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Creating Royal Australian Navy Standard Operating Procedures using Flow Diagrams

Sandra Tavener and Peter Asenstorfer

Joint and Operations Analysis Division
Defence Science and Technology Group

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ABSTRACT

The Royal Australian Navy (RAN) uses Standard Operating Procedures (SOP) to record standard practices on individual ships. SOPs are usually written as descriptive documents covering the rules to be followed when performing ship activities. It has been observed that this style of document does not provide crews the required guidance in a clear and easy to use form, or for the RAN Test Evaluation and Analysis Authority to use when assessing crew performance. DST Group was requested to improve the situation and develop a robust methodology tailored to the RAN for creating SOPs using flow diagrams. This report covers the issues with the current RAN style of SOP and details the developed methodology of using flow diagrams that was piloted on HMAS *Canberra*.

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Creating Royal Australian Navy Standard Operating Procedures using Flow Diagrams

Executive Summary

The Royal Australian Navy (RAN) has a documentation system for recording and disseminating operational practices on ships. Within this system are ship Standard Operating Procedures (SOP), which describe how to perform a set activity on a particular ship. However, as observed by the Royal Australian Navy Test and Evaluation Analysis Authority (RANTEAA) and the Defence Science and Technology Group (DST Group) the current form of RAN SOP does not provide the required information in a form that is easy to understand, implement or assess.

The aim of a ship SOP is to communicate to the reader in sufficient detail a description of the steps that should be performed for a particular activity on that particular ship. Current RAN SOPs are primarily written as descriptive documents covering the rules that should be followed when performing a set activity. There is minimal control over the interpretation, which is influenced by the different levels of ship crew experience and knowledge. Due to the regular crew posting cycle the interpretation and application of the rules can change increasing the risks to safety and reducing the ability of the ship's crew to perform as a cohesive unit. Descriptive rules are also difficult to use for teaching or for assessing crew performance.

Based on practices adopted by businesses the flow diagram methodology was recommended as an improved method for creating SOPs. This methodology involves using symbols and lines to graphically represent the order and flow of tasks to perform during a ship activity. This is then enhanced with a description of each task where details, such as who performs the task, the relevant Safety Risk Profiles and required resources are documented. Focussing on the use of clear and succinct language tailored to the anticipated audience results in a clear and easy to follow procedure, whilst maintaining sufficient background information to enable informed changes to the procedure.

Commander Surface Force RAN (COMSURFOR) requested DST Group develop a method for creating ship SOPs based on flow diagrams and to assist the first RAN Landing Helicopter Dock ship's (HMAS *Canberra*) crew use this new method. DST Group developed a robust methodology, described in this report, tailored to the RAN that produces clear and easy to use written SOPs. COMSURFOR, supported by RANTEAA, plans to adopt this new way of developing SOPs by directing its use across the fleet.

Authors

Sandra Tavener
Joint and Operations Analysis Division

Sandra Tavener began her career with the DST Group in late 1988, shortly before graduating from the University of Sydney with a Bachelor of Science majoring in physics and pure mathematics. For the first half of her career she worked in the field of underwater acoustics, measuring properties affecting the underwater transmission of sound and modelling underwater noise. During the second half of her career she worked on the Headmark Navy Future Concepts program designing and executing experimentation activities, did a one and a half year posting as DST Group's Sydney Executive Support Officer coordinating a site relocation, and as a member of the Maritime Security Group investigated the reception capabilities of a ship automatic identification system.

Since 2009 she has been researching and modelling processes to determine staffing and information requirements for amphibious command and control.

Peter Asenstorfer
Joint and Operations Analysis Division

Mr Peter Asenstorfer is a senior analyst in the Maritime Capability Analysis branch in Joint and Operations Analysis Division. He has extensive experience in the modelling and analysis of the command and control activities of military headquarters. His current research interest area is in the application of Systems Engineering approaches to the efficiency and effectiveness of command team operations.

Contents

Acronyms

4TQ	4TQ Toolkit
ABR	Australian Book of Reference
ADF	Australian Defence Force
BPMN	Business Process Model and Notation
CCO	Custodian Officer
COMSURFOR	Command Surface Force
DST Group	Defence Science and Technology Group
FDDR	Fill Device Disposition Record
HMAS	Her Majesty's Australian Ship
LHD	Landing Helicopter Dock
ME	Mechanical Engineering
METL	Mission Essential Task List
OMG	Object Management Group
OP	Operating Procedure
RAN	Royal Australian Navy
RANTEAA	Royal Australian Navy Test and Evaluation Analysis Authority
SOP	Standard Operating Procedure
SRP	Safety Risk Profile

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1. Introduction

The Royal Australian Navy (RAN) has a documentation system for recording and disseminating operational practices on ships. Within this system is Standard Operating Procedures (SOP). However, as observed by the Royal Australian Navy Test and Evaluation Analysis Authority (RANTEAA) and the Defence Science and Technology Group (DST Group) the current style of RAN SOP does not provide the required information in a form that is easy to understand, implement or assess.

The aim of a ship SOP is to communicate to the reader in sufficient detail a description of the steps that should be performed for a particular activity on that particular ship. SOPs cover different levels of ship activities, from whole ship activities down to an individual's activities. Current RAN SOPs are primarily written as descriptive documents covering the rules that should be followed when performing a set activity. This leaves the application of the rules open to interpretation. There is minimal control over the interpretation, which is coloured by the different levels of experience and knowledge of those using them. Due to the regular crew posting cycle the application of the rules can change increasing the risks to safety and reducing the ability of the ship's crew to perform as a cohesive unit. Descriptive rules are also difficult to use for teaching or to assess crew performance against.

For these reasons Commander Surface Force RAN (COMSURFOR) requested DST Group develop a method for creating ship SOPs based on flow diagrams and to assist the first RAN Landing Helicopter Dock ship (HMAS *Canberra*) crew use this new method. This was carried out during 2013.

This report describes the intent and purpose of RAN SOPs. It also describes why changes are required to existing format of RAN SOPs, and the method tailored to the RAN for developing RAN SOPs based on flow diagrams. COMSURFOR, supported by RANTEAA, plans to adopt this new way of developing SOPs by directing its use across the fleet.

2. The RAN SOP

The RAN uses an extensive range of documents, which must either be adhered to or are guidance, to inform RAN personnel, the wider Defence Department and the general community on its strategy, methods, systems and requirements. These documents are tailored to different audiences and, for the Navy, either to the service as a whole, to the Fleet or to individual ship classes. These documents form a contiguous description of operating policies.

RAN ship SOPs sit beside the Australian Books of Reference (ABRs) and the DEF(AUST) 5000 (ADF Maritime Material Requirements Set) to describe in detail how to perform an activity using the available ship systems/equipment. ABRs describe the 'what' of the

activity - the purpose of the activity and how the activity fits into the broader context of an operation. ABRs also provide the rules a class of ship or the entire fleet must adhere to when performing an activity. The rules address safety aspects as well as approval and reporting requirements.

DEF(AUST) 5000 [1] describes in detail how to technically use a system or piece of equipment safely. DEF(AUST) 5000 also includes test scenarios, performance measures and values[1]. The Command Information section of DEF(AUST)5000[2] covers the performance of the system/equipment, its limitations and warfare implications. The Operating Instruction section details the operating instructions and drill for the operators of the system, including the operational interfaces of the system equipment and associated systems. The focus is the safe use of the individual system.

Ship SOPs describe how to implement the rules in ABRs and when to use the systems/equipment detailed in DEF(AUST) 5000. Importantly ship SOPs must adhere to the guidance in ABRs and DEF(AUST) 5000, as well as the intent in higher level doctrinal documents.

2.1 Issues with the descriptive style of RAN SOP

RAN SOPs have traditionally been mainly descriptive documents covering the ship rules and only occasionally covering the implementation of those rules (see Appendix A for an example excerpt). This has allowed individuals performing an activity to use their experience and knowledge to be flexible when performing or coordinating an activity. The benefit of this approach has been the scope to adapt the steps based upon the circumstances. The disadvantage is each new person performing the activity must interpret the rules and determine the best way to perform the activity. The 'how' must then be communicated to others who may also be performing the activity or are impacted by it.

How well the activity is performed is heavily influenced by the person's knowledge and experience, and consequently the steps performed by one person may differ significantly to the steps performed by a different person. For a simple activity that is self-contained, as long as the rules are adhered to, the steps performed are not of concern. However, the activities on ships are not simple and rarely are they self-contained within a single department. Purely descriptive SOPs cannot adequately describe the impact performing different steps within an activity may have upon other ship departments. Consequently, there is an increased risk that interface activities to synchronise and coordinate activities between departments will introduce additional overheads. This in turn increases the risks to safety and reduces the ability of the ship's crew to perform as a cohesive unit.

[1] e.g. DEF(AUST) 5000 Vol 7 Part 15, Section 5 specifies times to aim for in evacuations for different weight vessels and Vol 7 Pt 15, Annex B attachment 1 contains test scenarios for evacuations.
[2] DEF(AUST) 5000 Vol 02 Part 18 Issue 01, Section 5.9 describes the content for technical system, sub-system and equipment manuals.

This is particularly the case for the new to the RAN Canberra class Amphibious Assault Ship, also known as a Landing Helicopter Dock (LHD) ship. This class of ship will provide capabilities never before available to the RAN and will allow for amphibious operations at scales which have not been practised by the RAN for generations. Consequently, the Australian Defence Force (ADF) personnel joining the Canberra class of ships will not have prior LHD or strong amphibious experience. Operations performed from an LHD ship will require it to be manned by Navy, Army and Air force personnel. Activities will often require interaction between ship departments and those departments may be manned by more than one service.

Ship SOPs should be used by the ship's crew when training other staff and as a reference for themselves during an activity. They are also useful to agencies that perform testing and evaluation as they detail the steps to be performed, which can then be assessed. During exercises in 2013 RANTEAA and DST Group observed that majority of ship personnel do not consult the ship SOPs before performing an activity. This was true even for activities performed infrequently where there was a greater risk of forgetting some aspect of the activity. Anecdotally, personnel relied on word of mouth and what they remember being taught during training. SOPs were regarded as documents that must be written to satisfy quality assurance requirements; they were not regularly used as reference documents.

DST Group noted that the style of the RAN SOP is a contributing factor to these documents not being used regularly as references. The current descriptive styled documents necessitate users to read the whole document to gain a full understanding of the activity. The time required to do this is a deterrent.

For these reasons modifications were recommended to the format of RAN SOPs to make them documents that clearly described the steps to be performed for each ship activity in an easy to understand and implement manner. This would ensure consistency in the way activities are performed and enable personnel, such as those newly posted to the LHDs, to adopt good practice and quickly become proficient.

2.2 Recommended style

The RAN creates its SOPs using computers and consequently also stores and accesses them via computer, but they also require paper copies in departments where access to computers is limited. Although SOPs could be produced in formats other than documents, such as videos, that take advantage of computer technology, written documents are the simplest to produce and update. Also, if only a refresh is required it is quicker to read than to watch a video. At this point in time the RAN's preference is for written SOPs.

A recognised and recommended method for clearly presenting the steps to be performed in an activity in an easy to digest written form is to use flow diagrams [2-4]. Carefully recording the steps of an activity in a flow diagram encourages the writer to include how information is obtained and passed on; how, when and from whom approvals are sought; decision steps and other steps that would be missed in a descriptive only SOP.

Importantly, a flow diagram on its own is not sufficient. To ensure flexibility is not lost each step should include a description, requirements and guidance. The combination of both a flow diagram and supporting information provides a way of succinctly communicating the steps of an activity without losing the flexibility to adapt. As personnel will generally avoid reading long, wordy documents, particularly when pressed for time, the flow diagram provides a succinct and easy to follow process. The associated supporting information provides the background detail to enable experienced personnel to understand the reasoning behind each step so that an informed change can be made to the process if circumstances require it.

3. Flow diagram support tools

Numerous software tools support drawing a flow diagram but, as described in Section 2.2, a comprehensive SOP should also include descriptions, requirements and guidance. The RAN is also required to adhere to the Defence Records Management policy [5], which states that all records need to be electronically stored, backed up and changes tracked. Software tools that do not cover all of these capabilities need to be paired with other software tools to create a complete set of capabilities.

For this study only the tools currently available to the RAN were reviewed. Early in the review it was found that the RAN had access to suitable software tool sets and there would be no additional value gained in researching other software tools. The software tool review considered only high level key capabilities.

Table 1 lists the software tools currently available to the RAN and the high level capabilities of each.

Table 1 Software tools, and their capabilities, available to the RAN for producing SOPs based on flow diagrams

Software name	**Flow diagram capability**	**Flow diagram drawing level**	**Information recording capability**	**Records management capability**
PowerPoint	Yes	Basic	No. Need to be paired with Word	No. Need to be paired with Objective
Word	Yes	Basic	Yes	No. Need to be paired with Objective
Visio	Yes	High	No. Need to be paired with Word	No. Need to be paired with Objective
4TQ Toolkit	Yes	High	Yes	Yes

In Table 1:

- 'Basic' flow diagram drawing level means shapes can be drawn with lines between them but additional formatting, relaying, numbering is either limited or requires significant user effort
- 'High' flow diagram drawing level means shapes are automatically linked and formatting, relaying and numbering is either automatic or easily performed by the user
- Objective is the software application mandated by Defence for electronic records management
- 4TQ, written by Axion, is a suite of applications that assists in the creation of SOPs and the management of the associated documentation. SOPs created in 4TQ are developed via flow diagrams, which 4TQ can then convert to a document. The approval, review and management of a SOP set can also be performed within 4TQ. The RAN owns a large number of 4TQ licences.

Although the RAN has access to suitable tools for creating comprehensive SOPs no particular tool is mandated, nor is there information on what constitutes a good quality SOP. This DST Group study was performed to develop and describe a methodology for creating good quality SOPs based on flow diagrams.

4. Creating a set of SOPs

Rarely will one SOP be sufficient to capture the steps performed for an area of work. Due to the complexity and number of activities performed upon a ship the ship set of SOPs will contain numerous SOPs, many of which will be interconnected. To ensure consistency across the set of SOPs and that sufficient resources are applied to their production, development and publication the SOP set should be treated as a project and managed accordingly. Key activities include scoping the set of SOPs, creating a team, developing a plan, writing, reviewing and approving procedures, and publishing the SOPs. Maintaining a SOP set also requires managing the set and keeping an audit trail of any changes made.

4.1 Scoping a set of SOPs

Before work begins the scope of the set SOPs should be defined. It is important to determine the activities that need to be addressed by ship SOPs and the activities that should be addressed in other documents. Ship SOPs should address activities performed by ship's personnel and cover steps that are specific to the ship. Procedures that are fully covered in ABRs or DEF(AUST) 5000 should not be re-written as a ship SOP. However, procedures which are defined in ABRs, etc., but have implementation details specific to the ship should be included in the list of SOPs.

If all ships within a class retain the same system and equipment fit outs then the SOP is suitable for the entire class of ship. However, it is common in the RAN for individual ships

to have system and equipment upgrades at different times. As a consequence the SOPs may need to be specific to a particular ship. If the individual ship SOP does not differ from the class SOP then an individual ship SOP is not required.

By using a number of different techniques it is possible to develop close to a complete list of SOPs. Different techniques will examine the question from different perspectives and will improve insight into the question. Ideally different techniques should be used until no new information is obtained. The list created will then be a comprehensive set of SOPs that need to be developed. However, the list of sub-SOPs will develop further as the individual SOPs are drafted. Some of the useful techniques to develop a list of SOPs are brainstorming, operational scenario walk-throughs, historical references and functional analysis.

4.1.1 Brainstorming

Brainstorming is a technique to elicit a large number of ideas from either an individual or a team. It usually takes the form of a question being posed and each participant noting all of their answers. Ideas are not judged but are collected in and collated into themes. The aim is to collect a diverse set of answers.

The advantages of this method are all team members have an equal say and diverse ideas can be expressed. The composition of the group needs to be considered to reduce the risk that like-minded people will generate similar ideas.

The end result will be the start of a list of SOPs that need to be written to cover the ship's activities.

4.1.2 Operational scenario walk throughs

Operational scenario walk throughs involve selecting a goal you wish to achieve (a mission) and mentally or physically walking through a suitable scenario with the end point as the desired goal. The walk through can be done by a small team or by an individual followed by a review by another person. The Navy's Mission Essential Task List (METL) [6] is one set of suitable goals to consider. An example of a suitable goal would be successfully rescuing a person who has fallen over the side of the ship whilst at sea (Man overboard).

To perform an operational scenario walk through use the goal as the end point of a scenario and walk through the scenario recording the activities that would need to be performed to achieve the goal. The activities should be broken down until they are performed by a single ship department. The list of activities contributes to the list of SOPs to be written.

It is important for each department to also consider goals and scenarios that are fully contained within their department.

The operational scenario walk-through technique is useful for discovering gaps in the list of SOPs. It also highlights sub-activities that are commonly performed. A disadvantage is it is not feasible to consider every possible scenario and infrequent activities may be missed.

4.1.3 Historical references

SOPs from other ship classes, coalition partners and superseded like-platforms can inform what topics need to be addressed in SOPs. These existing sets of SOPs provide example SOP sets and can be used to determine what level of detail should be contained in the written SOPs. They also provide a good reference for how an activity could be performed.

It is important to be aware of the differences between Australia's compliance requirements and those of other countries when using their SOP set as a base. Different compliance requirements may impact upon the set of SOPs required. The RAN is also likely to use a different crewing configuration that may affect the way activities are performed. Consequently SOPs from other sources cannot be taken verbatim.

4.1.4 Functional analysis

Functional analysis involves breaking down a high level activity into lower level activities in a hierarchical manner. Platforms, for which capabilities were derived during acquisition using the Department of Defence Architectural Framework [7], or similar, may already have functional analysis diagrams, in the form of the Operational View 5 diagrams. These diagrams can be used to determine which SOPs should be developed. If not the Navy METL [6] could be used.

A high level activity is *what* the department / ship is responsible for. For example, from the Navy METL (Amphibious), Figure 1, for the medical department the high level activity is 'Provide Health Services'. Two of the lower level activities required to achieve this high level activity are 'Perform Triage and Casualty Care' and 'Operate Primary / Secondary Casualty Reception Facility'. The lower level activities become the titles of SOPs to be written.

By focussing on the function of the department/ship, activities that are infrequent and may have been missed in the operational scenario walk through will be discovered.

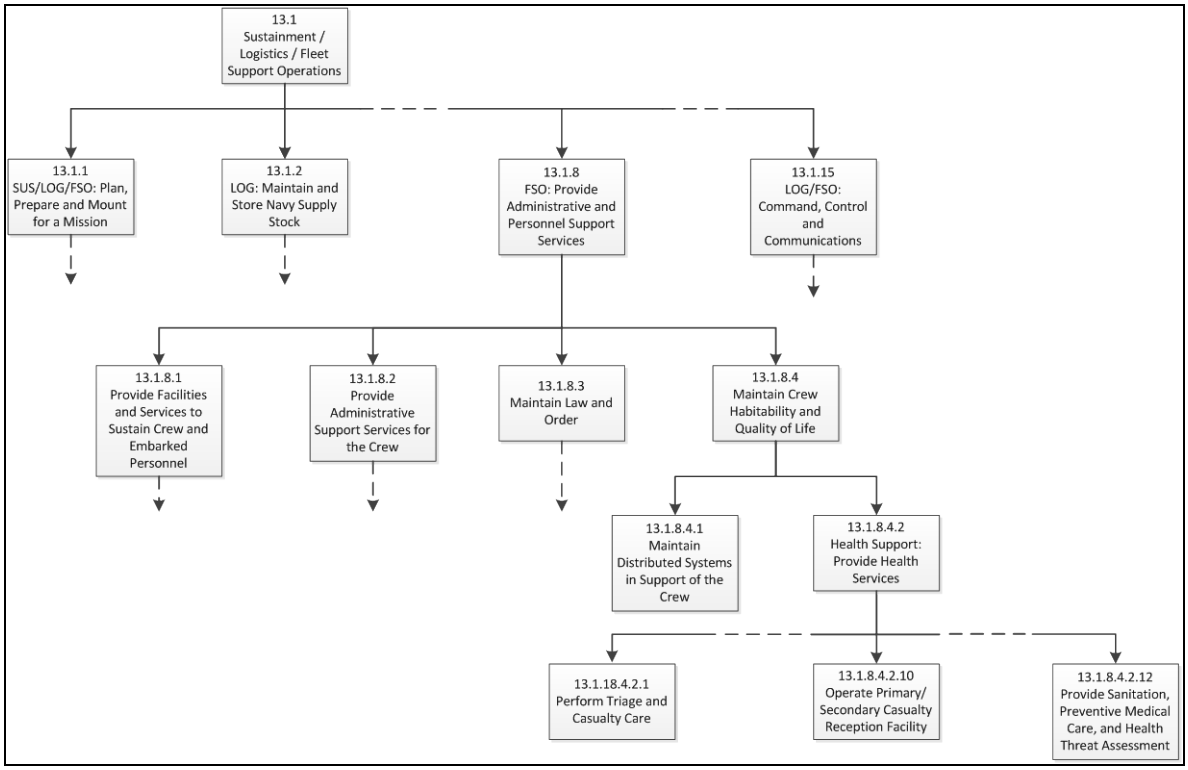

Figure 1 Functional Hierarchy excerpt from Navy METL. The dashed line indicates more detail exists in the Navy METL.

4.2 SOP management aspects

To ensure the SOPs are written as a cohesive set it is important to determine writing and approval responsibilities, storage methods and publishing details before SOPs are written. This information should be recorded and stored with the set of SOPs to ensure consistency across multiple sub-sets of SOPs that may be brought together to form a higher level set.

The key aspects to consider (listed below) are addressed in the following sub-sections.

1. Manager / administrators
2. Author / Reviewer
3. Approver
4. SOP review interval
5. SOP classification
6. SOP template
7. SOP distribution format
8. Storage location of electronic SOP files
9. Naming and numbering convention

4.2.1 Manager / administrators

A person or team of personnel need to be assigned as the managers and administrators of the SOP set. Their role will be to collate and store SOPs from different departments and check the naming and number conventions have been adhered to. They will also coordinate the review process and check that the definitive set contains the latest versions of the SOPs. This role may also be responsible for forwarding on SOPs for final approval and sending out review reminders.

4.2.2 Author / reviewer

SOPs should be developed by personnel who have the experience and knowledge for performing the activity. This will most commonly be the personnel performing the activity and who will be the end users of the SOP [8]. These personnel have the knowledge and desire to develop SOPs that cover the necessary detail in a usable form.

4.2.3 Approver

The developed SOP should be reviewed by experienced personnel who were not involved in the development of the SOP. However, the role assigned to approve the SOPs should have the knowledge, experience and authority to approve work processes.

4.2.4 SOP review interval

The time interval between SOP reviews is influenced by two main factors, the stability of the SOP and the risks associated with performing the activity. The SOP review interval should be set to the longest period for which the risks and the steps to be performed for the activity are unlikely to change.

If the risks associated to the steps performed for an activity are high more regular reviews are warranted. Also, if the cause of the risk may change over time the level of risk should be reviewed, e.g. levels of contaminant in an area fluctuate changing the risk to personnel working in the area.

Reviews should also be performed when a significant change or incident occurs that may impact upon how activities are to be performed; for examples, a change in command personnel results in different reporting or approval requirements, or there is a change to a higher level ABR that needs to be adhered to, or an injury or death occurs placing the activity process into question. In these cases affected SOPs should be reviewed.

It is important to ensure SOPs maintain their effectiveness in detailing appropriate safe work practices based on current best knowledge. Consequently, an interval of no more than 12 months is recommended as it ensures SOPs do not become so outdated that a full rewrite is required rather than just an update.

4.2.5 SOP classification

The classification of the SOPs should be in line with Defence Security Manual [9] requirements.

4.2.6 SOP template

To ensure consistency across the set of the SOPs and that an appropriate level of detail is included in each SOP a template should be used. The template can be imbedded with the tool used to capture the SOP or be a set of written instructions.

4.2.7 SOP distribution format

SOPs are living documents that should be referred to and amended to reflect changes in practice. Personnel who perform activities regularly will remember the steps involved and will generally not need to refer to a SOP unless they are training others. However, if an activity is performed infrequently the steps to be performed are likely to be forgotten and the SOP will need to be referred to. Consequently, the SOP documents need to be readily available to their users.

The SOPs will be created electronically but this may not be the best final format for users. Different departments may have different requirements and this should be taken into account when distributing and determining where SOPs are to be stored for use. If SOPs are printed it is important to ensure old versions are replaced by current versions as soon as versions change.

4.2.8 Storage location of electronic SOP files

The finalised SOP set should be stored electronically in an area that is accessible to all SOP users but be controlled to ensure only the latest approved versions are available. Normally only the administrators of the SOP set would have write access to the SOP set location.

4.2.9 Naming and numbering convention

The final set of SOPs is likely to be formed from a number of sub-sets from numerous departments. By using a consistent numbering and naming system the sub-sets can easily be aggregated to form a larger set.

A simple method to avoid re-use of numbers is to allocate a number to each department. Each department then uses this number followed by a '-' followed by the department's SOP number. In the example in Table 2 and Table 3 the Mechanical Engineering (ME) Department has been allocated the number 4. The Man Overboard SOP has been assigned the 'SOP number' of 5.

A version number should also be included in the SOP file name, so that it is clear which SOP is the latest version. A date can be used in the file name to perform the role of a version number.

4.3 RAN SOP management

Table 2 contains a suggested implementation of the aspects described in section 4.2 for the RAN ship *Canberra*. It is the first ship in the RAN to use the flow diagram methodology for documenting its SOPs, although the aim is to extend the use across the fleet.

The tool recommended to *Canberra* for developing their SOPs was 4TQ because it provides all of the key high level capabilities required to produce a comprehensive SOP based on a flow diagram.

Table 2 Suggested RAN ship SOP management allocations

Aspect	**Allocation**
Ship SOP manager	Executive Officer
Ship SOP approver	Commanding Officer
Ship SOP review interval	Yearly
Department SOP manager	Department Head
Department SOP approver	Executive Officer
Department SOP review interval	Yearly
Classification of SOPs	FOR OFFICIAL USE ONLY (FOUO)
SOP development tool	4TQ Toolkit (RAN)
Performer's list	As per Ship's Watch and Station bill
4TQ file name convention	CANB SOP *SOP-number department name-of-SOP ddmmmyyyy*
Objective name convention	HMAS Canberra SOP *SOP-number department name-of-SOP dd mmm yyyyy*

The file name convention used in Table 2 follows the 2013 Information Management HMAS Canberra Work Instruction. Table 3 expands the details used in the construction of the file name.

Table 3 Explanation of fields in SOP file name

Field	**Explanation**	**Example value**
SOP number	SOP number	*4-5*
department	department acronym	ME
name of SOP	name of SOP	Man Overboard
dd	two digit day	28
mmm	three letter month	Mar
yyyy	four digit year	2013

Example Objective file name:

HMAS Canberra SOP 4-5 ME Man Overboard 28 Mar 2013

The filename convention for 4TQ is different to Objective because 4TQ imposes the following file name restrictions:

1. File path names and file names must be less than 255 characters
2. If distributing by compact disk the maximum depth of folders is seven (7)
3. The number of items (maps, documents and forms) within a Category should be less than forty (40)

Therefore, the equivalent 4TQ file name becomes:

CANB SOP 4-5 ME Man Overboard 28Mar2013

5. Developing SOPs

The aim of a ship SOP is to communicate to the reader in sufficient detail a description of the steps that should be performed for a particular activity on that particular ship. The RAN ABRs provide the rules and safety requirements across all ships or for a particular class of ship. The information in the ABRs and DEF(AUST) 5000 should be used to develop the procedure to follow on the ship. Higher level doctrine should also be referred to.

At the beginning of a SOP document there should be a clear description of the activity aim, scope and where/when the procedure is applicable/not applicable. For clarity and ease of use a SOP should then include a flow diagram clearly showing the steps to be performed for the activity. Following the flow diagram there should be a description of each step in the procedure that includes any conditions, such as safety, security or resource requirements. As a whole the SOP document should be usable to both personnel requiring a quick refresh and to personnel requiring explanations of each step so that changes to the process can be informed. Appendix C contains an example SOP developed using the method described in this section.

5.1 SOP scope and bounds

The first steps in writing an SOP are to bound the SOP, to clearly define what activity is being described, under what conditions and for whom the SOP is intended. Considering the scope of the SOP before writing it enables the author to have a clear idea of what to cover in the SOP. It also reduces the chances of overlap with other SOPs and highlights when additional SOPs are required. Considering the audience encourages the use of appropriate language.

The bounds and scope of the SOP should be recorded at the beginning of the SOP document.[3]. The aspects to include are:

1. SOP objective
2. Start State
3. End State
4. Assumed Ship Readiness State
5. Assumed Environmental Conditions
6. Target Audience
7. Assumed Background Knowledge
8. Authoritative / Informative Sources
9. References

In the following sub-sections the example of transferring goods, excluding explosive ordinance, onto a ship whilst it is in port has been used. The examples are in *italics*.

5.1.1 SOP objective

The SOP objective is the end point the activity is trying to achieve and provides the reader a means of identifying if the SOP is relevant to their desired purpose.

> *When the ship is in port safely transfer goods, excluding explosive ordinance, from the delivery vehicle on the wharf to the designated ship store area. Explosive ordinance transfers are covered in a separate SOP.*

5.1.2 Start State

The Start State entry clearly articulates all the preparations, if any, that have occurred and are not included in this SOP. If possible any preparatory SOPs should be identified.

> *This SOP assumes that the recognition of the need for stores, the ordering and the arrangement of delivery have already occurred and are captured in separate SOPs. This SOP begins when the delivery vehicle arrives alongside the ship.*

5.1.3 End State

The End State entry clearly states the end goal of the activity, which is where the SOP ends.

> *Delivered stores stowed and receipted.*

[3] In 4TQ each aspect should be entered as a heading under Title page/Process Summary and an entry made under each heading.

5.1.4 Assumed Ship Readiness State

The Ship Readiness State describes in which ship readiness states this SOP can be performed. If more than one ship readiness state applies to the SOP all relevant states should be listed. If all ship readiness states are relevant enter 'All ship readiness states'. This is preferable to a blank entry as it shows that this aspect has been considered.

Ship alongside the wharf.

5.1.5 Assumed Environmental Conditions

The Environmental condition is the environment (weather) the SOP can be safely performed in, e.g.: 'Sea States less than 4' or 'Wind Speeds below 30 knots'. If the SOP applies to all environmental conditions enter 'All environmental conditions.'

All environmental conditions.

5.1.6 Target Audience

The personnel/group this SOP has been written for is entered here. It may be particular individual roles, teams or more than one team. The language used in the SOP should be tailored to the personnel who are expected to read and use the SOP.

SOP USERS
LOG department
AMPHIB department

FOR INFO ONLY
Embarked Forces Logistics Element

5.1.7 Assumed Background Knowledge

The expected knowledge base of the personnel using the SOP should be recorded and will determine the appropriate level of technical jargon that can be used in the SOP. If personnel are expected to have completed particular training before performing the activity described in the SOP the technical terms used in the training can be used in the SOP without explanation. If the SOP is to be used by non-trained personnel any technical terms should be explained.

Qualified Terminal Operators
Qualified Logistics Operators

5.1.8 Authoritative / Informative Sources

This entry provides the opportunity to note any knowledge from external personnel or experience external to the ADF that were drawn upon to develop this SOP, such as suggestions from personnel posted from overseas or experience from overseas training

courses or exercises. This is useful background information to the crew who follow on and update the SOP. It enables them to understand how the process was initially developed and the background behind some of the decisions.

This is particularly important for vessels such as *Canberra*, which are the first in their class to come into service. Procedures for these vessels cannot mirror the procedures used on other classes of vessels due to the ship's differences. Procedures will need to be developed based on experience and advice from many sources.

A NIL entry is acceptable.

NIL

5.1.9 References

The documents, or section of documents, to which this whole SOP refers to and should comply with should be recorded. References related to only an individual step should be recorded within that step's description rather than with the SOP summary information.

Navantia LHD Amphibious Deployment and Sustainment Capability
OPS-1-3- Cargo Embarkment and Disembarkment Report, Document No 835-6-35--38-OR
AFGOs Chapt
ABR 5562 - Pending change
ABR 862 Vo2

5.2 Creating a flow diagram

A flow diagram uses symbols and lines to graphically represent the order and flow of tasks within a procedure. The flow from one task to another is clearly represented and decisions and alternate paths are also easy to discern. The end result is a diagram that clearly shows the process to follow. The user is not required to read a lengthy document or interpret the required steps to perform the activity.

Object Management Group's (OMG) Business Process Model and Notation (BPMN) [10] is becoming the standard to use when modelling a business process using a computer. These models take the form of a flow diagram but include greater detail to enable computer simulation of the model. The notation includes a large number of variations on each symbol, each with a specific meaning in simulation. On an SOP flow diagram this level of detail is not required because it is not designed to be computer simulated; the basic shapes of the notation symbols are sufficient. Appendix B show the basic notational shapes used in 4TQ.

To create a flow diagram, mentally or preferably physically walk through the activity and record, using the specified symbol set, the flow of steps to be performed. The flow should start with a trigger and each step should be a unique action. It should end with the desired end goal.

To maintain comprehensibility of the final product a balance should be sought between documenting detail and the size and complexity of the SOP. The flow should contain the key steps a person with the specified knowledge background would need to be told to be able to perform the activity for the first time.

The following sub-sections provide further guidance when using flow diagrams to create a SOP.

5.2.1 Effective language

A clear and succinct SOP uses effective language in both the flow diagram and the background description of the steps. Effective language is tailored to the audience, taking their experience and training into account, and does not assume acronyms and abbreviations are understood.

Effective language tips for SOPs are:

- Each step should be an action.
- Be succinct (short clear sentences).
- Use short words and minimise the word count.
- Be clear.
- Be imperative (like a command).
- Write steps in present tense.
- Avoid ambiguity.
- Do not include slang.
- Be consistent with terms.
- Use acronyms in the step title but expand acronyms in the step description.
- Include a glossary / acronyms list.
- Do not include unnecessary components (e.g.: cartoons, anecdotes, quotations).

Table 4 contains examples of ineffective and effective language for SOP flow diagrams.

Table 4 Examples of ineffective and effective flow diagram language

Ineffective language in flow diagrams	**Issue**	**Effective language in flow diagrams**
The engine is to be turned off.	Not imperative.	Turn off the engine.
The canisters and associated FDDRs are to be returned to the CCO for checking.	Not concise.	Return canisters and FDDRs to CCO.

Ineffective language in flow diagrams	Issue	Effective language in flow diagrams
Evacuate the compartment shutting all doors and hatches then make your way to the Damage Control Deck clearing any adjacent compartment of personnel.	More than one action.	1. Evacuate compartment, shutting all doors and hatches. 2. Check and clear adjacent compartments of personnel. 3. Move to the Damage Control deck.
In this particular case listen to the pipe as you may be instructed to muster at a location other than your usual station.	Not concise. More than one action.	1. Listen to pipe. 2. Muster at instructed location.
Don personal protective equipment as per compliance document xxxx.	Requires the user to look up another document.	Put on full hearing protection and safety glasses.

5.2.2 Considerations

At each step of the flow a range of aspects should be considered to ensure all important information is recorded. Majority of this information is not required on the flow diagram but should be recorded, where appropriate, in the description sections of the SOP document.

The key aspects to consider, listed below, are covered in the following sub-sections:

- Safety
- References
- Security
- Information input and output
- Physical location
- Physical constraints
- Approval requirements
- Performer
- Resources required

5.2.2.1 Safety

The RAN records identified risks and associated mitigations in Safety Risk Profiles (SRP). The process described in a SOP must comply with the relevant SRPs and any associated safety steps should be included in the process. Any SRPs referred to should be recorded as a reference.

5.2.2.2 References

Any document containing information that must be adhered to should be recorded with the SOP. References relevant to the entire SOP should be recorded on a summary page at the beginning of the SOP. References relevant to only a particular step should be recorded with the description of the step.

5.2.2.3 *Security*

The security requirements of a step should be considered. The requirements may be physical or data related. Additional steps may need to be performed to ensure compliance with security requirements. If a security document is referenced it should be recorded as a reference for the step.

5.2.2.4 *Information input and output*

A process often involves the use and passage of information. The requirement to obtain, store or pass on information should be included in the process, either as a specific step or in the description of a step. The system used or the roles from whom information is obtained/passed should also be recorded.

5.2.2.5 *Physical location*

If a step must be performed in a particular location this should be recorded with the step. The location identifier must be an approved identifier and recognised by all ship's personnel.

5.2.2.6 *Physical constraints*

If a step is performed in a particular physical location physical constraints should be considered. Additional steps may be required to ensure the step can be performed safely in the specified location.

5.2.2.7 *Approval Requirements*

The requirement for approval should be included in the process. Depending upon the frequency of the need for approval it may be included as a specific step or within the description of a step. A balance needs to be achieved between having sufficient detail in the flow diagram and having too much detail leading to the flow diagram being unreadable.

5.2.2.8 *Performer*

The role responsible for performing the step should be recorded with the step and the name of the role should be understood by all ship's personnel. The ship's watch and station bill contains a list of ship's roles and the performer should be selected from this list if possible.

If the performer is a team the composition of the team should be described in the SOP, either as a definition or in the description of a step.

5.2.2.9 *Resources required*

The resources, such as equipment, communication systems, software tools etc. required to perform the step should be recorded in the description of the step. This is important information for the person who will perform the step and can also be used to justify the need for particular resources.

5.2.3 What to include / not include

Just as important as what to include is what *not* to include. Although not a complete set recommendations are:

Assumptions, such as *the person reading the SOP will already know they have to report to their supervisor,* must be avoided. It is better to include the report to the supervisor as a step than risk the action being missed by someone new to the position who has not been given a full hand-over.

The flow should show the expected normal set of actions. There will be exceptions to this norm but unless the exception occurs frequently it should be covered in the description or in a separate SOP rather than as a separate branch in the flow. The aim is to create an easy to follow diagram of the normal set of actions. If many exceptions are included the diagram will become difficult to use.

The name of a performer should be the role name rather than the specific individual who is currently posted into the position.

Requiring the user to read a reference when performing the activity should be avoided. Instead the relevant details from the reference should be included in the SOP.

Each step should be performed by one performer (can be a team). If the step triggers simultaneous actions by another performer these actions should be recorded in a separate branch, rather than left out.

5.2.4 Cyclic activities

Flow diagrams traditionally show sequential flows; however cyclic flows can also be represented. In a cyclic flow the start or a step is triggered by the completion of the flow or another step. The cycle may be the entire flow or a portion of the flow. An example is a repair cycle.

Before a repair is done a test is performed to determine what repair is required. Once the repair is complete the test will be redone to check the equipment is fully functional. If not fully functional then another repair / test process will be performed. If the equipment is working the repair cycle ends. Figure 2 shows this graphically.

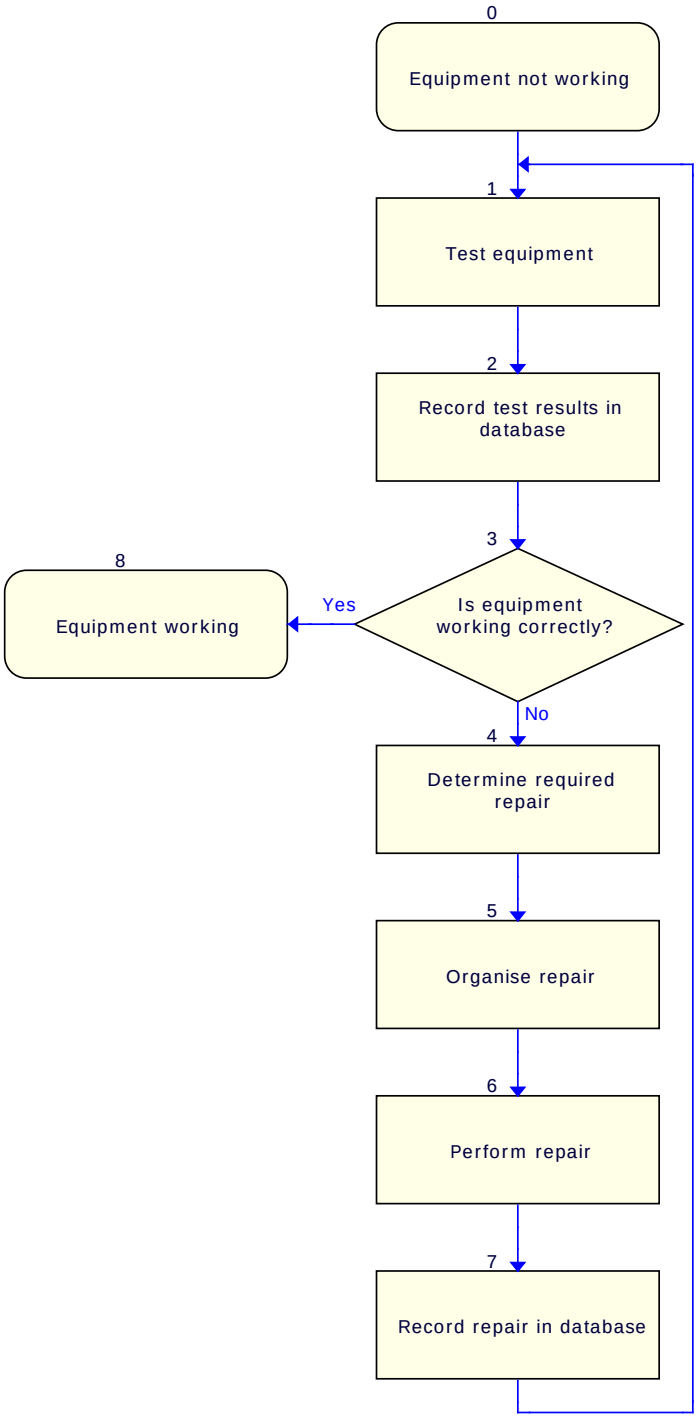

Figure 2 Flow diagram of the cyclic repair flow

As cyclic activities are repetitive it can be difficult to determine the trigger. The trigger is usually a state that needs to be resolved, e.g. equipment is not working, stores are required or a patient is in sick bay. All cyclic flows should have an end condition that stops the cycle. This is usually the opposite of the trigger state.

5.2.5 Activities triggered by a timetable

Many ship activities will be triggered by the time/day or a after a period of time has elapsed. The trigger for these activities is the specified time/day or a period of time, e.g. 1500 Mondays, 3rd Tuesday of the month, or 30 days after last meeting.

If using a specific date be aware the day of the week will be different each time the activity is performed.

5.2.6 Pictures / video

Flow diagrams can be enhanced with the use of pictures. Pictures are useful for showing the state of a piece of equipment or what it looks like. If possible the picture can be placed on the flow diagram. If the tool being used to create the flow diagram does not allow this then the picture will need to be added to the description section of the created document.[4]

If it is difficult to describe a process or part of a process using words or a flow diagram a video could be used. A hyperlink to a video of the process to follow could be added to the flow diagram or the description section of the SOP document, if the tool to create the flow diagram supports this. Keep in mind that videos will only be available electronically and consequently are not suited to cases where the SOP is required in departments with limited computer access. Also, that generally it takes longer to watch a video than to read or follow a flow diagram. Consequently video should be limited to processes that are difficult to describe in words or flow diagrams.

6. Future work

This study's scope was limited to the RAN's current capability, which limits crews' access to technology to obtain references when performing their activities. In the future crews may have much greater access to technology, whether in the form of desk top computers or mobile electronics, such as phones or tablets. When this occurs it would be worth revisiting how best to capture and communicate operating procedures. Access to technology will open up the options available for communicating operating procedures. Research on different communication techniques, such as interactive flow diagrams and videos should be considered in the future.

[4] Pictures other than small icons cannot be added to flow diagrams created in 4TQ. They must be added to the final document created by 4TQ, noting that any change made to the flow in 4TQ will result in a new document to which the picture will have to be added again.

7. Summary

The RAN has in the past written its ship SOPs as descriptive rules. With the introduction of the new LHD it has been recognised this SOP format will not be sufficient to enable new crews to quickly become proficient in their new roles or for RANTEAA to assess their capability. To resolve these issues DST Group was requested to develop a methodology for creating SOPs using flow diagrams and to pilot it with the crew of the first LHD, HMAS *Canberra*.

This report discussed the issues and provided the details of the method tailored to the RAN for developing SOPs using flow diagrams. It covered the need for a flow diagram, effective language and comprehensive supporting descriptions of each step. COMSURFOR, supported by RANTEAA, plans to adopt this new way of developing SOPs by directing its use across the fleet.

8. Acknowledgements

This work would not have been possible without the willingness and support from COMSURFOR, RANTEAA and the crew of *Canberra* to change the RAN's SOP document style to better meet their requirements.

9. References

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Appendix A: Example of current RAN SOP

This is an excerpt from a RAN ship SOP written in 2011 covering what to do if a crew member is discovered missing. It is a mixture of steps to perform and items to consider. The role responsible for each step is not always stated and the order in which the steps should be performed is not necessarily the order as written.

PROCEDURES WHEN A CREW MEMBER IS DISCOVERED MISSING

1. In all cases where a man overboard has not been witnessed but is suspected, the following action is to be taken:

2. An immediate check of the person's cabin and mess room is to be made along with a general pipe for that person to contact the bridge.

3. The OOW should IMMEDIATELY notify the CO.

4. The ship, if underway, is to be turned to commence its track. The ship should alert other ships in the vicinity if this involves manoeuvring in close proximity or in the vicinity of a traffic separation scheme. If ICW other units, the OTC is to be informed and may take charge of the SAR incident.

5. The ship is to be brought to Modified Leaving Ship Stations in order that a comprehensive muster can be made. If other service personnel are embarked then they must also be comprehensively mustered.

6. If someone is reported missing at the muster a whole ship search (OP THIMBLE) should be undertaken in addition to a sea search to establish that the missing person is not on board incapacitated.

7. The Commanding Officer, the missing persons Head of Department, the Chief Officer and Navigator should meet to determine when the man was last seen.

8. The Navigator will establish the ship's position at the time he /she was last seen, which then becomes the starting point for a search pattern.

9. The Ship steams back down its track, engines ready for immediate manoeuvring. If the man is sighted, procedures set forth in para 12 are put into motion. A SAR helicopter (if available) should be launched at the earliest opportunity consistent with flight safety.

10. If the missing person is not sighted by the time it reaches the last known position the person was seen, a search pattern is established based on predicted set and drift

of the person in the water. Close attention must be paid to possible current and tidal flows because these will affect the persons drift far more than wind.

11. If in coastal waters, assistance from shore or air assets should be requested. If in open Ocean, the assistance of any other ships in the vicinity should be requested. If in company with other ships with embarked helicopters, use of their helicopters should be requested.

12. Anyone seeing a man fall overboard is to Shout
"MAN OVERBOARD PORT/STARBOARD"

13. Throw the nearest lifebuoy, if possible, the flare attached type. Avoiding hitting the man in the water.

14. **Inform the bridge by the quickest possible** method ensuring that no-one loses sight of the man overboard. If a telephone is used, standby the telephone in case of any further information is required. **Emergency Telephone Number 999**

15. **Keep the man in sight for as long as possible.**

16. **The OOW is to:**

SOUND GENERAL ALARM

a. **BROADCAST:**

"MAN OVER BOARD X 3
MAN OVERBOARD PORT/STBDSIDE
STAND BY TO RECOVER PORT/STBD SEABOAT"

b. Release Life Buoys.
c. Mark the plot, ECDIS, GPS, Radar, Ops Room.
d. Manoeuvre ship.
e. DGs at min 3 sets to run
f. Hoist Flag O.
g. Sound 3 Long blasts.
h. AWAY SEABOAT A.S.A.P.
i. Medics to sick bay.
j. Person reporting MOB to contact bridge (if possible).
k. Prepare PAN PAN or MAYDAY message.
l. Post Extra Lookouts.

Extra Lookouts

17. 2 Extra Lookouts will be nominated by WOD if required.

18. The lookouts are to report immediately to the bridge and commence looking for the MOB.

19. They are to be shown where to look by the OOW or a suitable person.

20. On seeing the MOB they are to shout for attention and point at the MOB whilst **NEVER** breaking view of the MOB.

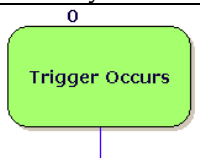
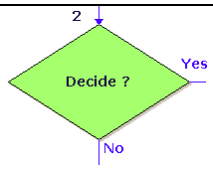
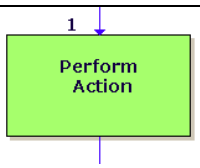
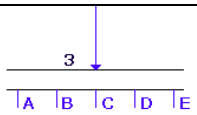
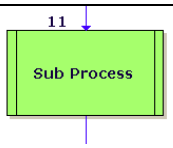
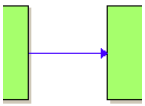
21. They are to continue pointing until the FRC has recovered the MOB.

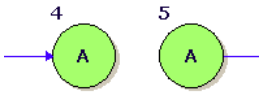
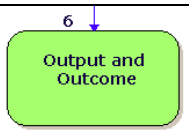
22. The Extra Lookouts are only to be stood down by the OOW.

Appendix B: 4TQ flow diagram symbols

The symbols used by 4TQ are shown in Table 5. They follow the notational concepts within OMG's BPMN. The number above each symbol is unique to 4TQ and is used to connect the flow diagram steps to their descriptions, which are recorded later in an SOP document. The splitter symbol is also unique.

Table 5 Symbols used in 4TQ to represent the different steps involved

Name	Step description	Symbol
Start	The trigger of the process. This may be an event or a set time/date.	
Test	A decision that can only result in "Yes" or "No"	
Task	A step that must be performed.	
Splitter	Used when there is more than one flow of steps (branch) and they are to be performed concurrently.	
Sub-process (task)	A step that is a process in itself but for clarity the additional steps are hidden. A sub-process is used when the SOP refers to another SOP.	
Flow lines	All figures are connected by lines. The lines show which is the next step in the process.	

Name	Step description	Symbol
Connector	Extends the flow line without the entire line being drawn across the workspace.	
Finish	The end point of the process stating the achieved end goal. More than one Finish may exist in a process if there is more than one branch to follow.	

Appendix C: Example SOP: Man Overboard – Witness SOP

This SOP, detailing the steps a witness to a person falling overboard should follow, was created using a stand-alone copy of 4TQ Toolkit version 6.19.

The procedure looks different to that described in the example in Appendix A because this SOP is from the perspective of the witness to a man overboard.

THIS PROCEDURE IS ISSUED AS AN UNCONTROLLED DOCUMENT
NO FURTHER AMENDMENTS WILL BE ISSUED

Man Overboard - Witness SOP

Document Reference Number	
Controlled Process	No
Version	
Status	Draft
Created	1/03/2013
Modified	22/08/2013
Approved	Not Approved
Process Owner	EXEC
Prepared By	Sandra Tavener
Company	DST Group
Branch	

Table Of Contents

1. Review Schedule

Next Review Scheduled For 2/08/2014

2. Process Summary

SOP OBJECTIVE
To successfully recover a person if they have fallen over the side of the ship. The medical treatment of the person is covered by a different SOP.

START STATE
No prior activities are assumed.

END STATE
Man overboard recovered onto the ship ready to be handed over to medical personnel.
Ship returned to previous duties.

ASSUMED SHIP STATE / ENVIRONMENTAL CONDITIONS
Any ship readiness state or environmental condition.
Assumed ship at sea.

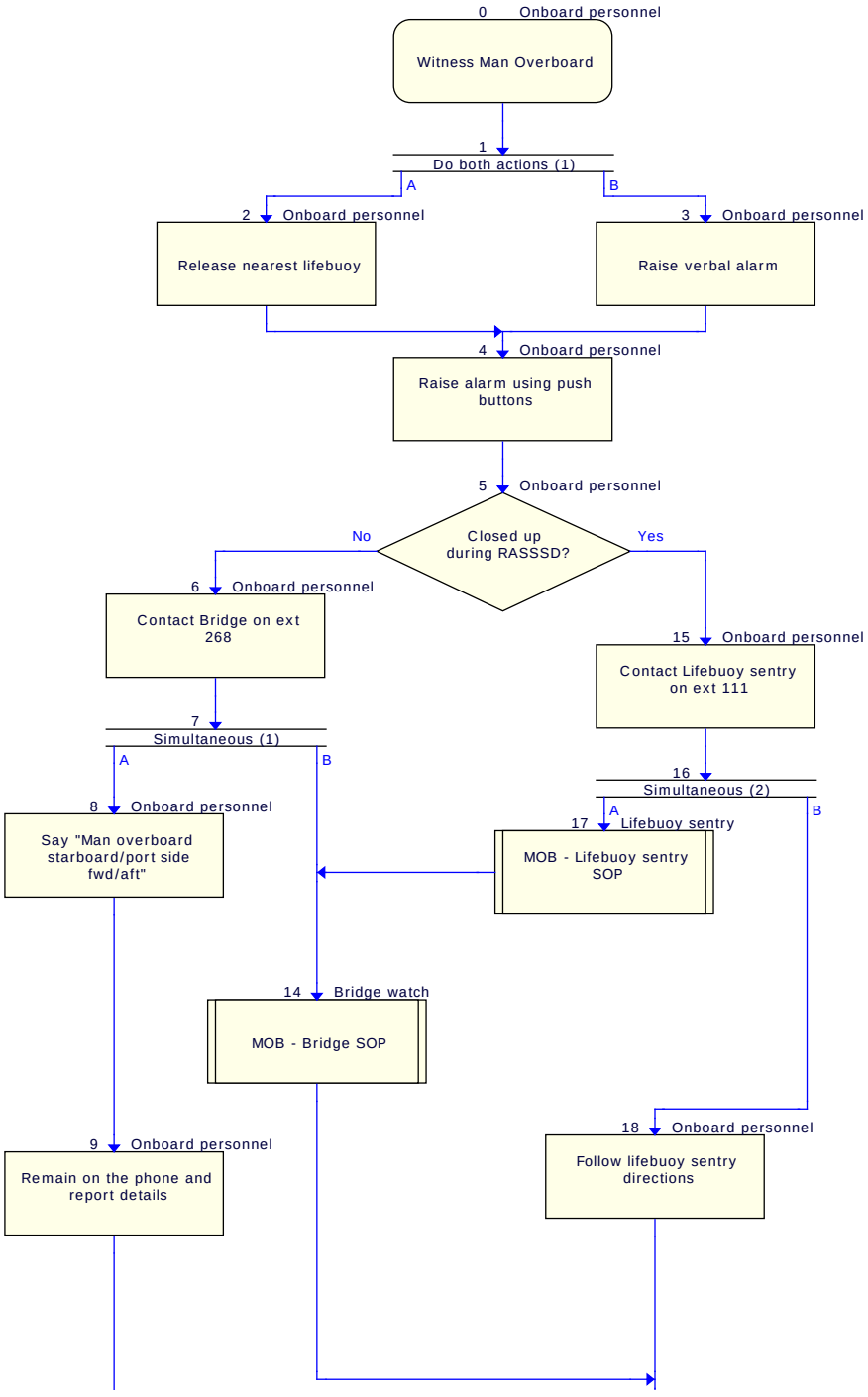
TARGET AUDIENCE
Any person on board the ship.

ASSUMED BACKGROUND KNOWLEDGE
Either basic sailor training or have received the ship's induction.

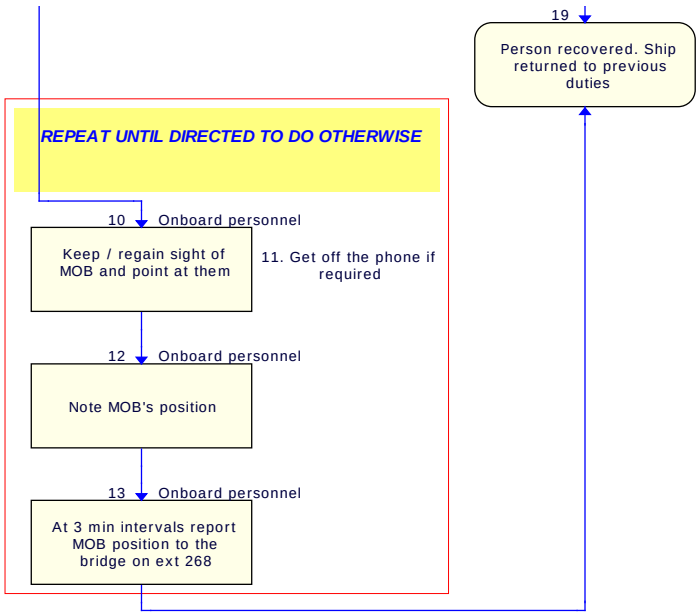
AUTHORITATVE / INFORMATIVE SOURCES
HMAS Choules ship crew.

REFERENCES
ABR 123

3. Process Chart



Part 2


19
Person recovered. Ship returned to previous duties
REPEAT UNTIL DIRECTED TO DO OTHERWISE
10 Onboard personnel
Keep / regain sight of MOB and point at them
11. Get off the phone if required
12 Onboard personnel
Note MOB's position
13 Onboard personnel
At 3 min intervals report MOB position to the bridge on ext 268

4. Process Detail

4.0 Witness Man Overboard

4.0.1 Trigger Event

Witness a person fall overboard.

Performer *Onboard personnel*

4.1 Do both actions (1)

Performer *No Performer*

The next figure for "A" is	4.2	Release nearest lifebuoy
The next figure for "B" is	4.3	Raise verbal alarm

4.2 Release nearest lifebuoy

4.2.1 Description

Locate the nearest life buoy and release it close to but not onto the person in the water.

4.2.2 Refs / Quals / Resources

Lifebuoy stations.

Performer *Onboard personnel*

The next figure is	4.4	Raise alarm using push buttons

4.3 Raise verbal alarm

4.3.1 Description

Shout loudly "Man overboard".

4.3.2 Refs / Quals / Resources

Shout loudly but clearly.

Performer *Onboard personnel*

4.4 Raise alarm using push buttons

4.4.1 Description

If push buttons are nearby push the 'Man overboard' button.

4.4.2 Refs / Quals / Resources

Resource: Push button alarms accessible from the deck.

Performer *Onboard personnel*

4.5 Closed up during RASSSD?

4.5.1 Description

Is the ship closed up for Refuel At Sea Special Sea Duty?

Performer *Onboard personnel*

The next figure for "No" is	4.6	Contact Bridge on ext 268
The next figure for "Yes" is	4.15	Contact Lifebuoy sentry on ext 111

4.6 Contact Bridge on ext 268

4.6.1 Description

Using nearest ship phone contact the bridge on ext 268.

4.6.2 Refs / Quals / Resources

Resource: Phone

Performer *Onboard personnel*

4.7 Simultaneous (1)

Performer *No Performer*

The next figure for "A" is	4.8	Say "Man overboard starboard/port side fwd/aft"
The next figure for "B" is	4.14	MOB - Bridge SOP

4.8 Say "Man overboard starboard/port side fwd/aft"

4.8.1 Description

Tell the bridge from where the person fell. Include over which side (starboard or port) and whether it was forward or aft of midships.

4.8.2 Refs / Quals / Resources

Resource: Phone

Performer *Onboard personnel*

4.9 Remain on the phone and report details

4.9.1 Description

Remain on the phone and report to the bridge your ID, the ID of the person overboard (if known), and other relevant information.

Performer *Onboard personnel*

4.10 Keep / regain sight of MOB and point at them

4.10.1 Description

Get off the phone if required.

Performer *Onboard personnel*

4.12 Note MOB's position

4.12.1 Description

Note the position, relative to the ship, of the person overboard.

Performer *Onboard personnel*

4.13 At 3 min intervals report MOB position to the bridge on ext 268

4.13.1 Description

At 3 minute intervals report to the bridge on ext 268 the person overboard's position wrt the ship.

Performer *Onboard personnel*

The next figure is	4.19	Person recovered. Ship returned to previous duties

4.14 MOB - Bridge SOP

4.14.1 Description

SOP covering Bridge actions to take when notified of a person overboard.

4.14.3 Work Instruction

MOB_Bridge.FLWUnable to find file

Performer *Bridge watch*

The next figure is 4.19 Person recovered. Ship returned to previous duties

4.15 Contact Lifebuoy sentry on ext 111

4.15.1 Description

Contact the nearest life buoy sentry on ext 111 using internal phone.

4.15.2 Refs / Quals / Resources

Resource: Phone

Performer *Onboard personnel*

4.16 Simultaneous (2)

Performer *No Performer*

The next figure for "A" is 4.17 MOB - Lifebuoy sentry SOP

The next figure for "B" is 4.18 Follow lifebuoy sentry directions

4.17 MOB - Lifebuoy sentry SOP

4.17.1 Description

SOP covering Life buoy sentry actions to take when informed of a Man Overboard situation.

4.17.3 Work Instruction

MOB_Lifebuoy sentry.FLW Unable to find file

Performer *Lifebuoy sentry*

The next figure is 4.14 MOB - Bridge SOP

4.18 Follow lifebuoy sentry directions

4.18.1 Description

Follow directions as given.

Performer *Onboard personnel*

4.19 Person recovered. Ship returned to previous duties

4.19.1 Output

Upon the completion of the rescue of the person overboard, all personnel return to the activity being performed before the Man Overboard incident, unless directed to do otherwise.

Performer *No Performer*

5. Compliance Issues

Performers

Performer Onboard personnel
- 4.0 Witness Man Overboard
- 4.2 Release nearest lifebuoy
- 4.3 Raise verbal alarm
- 4.4 Raise alarm using push buttons
- 4.5 Closed up during RASSSD?
- 4.6 Contact Bridge on ext 268
- 4.8 Say "Man overboard starboard/port side fwd/aft"
- 4.9 Remain on the phone and report details
- 4.10 Keep / regain sight of MOB and point at them
- 4.12 Note MOB's position
- 4.13 At 3 min intervals report MOB position to the bridge on ext 268
- 4.15 Contact Lifebuoy sentry on ext 111
- 4.18 Follow lifebuoy sentry directions

Performer Lifebuoy sentry
- 4.17 MOB - Lifebuoy sentry SOP

Performer Bridge watch
- 4.14 MOB - Bridge SOP

Performer No Performer
- 4.19 Person recovered. Ship returned to previous duties

Groupings

Members Of REPEAT UNTIL DIRECTED TO DO OTHERWISE
- 4.10 Keep / regain sight of MOB and point at them
- 4.12 Note MOB's position
- 4.13 At 3 min intervals report MOB position to the bridge on ext 268

Run Files

There are no Figures with 'Run File'

Sub Processes

Work Instruction MOB_Bridge.FLW
Unable to find file MOB_Bridge.FLW
Is referenced from:
- 4.14 MOB - Bridge SOP

Work Instruction MOB_Lifebuoy sentry.FLW
Unable to find file MOB_Lifebuoy sentry.FLW
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- 4.17 MOB - Lifebuoy sentry SOP

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Sandra Tavener and Peter Asenstorfer

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Defence Science and Technology Group
506 Lorimer St
Fishermans Bend Victoria 3207 Australia

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Standard Operating procedures, Documentation

19. ABSTRACT

The Royal Australian Navy (RAN) uses Standard Operating Procedures (SOP) to record standard practices on individual ships. SOPs are usually written as descriptive documents covering the rules to be followed when performing ship activities. It has been observed that this style of document does not provide crews the required guidance in a clear and easy to use form, or for RAN Test Evaluation and Analysis Authority to use when assessing crew performance. DST Group was requested to improve the situation and develop a robust methodology tailored to the RAN for creating SOPs using flow diagrams. This report covers the issues with the current RAN style of SOP and details the developed methodology of using flow diagrams that was piloted on HMAS *Canberra*.