The Six Systems of Rope Rescue
(or The Systems Approach to Rope Rescue)

Introduction
Over the past few years the team at SARINZ has been developing books, manuals, and training material for a variety of organisations undertaking wilderness and industrial rescue including the United States Antarctic Programme, Australian Antarctic Division, Antarctica New Zealand, New Zealand Land Search and Rescue, Department of Conservation and the New Zealand Fire Service.

During this development phase SARINZ came across an issue – a lot of detailed information but in many cases nowhere to put it. The rope rescue systems of Anchor System, Pulley System and Lowering System have long been used. We have added another three – the Belay System, Directional System and Load System. These six systems, we think, completes the core rope rescue systems for the vast majority of operations that are undertaken.

The Six Systems of Rope Rescue has also developed into a framework that can be used for the effective teaching of material, development of standards based assessment, deployment of equipment and application of techniques during a rescue. The Six Systems of Rope Rescue is not gear, technique or environment centric so can adapt to most things teams are undertaking or using.

Why the systems approach?
When the SARINZ team first started thinking about the issue of ‘a lot of detailed information but nowhere to put it’ we considered the approach that many scientists and organisations undertake. That is, step back from the detail and see if we can arrange and organise the technical information into a useful structure to gain greater understanding.

Ultimately the SARINZ instructing team wanted to come up with a new way of operating that could move us past current constraints and improve what we were doing. The systems approach was already partially in use in rope rescue so the team has added to and clarified this process.

What is a system?
A system can be defined as a set of connected things or parts forming a complex whole, in particular a set of things working together as parts of a mechanism or an interconnecting network. Rope rescue can therefore be thought as the complex whole while the systems (anchor, pulley, lowering, belay, directional and load) work together as parts of the mechanism.
The six systems of rope rescue

The six systems of rope rescue is simply a method of categorisation and description that helps those in training grasp manageable subject areas, creates a collecting place for similar knowledge and techniques, and assists us to see the complex whole and the interactions that take place.

Figure 1 Level 1 Organisation

Figure 2 Level 2 Organisation

Figure 3 Level 3 Organisation
**Anchor system**
The anchor system is a collection of the object, attachments and rigging that secures a rope in the desired location for appropriate for the load and purpose. The object is the base material being rigged to such as snow, rock, tree, steel beam, concrete or vehicle. The attachment is what provides security onto the object such as a snow stake, nut, bolt, or a wrap 3 pull 2 with webbing. The rigging forms the anchor by focusing or moving the focal point to a desired location such as 2-point anchor rigging, 3-point anchor rigging, fixed focus anchor rigging or floating focused anchor rigging.

**Lowering system**
The lowering system is a method of moving the load downward. The descent is controlled by application of friction though a suitable device for the load and situation. Various lowering devices are available that are suitable with the most common being a brake rack. Other friction devices can be used but may need to be adapted to suit larger loads.

**Pulley system**
The pulley system is a simple machine that requires the application of a single force to work. The force required to do this can be reduced provided the force is applied over a longer distance. Simple and compound pulley systems are commonly used. A progression of pulley system mechanical advantage (M.A.) is applied in combination with efficient rigging techniques.

**Belay system**
The belay system can be a secondary rope, independent of the mainline. The belay can also be applied where the stretcher-bearers are holding the load. For a double rope the device often used is the tandem Prusik with a suitable load release. For a lower angle situation or a stretcher carry the belay can be as simple as an Italian/ Munter hitch.

**Directional system**
The directional system is created where the rope bends around a pulley, carabiner or edge protection. The directional includes redirects, low directionals and high directionals. The directional usually occurs between the anchors on the mainline and the load.

**Load system**
The load system is the source of pressure borne by the rest of the rope rescue complex. The load systems is any rigging and techniques that are involved with the attendant(s), patient, and stretchers. The rigging of the stretcher for slope and vertical terrain is incorporated as well as tying in and protecting the patient. Any manoeuvres that are undertaken by the stretcher attendant are included such as a pickoff or stretcher scoop.
Rescue application

One use of the six systems is to give the team leader on the ground a big picture tool for decision making and what rope rescue system to use where.

Figure 4 Double rope lower

Figure 5 Double rope raise
Directional system
Load system
Anchor system
Lowering system
Directional system
Load system
Anchor system
Pulley system
Directional system
Load system
Anchor system
Belay system
Load system

**Figure 6** Single rope lower

**Figure 7** Single rope raise

**Figure 8** Single rope belayed stretcher carry
**Gear deployment**

Another use of the six systems is to assist as a planning tool for gear deployment. The aim is to have just enough gear to do the job.

**Figure 9** Six person gear deployment example

**Where to next?**

As the SARINZ instructing team has been delivering courses we have been thinking about other systems that could be included that would clarify what we are trying to do. As such we are considering title ‘The Systems Approach to Rope Rescue’ as more inclusive than just six systems. This systems approach could include organisational systems such as the:

- team system, and,
- sector system

and technique systems such as the:

- personal system,
- offset system, and,
- highline system.
Conclusion
The six systems of rope rescue is a method that allows us to:

• classify different parts of the rope rescue system,
• look at the parts as well as the whole,
• see the interactions that can occur between the systems, and,
• improve our overall understanding and performance.

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