

# Using accessible cost effective technology to save lives

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## ABSTRACT

*Issues:*

1. Public safety is an important issue for coastal management and planning.
2. Despite ongoing efforts, coastal drowning continues at unacceptable levels.
3. Surf Life Saving has many systems in place to collect, analyse and communicate information.
4. Maintaining this information is very resource intensive.

In order to address these issues Surf Life Saving has developed a suite of low cost, high tech, location based tools. These tools are used for a range of applications including, public education, data collection, event risk management and coastal public safety risk assessment.

BeachSafe

A website and location based iPhone app containing information on over 11,500 Australian beaches. The Australian Beach Safety and Management Program database developed jointly by Prof. Andrew Short (University of Sydney) and Surf Life Saving Australia (SLSA) is the foundation of this application.

Event Risk Management Application

Every year SLSA conducts the Australian Surf Life Saving Championships. This event has more competitors than the Commonwealth Games and is held in the most unpredictable of environments, the beach. SLSA has developed user friendly, guided risk management tools for the iPhone. This application was used successfully at the 2011 DHL Aussies.

Coastal Public Safety Risk Assessment Application

Surf Life Saving provides commercial risk management services to local government and other organisations as required to mitigate coastal public safety risk. SLSA has developed a groundbreaking enterprise tool for this purpose that revolutionises this service. This application allows for the rapid collection of data and instant reporting, as well as validating and updating data contained in the ABSAMP database.

This paper will illustrate how Surf Life Saving is addressing coastal public safety issues using these cost effective and efficient applications.

## INTRODUCTION

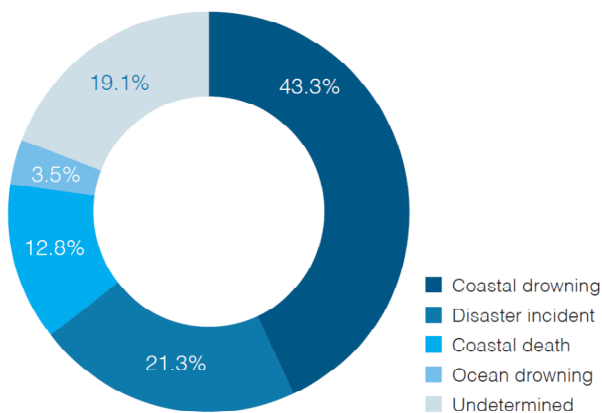
Over 85% of Australians live near the coast (ABS 2004) and our tourist beaches alone receive an estimated 110 million visitations (Surf Safety & Rips Study, October 2009) every year. The vast coastline of Australia covers more than 35,877kms and when all islands are included the length increases to 59,736kms (Source: Geoscience Australia).

Most people living near the coast live in capital cities, as seven of these are situated on the coast. However, there has been rapid growth of coastal areas outside of Australia's capital cities. In 2008, the Australian Bureau of Statistics reported that Australians are still heading to the coast, with many of Australia's coastal regions experiencing population gains.

Whilst a magnet for living by and visiting, coastal regions come with inherent, and up until now, unpredictable risk. In the past 100 years Surf Life Saving has saved over 500,000 lives at our beaches and continues to rescue more than 12,000 people every year.

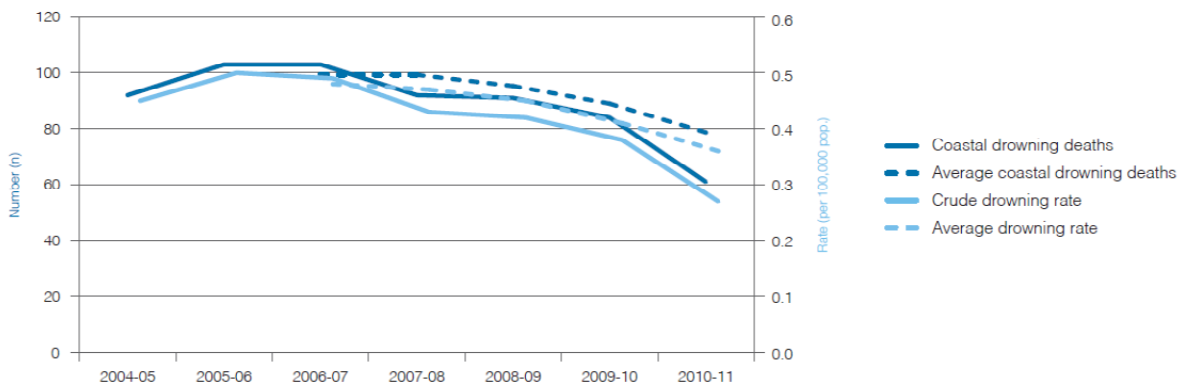
Since 1907, when a group of surf life saving clubs on Sydney’s beaches first emerged, the network of services protecting our coastline has grown rapidly. Today, volunteer surf lifesavers, SLS and council employed lifeguards, rescue helicopters, rescue power craft, surveillance systems and radio control and coordination centres all work together to ensure that our beaches are the safest in the world. This collaborative approach to coastal safety is essential in preventing drowning along our coastline.

Despite this extensive network of services, coastal drowning deaths are still at unacceptable levels. In 2010-2011, there were 61 coastal drowning deaths (SLSA, 2011) in Australia, and while this figure is down on last year’s 84 coastal drowning deaths and the seven-year average of 89, it still shows that there is significant work ahead of us – every life lost is one life too many.



**Figure 1: National Coastal Fatality Summary (n=141) (SLSA, 2011)**

Both the number and rates of coastal drowning deaths have continued to decrease this year. The average rate of coastal drowning deaths from 2004-07 is 0.48, the current three year average rate is 0.36. This is a 25% reduction in the average rate of coastal drowning deaths.



**Figure 2: Seven year national coastal drowning incidents (SLSA, 2011)**

Of the 11,500 (March 2009) beaches now identified by ABSAMP, only approximately 400 or 3.3% have a lifesaving service that is provided by the lifesaving clubs affiliated with SLSA and patrolled by lifeguard services provided by SLSA and local governments across Australia.

Surf Life Saving continues to address the following issues:

- The risk of drowning (fatal and non fatal) on the coast has many contributing factors.
- Risk management concepts of hazard, uncertainty and opportunity based risk collectively provide opportunities for drowning prevention
- Despite ongoing efforts, coastal drowning continues at unacceptable levels.
- SLS has many systems in place to collect, analyse and communicate information.
- Maintaining this information is very resource intensive.

In order to address these issues, Surf Life Saving has developed a suite of low cost, hi-tech, location based tools. These tools are used for a range of applications including, public education, data collection, event risk management and coastal public safety risk assessment.

## BACKGROUND

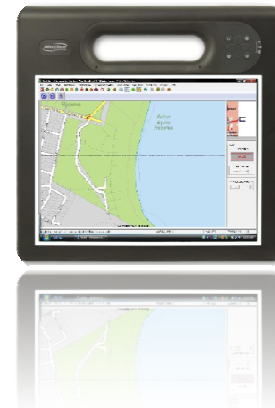
Coastal risk assessments have been provided by Surf Life Saving Australia to coastal land managers and developers for more than a decade. These assessments involve the following steps:

1. Determine the minimum acceptable level of risks and potential injuries at the location through completion of a risk assessment in accordance with recognised guidelines, standards and best practice;
2. Provide economically sustainable risk mitigation options;
3. Provide recommended staging plans considering the environmental conditions, forecast settlement areas, beach access and usage;
4. Review the status of aquatic safety and signage management;
5. Evaluate the level of compliance or non-compliance with relevant regulations and standards.
6. Assessments include reference to:
  - i. The Australian Beach Safety and Management Program (ABSAMP)
  - ii. The Australian Coastal Public Safety Guidelines;
  - iii. Beaches of *Australian coast – A guide to their nature, characteristics, surf and safety*
  - iv. The National Aquatic and Recreation Signage Style manual;
7. Relevant standards including *A/NZS 2416-1,2,3-2010 Water safety signs and beach safety flags* and *AS NZS ISO 31000-2009 Risk management - Principles and guidelines*
8. Consult with relevant community stakeholders including volunteer surf life saving clubs, beach safety liaison committees and other community organisations involved in or impacted by beach safety.

In recent years Surf Life Saving Australia has invested significant resources in further developing its Coastal Public Safety Risk Assessment services. This includes:

1. Spatially enhancing the Australian Beach Safety and Management Programs beach database, containing over 11,500 individual beach locations. This enhancement provides Surf Life Saving Australia with a Geographical Information System containing data on every ocean beach along the coast of Australia.
2. Ruggedised computer hardware for field use during the provision of coastal public safety risk assessment. This hardware provides connectivity for assessors to access SLSA's databases in the field as well as allowing once only data entry from the field.
3. Instant report production – once risk assessment data has been collected in the field reports can be immediately produced and taken to the land manager for discussion.

**Figure 3: An example of a ruggedised tablet.**



With advances in mobile phone and tablet technology SLSA saw an opportunity. So called 'smart phones' became commonplace and the capability and power of these devices increased significantly in a very short period of time. Features that once required multiple pieces of technology were now available in a single handheld device. Features such as:

- Gigabytes of storage,
- Fast processors,
- Digital still and video camera,
- GPS receivers,
- Voice recorders,
- High speed internet connectivity.

These features allowed SLSA to build applications that once developed could be used by anyone with a smart phone. These applications included business solutions developed for SLS services as well as publicly available location based applications that aimed to provide safety and educational information to help beach goers make more informed decisions on which beach they will go to and how to stay safe when they get there.

## RISK MANAGEMENT APPLICATIONS



**Figure 4: SLSA's suite of risk management tools for iPhone and iPad.**

Risk management is a key element of the strategies to reduce injury and loss of life or other adverse impact in the aquatic environment. It is a central component of the drowning chain and used to identify threats to life and strategies to mitigate those threats in a targeted and effective manner. Surf Life Saving has been providing commercial coastal public safety risk management services to organisations (i.e. Local Government) for more than a decade. At the same time there has been an increasing requirement for our members to assess and manage risks for events and member activities. Traditionally these assessments have involved complex paper based forms and there has been a wide variation in the quality of assessment being produced.

To address these issues and enable easy and accurate risk assessments to be performed Surf Life Saving has created the following risk assessment tools for the iPhone and iPad:

### *Event Risk Management iPhone Application*

To ensure continuous improvement and leading development in this area, Surf Life Saving Australia looked at ways in which decision making at large events could be improved. One aspect identified was risk management. Although risk management processes were put to good use at previous events, the paper based approach was not ideal. The iPhone Event Risk Management App was developed to address these issues, improving competitor safety by enabling real-time reporting and more informed decision-making.

### *Coastal Public Safety Risk Assessment iPad Application*

Commercial coastal public safety risk assessments collect enormous amounts of information about the area being assessed. This information is then used to compile a report that identifies hazards, evaluates risk and recommends risk mitigation strategies to land managers. Assessors in the field traditionally have needed multiple items of equipment to complete the task, such as, dictaphones, cameras, hand held GPS receivers, notebooks and pencils. In dangerous environments this can be

a lot of equipment to carry around. It has also been time consuming switching between equipment and recording all the information required on paper. Once this information has been collected there was then the task of compiling a report that often took weeks to complete depending on the size of the area being assessed. The Coastal Public Safety Risk Assessment iPad Application has been developed to address all of these issues.

The core of these applications is a risk management approach based on International and Australian Standards, which involved extensive stakeholder consultation. There is a need within the community for safety; risk management provides the framework to help make this possible. These tools have been designed to allow a more risk assessments to be completed with greater detail, accuracy and efficiency, making the process accessible to more people at a fraction of the cost of other solutions available.

These are the first apps of their kind to be developed. As such they are part of Surf Life Saving Australia's world leading approach to risk management and coastal public safety risk assessment services. These tools can be made available through a global distribution network to anyone with an iPhone or iPad. International organisations are already discussing how this application may be adapted to their environments.

These applications are used to guide those who make decisions affecting public safety in the coastal aquatic environment. As a result, the outputs of these tools provide the vital supporting evidence to implement necessary awareness programs in the community. Decision makers easily understand this evidence as it follows the familiar risk management principles that are set out in International Standards. As a result, land managers to secure funding for public safety and awareness programs around the country have used these reports successfully.

## **PUBLIC EDUCATION APPLICATIONS**

### *BeachSafe*

'Beachsafe' was developed to harness and capitalise on the wealth of data collected and managed by SLSA covering all aspects of beach safety and water safety. The premise behind Beachsafe was simple, to present this wealth of information in an easy to read, informative and educational manner that will help to keep safe and educate the community. Development started in early 2009 and has expanded beyond general beach safety and now provides location aware features allowing the community to actively search for appropriate beaches and decide on their eligibility based on both real-time and historical safety information.

Jointly funded by the Australian government and SLSA, Beachsafe was designed to provide valuable information about Australia's 11,872 beaches which are currently mapped in SLSA's ABSAMP database. This data has been gathered over 3 decades in conjunction with the University of Sydney coastal studies department. The Beachsafe website includes multilingual translation, an intuitive geographical based interface, simplified navigation and graphical delivery of information, such as:

- Is a beach patrolled (Yes/No, by whom and when)
- Static risks (Hazards on the beach, in the water and in surrounding environment)
- Daily Real-time risks and beach status (based on information supplied by our radio communication system, Surfcom)
- Services and Amenities (Lifeguard, Volunteer Patrols, Toilets, Carparks etc)
- Statistical Information (historical and real-time information relating to rescues, first aids and preventative action at that location)

Since releasing the popular website (<http://www.beachsafe.org.au>) the BeachSafe initiative has been expanded to include a smart phone version (<http://m.beachsafe.org.au>) and an iPhone application (which to date has had over 100,000 downloads since its release in October 2010).

The expansion of BeachSafe is ongoing and many new enhancements are scheduled for development in the coming year in order to provide a more robust and informative tool for the community.

#### *Surf Life Saving CPR Interactive Chart*

Everybody should learn CPR and be able to save a life. Although there is no substitute for doing an actual CPR and first aid course. This app makes it easy to have a CPR reference guide on your phone if ever needed.

This basic and straight forward step by step look at resuscitation and CPR could prove invaluable if ever called on. Some of the handy features on the application are:

- Step by step DRSABCD
  - Danger,
  - Response,
  - Send for Help,
  - Airway,
  - Breaths,
  - Compression and
  - Defibrillation
- best compression rates

Included in the app is a 'hot key' for dialling the emergency number from a mobile '000' which is built into the app at the response stage. The app offers multiple ways to enrol to do a first aid course with the Surf Life Saving Academy.

Surf Life Saving delivers first aid and CPR training commercially in Australia to individuals and businesses. There should be a "lifesaver" in every home that has completed a CPR course. Donations can also be made to Surf Life Saving through opening a web browser within the app.

## **IMPLEMENTATION & RESULTS**

#### *Event Risk Management iPhone Application*

The Event Risk management iPhone Application was used at the 2011 Australian Surf Life Saving Championships. This is an event with more competitors than the Commonwealth Games. Risk assessments were performed using iPhones and the app in each competition area four times per day. Once the data had been entered by the area referees a PDF report and Google Earth KML file were sent to the Carnival Referee via email. The app allowed for almost instant communication of increasing / decreasing risk levels and ways in which these risks were being addressed in each area.

In addition the assessments were easily stored as supporting evidence for decisions made during the event. This app is now being used to ensure the safety of competitors in other events conducted by SLS, and will continue to be rolled out in the future.

#### *Coastal Public Safety Risk Assessment iPad Application*

The Coastal Public Safety Risk Assessment iPad Application has been used to complete risk assessments on Australian beaches. By using a breadcrumb interface the app guides the assessor through the collection of data and then allows the creation of an instant risk assessment and treatment plan report. Traditionally taking up to 30 days to complete these reports are now ready as soon as the assessor has left the beach being assessed. Speed is not the only benefit though;

the app makes use of all of the iPads features, including GPS, camera, video and voice recording to create extremely accurate and rich reports.

This tool has revolutionised the way in which Surf Life Saving Australia provides this service to help land managers address risk and save lives along the coastlines for which they are responsible.

## **CONCLUSION**

Surf Life Saving had investigated and piloted several other solutions prior to developing these applications. Other solutions involved the same or greater investment through the development phase of the project. However, once development of the customised solutions was completed the ongoing costs were prohibitive.

In making use of the iPhone and iPad SLS was able to reduce the ongoing costs of implementation. With third party solutions, not only would development have been costly, but ongoing software licensing costs and hardware costs would also have been incurred. The current solution is entirely owned by SLS with no additional costs for licensing for additional users. Through the use of Apple's Enterprise App Store SLS is able to quickly and easily distribute the application to anyone with a compatible device at no cost. Updates to the application are also easily distributed and installed.

By making use of the end user's own hardware Surf Life Saving is able to have more enabled devices in the field being used by assessors to help guide strategic decisions on lifesaving services and also provide beach goers with location based real time software to keep them informed and able to make better decisions about where they will swim.

## **TAKE HOME MESSAGE**

Risk management concepts of hazard, uncertainty, and opportunity based risk collectively provide opportunities for drowning prevention.

Surf Life Saving Australia continues to address the ongoing risk of drowning to the public using targeted intervention strategies guided by the principles of risk management. With new advances in mobile technology surf life saving is able to significantly enhance the quality of data and speed of delivery at very low on-going running costs and with zero cost of distribution.

Surf Life Saving Australia can assist coastal land managers by providing coastal public safety risk management services, training and software to help meet their public safety duty of care requirements.

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## **AUSTRALIAN STANDARDS**

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AS NZS 2416:2010.2 Water safety signs and beach safety flags Part 2: Specifications for beach safety flags - Colour, shape, meaning and performance (ISO 20712-2:2007, MOD)

AS NZS 2416:2010.3 Water safety signs and beach safety flags Part 3: Guidance for use

AS 1319:1994 Safety signs for the occupational environment

AS 2899.1:1986 Public information symbol signs—General information signs

AS 60417.2.7:2004 Graphical symbols for use on equipment—Safety aspects

HB 76:2004 Dangerous goods, initial emergency response guide

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AS NZS ISO 31000-2009 Risk management - Principles and guidelines



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