

Methodology For Assessing The Life Extension Of High Performance Marine Craft

Dominic Robertson D.M.V.Roberton@soton.ac.uk

School of Engineering Sciences, University of Southampton, UK

Supervisors: Prof. Ajit Shenoi, Dr. Stephen Boyd, Steve Austen (RNLI)

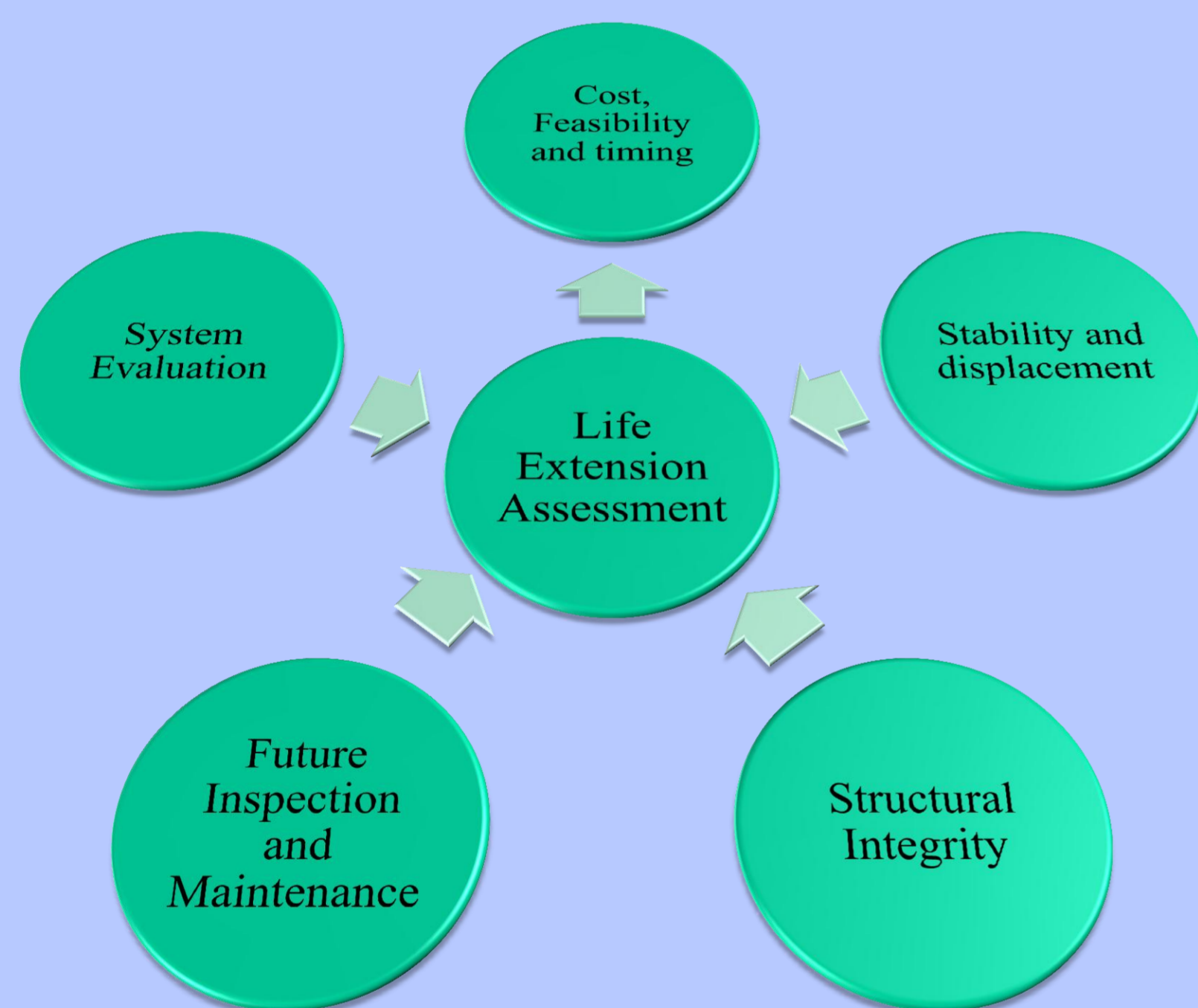
1. Background

When the Severn class life boat went into service in 1995. Each vessel was expected to be in service for 25 years with replacements due in 2020. If these replacements are to be ready then a decision needs to be made soon on how and with what they are to be replaced. However tests completed on behalf of the Royal National Lifeboat Institution (RNLI) suggested that sandwich materials from which parts the vessels are made have a life expectancy well in excess of the 25 year operational life of the vessel. The RNLI are interested in utilising this property along with investigations into the fatigue properties of top hat stiffened single skin composite structures, as used in the hull of the Severn, to assess the possibility of an extension of the service life of the Severn lifeboat, potentially reducing the costs to the institution.



Figure 1: Severn Class Lifeboat

2. Life Extension Assessment Areas



The focus of this study is on the structural integrity of the vessel

3. Aim and Objectives

Aim

- The principle aim is to develop a methodology for assessing the potential for extending the service life of a class of lifeboat.

Objectives

Structural Integrity

- Assess the RNLI design pressure curve used in the design of life boats through a characterisation of hull wave loading.
- Produce a fatigue master curve relevant to the layup of the Severn lifeboat hull and assess the potential damage experienced by the vessels
- Perform an FEA analysis of the Severn's structure, identifying any hotspots and investigate modifications/repairs to reduce these hotspots during the extended life.

4. Progress and Work Package

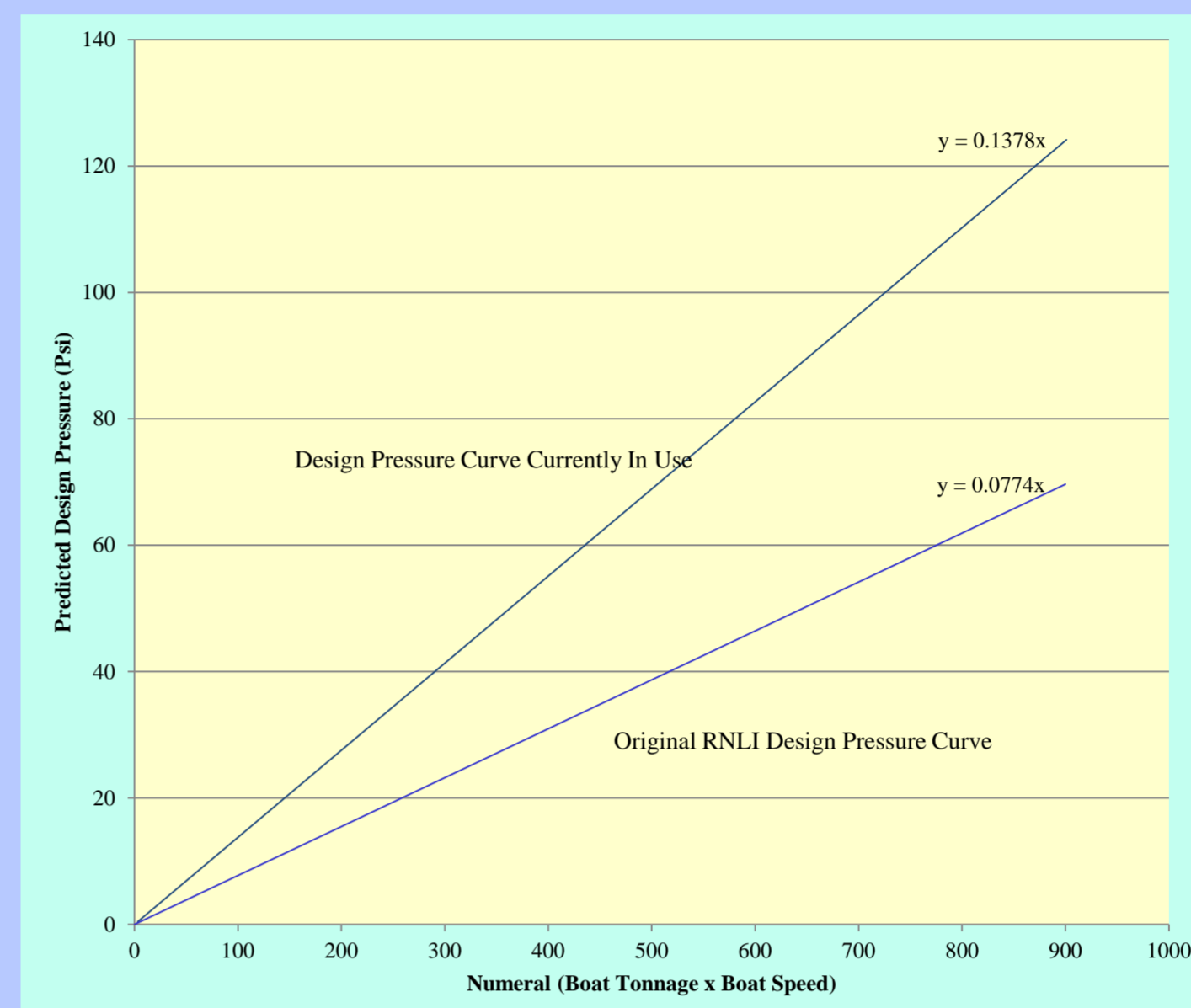


Figure 2: RNLI Design pressure curve's

Current design practice within the RNLI uses the design pressure curve noted in Figure 2. However this curve helps RNLI engineers build a structure which will withstand the extreme circumstances lifeboats often find themselves in. This work was based on Heller and Jasper's work on displacement and planing hulls and factors of safety.

In it's current form it does not provide enough detail to make predictions of the fatigue loading the vessels will experience throughout their life.

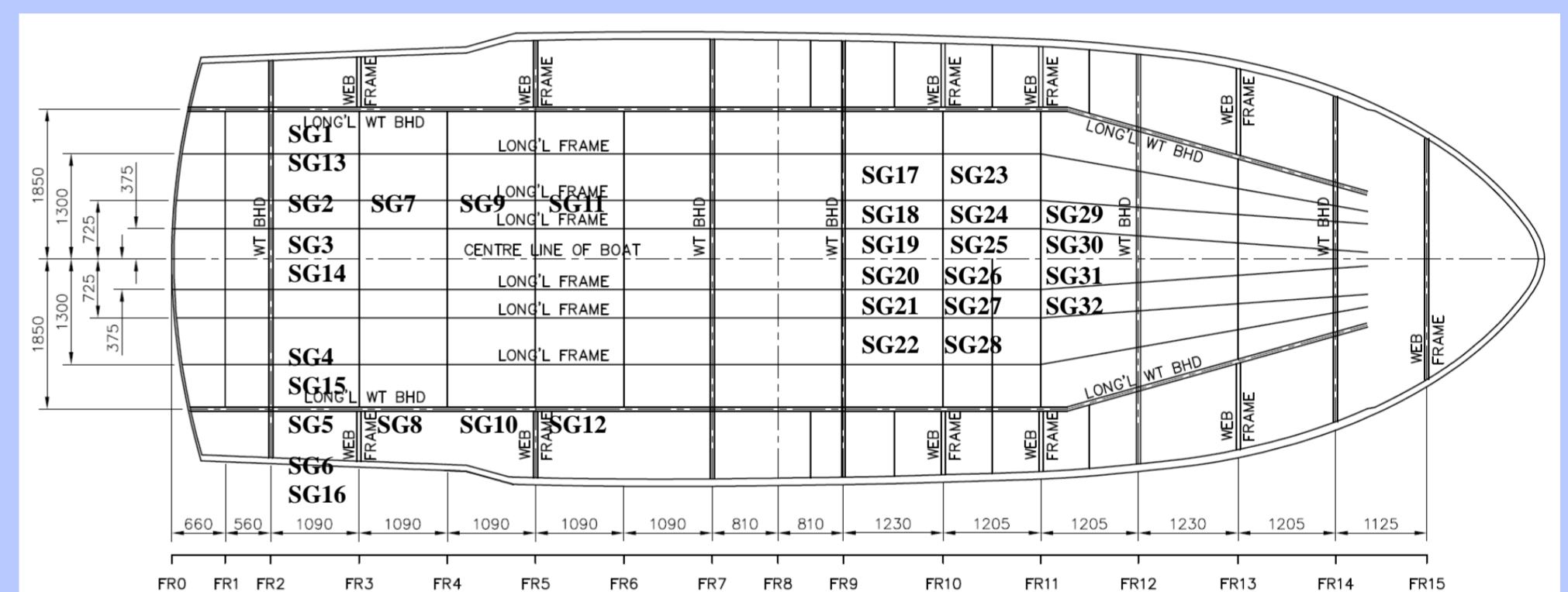
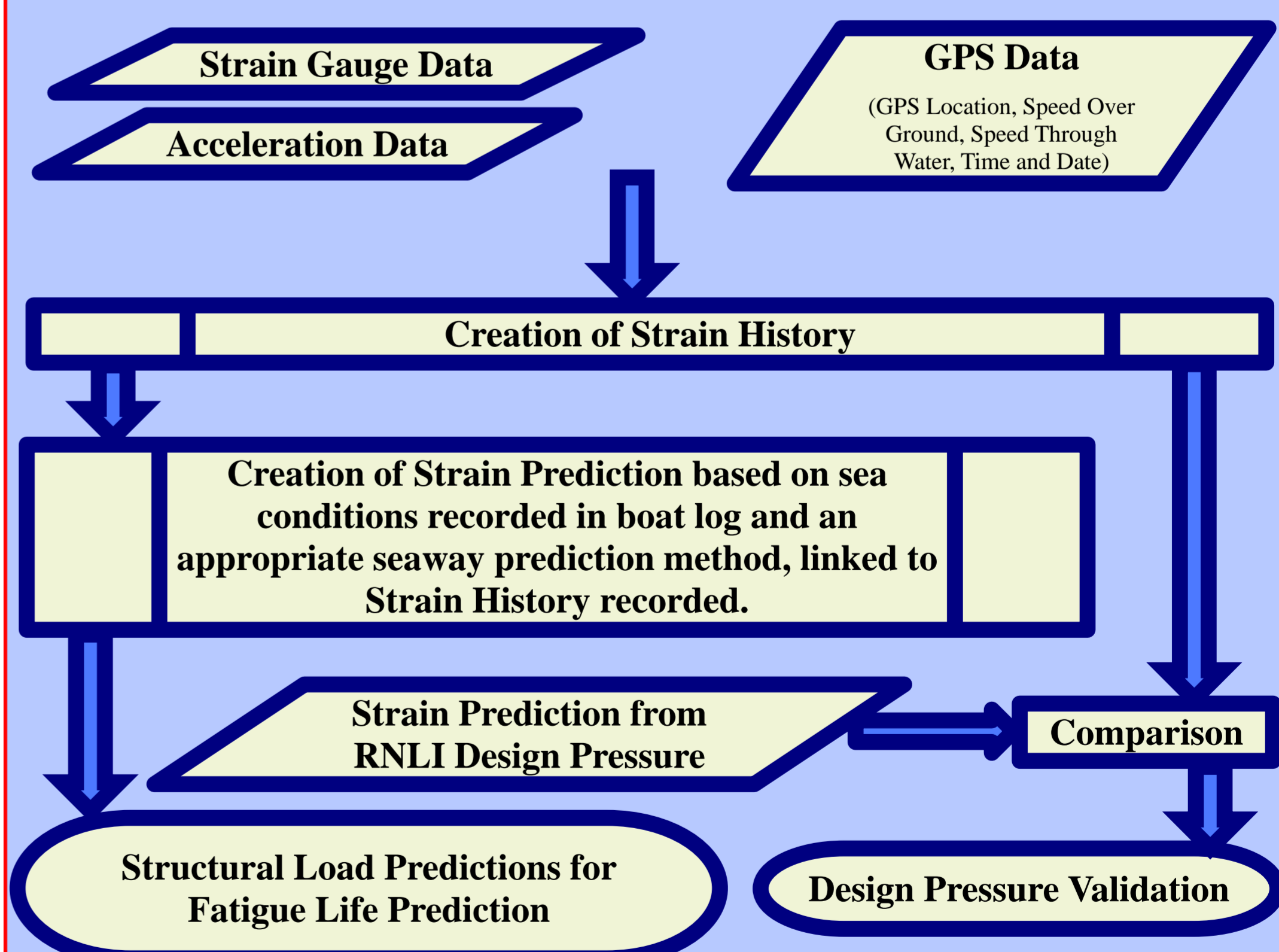


Figure 3: Instrumentation placement on Lifeboat 17-46 Margaret Joan and Fred Nye. SG#'s define panel positions of the strain gauges. All gauges were placed centrally to the panel with the exception of 18 and 21 where there are inspection tubes projecting from the hull.



5. Acknowledgements

This work is being carried out thanks to the funding and valuable input of the RNLI advanced technology partnership and EPSRC