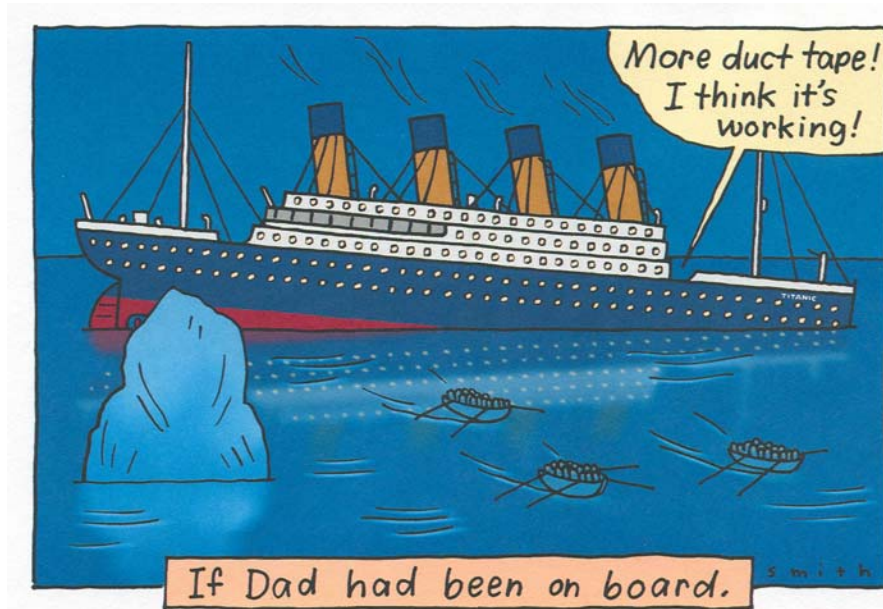


# NINE WAYS THE TITANIC MIGHT HAVE BEEN SAVED

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The sinking of the R.M.S. Titanic in April 1912 and the accompanying loss of life might have been averted if the ship's designers or the vessel's officers been made aware of certain engineering and damage control principles. These actions include: 1) alternating the thrust of the ship's wing screws and advancing the centerline screw to increase the turning response of the ship; 2) allowing the ship to ram the iceberg head-on; 3) counter-flood the aft end of the stricken ship to reduced the rate of water intake by 4.5 hours; 4) employing sluice gates to connect the bilge pumps in series between engine and boiler rooms; 5) they could have steered the stricken vessel at low speed to the ship on the horizon; 6) broadcasting an accurate longitude position to nearby vessels; 7) extending the watertight bulkheads to the ship's main deck, creating watertight compartments; 8) increasing the number of lifeboats and providing lifeboat drills, and 9) enlargement of the ship's rudder to increase response and maneuverability.

Most people have seen the film "Titanic"; which is filled with theatrical stereotypes. Dr. Rogers lecture attempts to stimulate audience response by explaining how engineering design follows assumptions; which, in turn, are based on past experience. Although a number of steamers had been lost to icebergs over the preceding half century, the absence of wireless communications created an information vacuum, and the ships were simply reported "missing". The Titanic's designers assumed that her only failure modes would be ship-to-ship and ship-to-dock collisions or grounding. In each case the hull damage would be localized, certainly not extending over more than two adjacent compartments. In point of fact, the Titanic would not have sunk but for 5-1/2 feet of plate buckling which extended into Coal Bunker No 9. That's how close it was to NOT sinking. His lecture illustrates how most technological advances evolve from high visibility failures of engineering systems. Much credible forensic engineering was accomplished in the wake of Titanic disaster, mostly by Harland & Wolf, the ship's designers. Hardly any of this work has been publicized or appreciated, although much emphasis has been placed on errors in human judgment.



**Nine Ways Titanic Might Have Been Saved** was nominated as a Sigma Xi Distinguished Lecture in 1999. It illustrates how forensic engineering can be more fascinating than Hollywood stereotypes. The subject matter evolved from Professor Rogers' tenure as a Navy intelligence officer. Rogers has evaluated hundreds of engineering failures involving earth and ocean systems across the world over the past 25 years, including the failure of the Teton Dam, the deadly Mexico City earthquake and the Oakland Hills firestorm, to name a few. He has served on the faculty of the U.S. Naval Postgraduate School and joined the Department of Civil and Environmental Engineering at the University of California, Berkeley in 1994. In 1996 he was named the R.H. Jahns Distinguished Lecturer in Engineering Geology by the Association of Engineering Geologists and Geological Society of America. He was named to Sigma Xi's College of Distinguished Lecturers in 1999. In 2001 he accepted the Karl F. Hasselmann Chair in Geological Engineering at the University of Missouri-Rolla, where he is Associate Director of their Natural Hazards Mitigation Research Center. He is frequently sought as a technical advisor for historic and documentary films.