

From Pioneer to President: Omond McKillop Solandt's Rise in Operational Research.
Jason S. Ridler

Dr. Omond McKillop Solandt (1909-1993) was the inaugural president of the Canadian Operational Research Society. That such an honour came to him was of little surprise to contemporaries in 1958. Since the Second World War, Solandt had established an international reputation as a first-generation operational research pioneer, sage science manager, and leader in applying scientific principles to solve complex problems in government, the military, and industry. At the time of his presidency, Solandt's extensive list of accolades included the Order of the British Empire, the American Medal of Freedom (Bronze Palm), and the Canadian Gold Medal of the Professional Institute of the Public Service. His formidable intellect was matched by a quiet manner and intense presence. Indeed, there were few rivals to lead Canada's first major post-war civilian OR organization. To know why requires understanding the man elected as CORS first president in 1958.

EDUCATION OF AN OPERATIONAL RESEARCH PIONEER

Born in Winnipeg, 1909, Solandt was soon recognized as a brilliant student. His meticulous intellect thrived on problem solving of all kinds, including in scientific, medical and technical fields. Before he began medical studies at the University of Toronto (U of T), he'd acquired solid grounding in engineering principles and the mechanical arts from Central Technical School in Toronto. At U of T he received Gold Medal standing during his undergraduate years and became the star pupil of Dr. Charles Best, co-discoverer of insulin. Best mentored and groomed Solandt in physiology during his MA, and Solandt attributed his later success in OR to Best's research methodology. Best demanded that meticulous measurements and absolutely accurate data be collected before any analysis could be attempted. Any valid analysis also required a thorough appreciation of the body of knowledge that had come before the experiment, if the results were to be understood properly. Solandt's OR approach always rested on understanding how and why an organization operated before any thought could be given to improvements.

As a physiologist, Solandt was among a handful of OR pioneers who were not physicists or held advanced mathematical degrees. This prestigious group included wartime colleagues Solly Zuckerman, a zoologist, and Cecil Gordon, a biologist. While OR is best known for its skilled and unconventional use of statistical and mathematical analysis, Solandt and his kin were adept at envisioning complex organizations as "systems" of interlocking components whose existence depended on the influence of each other, much like the human body. Such systemic thinking found unorthodox and effective applications during the Second World War.

ARMY OPERATIONAL RESEARCH

Solandt finished his medical training at Cambridge and was set to start a promising career in clinical research when the Second World War began in 1939. After a successful stint as the director of the South West London Blood Depot during the bombing of London, Solandt was hired by the Medical Research Council (MRC) to help

solve problems to do with tank crews passing out during firing exercises. Solandt established a physiological laboratory at the Gunnery Wing of the Armoured Fighting Vehicle (AFV) School at Lulworth, Dorset, and got to work. Solandt quickly identified the problem as CO poisoning from gun fumes trapped in the main chamber of tank, but solving this problem required a new appreciation for the understanding of the relationship of men and machine. For the next year, Solandt and his team earned a reputation for systemic analysis of the relationship between tank crews and tank design. Solandt worked hard to have tanks changed so that they were, in modern parlance, “optimized” in terms of human, machine and operational efficiency, and earned a reputation as a tough operator on government committees.

While the team attempted to make the experiments at Lulworth as realistic as possible, Solandt was adamant about using actual operational data from tank battles in North Africa as the bedrock of their analysis. He sent his friend and colleague Major Laurie Chute to serve with the British 8th Army right before the battle of Al Alamien. Chute gathered valuable data on tank combat and tank operations which Solandt used as the basis for the experiments at Lulworth on everything from preparation for chemical warfare to the nature of tank casualties. This approach made the research not only more accurate, but more persuasive to the normally resistant Ministry of Supply and the Armoured Corps, neither of which were initially warm to Solandt’s attempt to tell them how best to make and use tanks. But, with the data being taken from the operational experience of front line soldiers, Solandt’s work had more gravitas to effect change.

In 1943, Solandt’s success at Lulworth was rewarded by his ascension through the ranks of what became known as the British Army Operational Research Group (AORG), an offshoot of the groundbreaking OR group under Sir Patrick Blackett, known as “Blackett’s Circus.” Solandt originally ran the tank section but soon rose to become Deputy and then full Superintendent, replacing noted physicist and lightening expert Brigadier Sir Basil Schonland. At AORG, Solandt’s diverse interests in science found full room to grow as AORG expanded to solve a host of army problems, from groundbreaking work on the lethality of weapons, to innovative detection measures against the V1 and V2 rockets.

After VE day, Solandt was selected to become Lord Louis Mountbatten’s scientific advisor for South East Asia Command with the rank of Brigadier. Japanese surrender after the dropping of the atomic bombs at Hiroshima and Nagasaki ended this opportunity. Instead, Solandt was selected as the only Canadian to serve with the British Mission to Japan to study the effects of the atomic bomb in November 1945. Here, Solandt used his medical and OR training to contribute to Britain’s first serious analysis of the deadly weapon, making him a rare expert in the realities of atomic war at the birth of the atomic age.

CANADA’S DEFENCE RESEARCH BOARD AND THE COLD WAR

The Canadian government was quick to recruit Solandt to lead its first peacetime defence research organization, the Defence Research Board (DRB). As Chairman of DRB, Solandt was a full member of the Chiefs of Staff Committee with the equivalent rank of Lieutenant-General, scientific advisor to the Minister of National Defence, and the chief executive for a growing number of scientific research establishments that achieved international acclaim for research in arctic warfare, chemical and biological

weapons defence, and the development of the “Velvet Glove” air-to-air guided missile. For ten years, Solandt led the DRB from its birthing stages into an effective, innovative, and unique institution, supporting such critical defence technologies as the “McGill Fence” continental defence system and acting as the nation’s key scientific advisor on military affairs.

While each of the senior services (Army, Air Force, Navy) had their own OR sections, DRB also provided a highly respected Operational Research Group (ORG) for each service to draw upon. Some of the most important OR in defence was done by Solandt’s DRB scientists, ranging from continental defence analysis to nuclear wargaming, and he had distinct praise for many future CORS members under his employ, including Harold Larnder, George Lindsey, and Cecil Law. While he’d had to abandon his own research years before, Solandt took an active interest in all of DRB’s OR activities, promoting their work throughout his tenure as Chairman.

THE ORIGIN OF CORS

Solandt left DRB in 1956, becoming the Vice President of Research and Development at Canadian National. Here he faced the seemingly impossible task of modernizing the research approach to the nation’s railway business, and he did so in part because of his belief in the use of OR in civilian as well as military and government environments. He established a cadre of OR and engineering staff that were both respected and valuable members of the CN team. By this time, Canada’s professional OR community was spread across different organizations and foci.

At that time, Sir Charles Goodeve, a Canadian OR pioneer who also worked with the British during the Second World War before becoming president of British Iron and Steel Research Association, had become president of the International Federation of Operational Research Societies (IFORS). As Canada’s OR community was then fragmented into different groups (mainly the Operational Research Society of America and The Institute of Management Science), Goodeve asked his old colleague Solandt to attempt to unify Canada’s OR groups into one organization so they could join IFORS. In 11 February 1958 in Montreal, Solandt gathered Canada’s leading OR scientists to settle differences and proposed the creation of a single, national OR body. While everyone had their say, Solandt’s proposals were approved and Solandt was elected provisional chairman to work out the new group’s constitution. The group held its first meeting in Toronto on 14 April 1958, where Solandt was elected President, a position he held until 1960.

Solandt’s later career was varied, from advisor in defence industries such as DeHavilland and Hawker-Sidley, to Canada’s representative to the 1958 Geneva conferences on nuclear weapons, to the inaugural Chairman of the Science Council of Canada, to chairman of a series of Royal Commissions (including the Ocean Ranger disaster in 1982). He brought an OR scientist’s sensibilities to research and analysis, prompting effective change to each. His penetrating intellect could cut through myriad of details on almost any subject and focus on the essential elements that needed fixing, changing, or support. To paraphrase Frederick Winslow Taylor, one of OR’s grandfather’s, Solandt could usually find the “one best way” of solving a problem in the most efficient way possible. If he couldn’t, he usually knew who could. Never a braggart,

Solandt believed in promoting quality research, and those that worked under him always knew that quality work was rewarded by recognition and support.

CONCLUSION

Solandt and OR were a natural fit. The application of scientific methods and principles to solve complex problems was, for Omond Solandt, a way of life. As a young man he used to “diagnose” systemic problems with his radio equipment and fix them. Tank problems or continental defence were just problems that needed proper thought and application. However, while proud of what OR had accomplished during the war and after, Solandt was also critical of its development. He never considered OR a science in its own right, and disliked most attempts at defining it. For the critical and pragmatic Solandt, OR was best described as applying “scientific common sense” to solving problems. He also worried that OR, beginning in the mid fifties, was becoming too mathematically oriented instead of systemic in analysis, which he also admitted was his bias toward the value of the medical sciences and his relative shortcomings in mathematics compared to OR legends like PMS Blackett, Robert Watson-Watt, or EC Williams.

Such humility from one of the foremost intellects of twentieth century Canada fit the man’s disposition. Quiet in character, forceful in presence, and with an uncanny knack for being right no matter what problems he tackled, Omond Solandt’s legacy was made not only as an OR pioneer but as a prominent champion of OR’s use in government, the military and industry.