Preface

Wars and conflicts exact a terrible toll on people well beyond those caught in the cross-fire. Massive human displacement, lost lives and livelihoods, deteriorating health and governmental services, the demise of justice and broken societies are all results of endemic violence. The cycle of insecurity empowers warlords and militarists, emboldens combatants and inflates military budgets in regions unable to afford such diversions. As well, it has repercussions around our interconnected world.

The world desperately needs *effective* peacekeeping. Helpless civilians caught in conflict need impartial forces to protect them. War-weary fighters need opportunities to stop their shooting and lay down their weapons. Moderates need outside assistance to sustain fragile cease-fires. Durable peace agreements backed by credible verification and enforcement by the international community are the best means for progress in local governance, for implementing the rule of law, for fostering greater prosperity and for a return to normalcy. But all too often the international forces deployed by the United Nations are unprepared and under-equipped, unable to meet the challenges in the field, unaware of emerging threats and unable to take proactive action to prevent escalations of conflict.

Since truth is the "first casualty" of war, I posit that winning back the truth is the first job of the United Nations peacekeeper. Piercing the "fog of war" is critical to any response. Conflicts are routinely fuelled by rumour, false reports, misinformation, disinformation and propaganda. The peacekeepers serve as the eyes and ears of the international community, and often its limbs as well, frequently placing themselves in harm's way

to monitor threats, protect civilians and create some order from bloody chaos. But the challenges of monitoring conflicts are many. Over large areas, at night and in difficult terrain, the human eye is insufficient, especially for border surveillance, sanctions monitoring and detecting early signs of violence. Spoilers of fragile peace processes try to keep their plans and preparations for attack secret, often using the cover of darkness; the United Nations must make use of all possible tools to keep watch over shadowy forces and conditions in the field.

With this challenge in mind, I ask how modern science and technology can help peacekeepers maintain their watch and carry out robust peace operations. This book is one answer to the issue I have been pondering since I was an undergraduate student in the physical sciences. If the reader permits me to describe the relevant personal background, I start with the words that inspired me to try to link the fields of physical science and political science. The scientist-sage Albert Einstein (Lynd 1939) told his students at Princeton University (United States):

> Concern for man himself and his fate [humanity itself and its fate] should be the chief interest of all technical endeavours. Never forget this in the midst of your diagrams and equations.

As a physical sciences student at the University of Toronto in Canada in the 1980s, I asked myself how the subjects I was studying (chemistry and physics) could make a difference in a world weary of the Cold War. Technology to support arms control verification seemed like a fruitful area, so I directed my graduate work to help develop sensors for the detection of chemical and biological warfare agents. In parallel, I served as the UN Representative of the Canadian organization Science for Peace, making bimonthly trips to New York. This allowed me to become familiar with the world organization, carefully observing UN operations and practices, gathering information from experienced contacts inside and outside of the organization. I watched with sadness and alarm as important UN operations became stuck in Somalia, Rwanda and Bosnia. I wondered what could be done better. I visited several conflict areas and in 1999 served on the UN mission administering a referendum in Indonesia-occupied East Timor. Although the UN mission proved successful, it was accompanied by tragedy, including of a personal nature. Several friends, colleagues and a member of my team were killed in the Suai massacre of 6 September 1999. This experience reinforced my conviction that the United Nations needed a strong intelligence architecture and much better technical tools to gather information for preventive action.

I sought to convey this link between technology and peacekeeping by developing and teaching courses at the Pearson Peacekeeping Centre in

Nova Scotia, Canada, in particular a course titled "Live, Move and Work: Technology and Engineering in Modern Peacekeeping". I also conducted research at Yale and Cornell universities on improving the capacity of the United Nations. Building a research bridge from the physical to the social sciences brought me to a professorship at the Royal Military College of Canada, where I was able to broaden the research. During a sabbatical in 2006, Canada's Permanent Mission to the United Nations in New York offered the opportunity to carry out a study for the United Nations on surveillance technology for peacekeeping. I presented the preliminary results to the United Nations Special Committee on Peacekeeping Operations in 2007, which welcomed the report. A year later, when the United Nations' Department of Peacekeeping Operations needed help in implementing the general proposals, I was given a golden opportunity to study how specific technologies could be applied to particular operations. With financial support from the Department of Foreign Affairs and International Trade (DFAIT) Canada, the United Nations sent me on research trips to UN missions in Haiti, Cyprus and the Democratic Republic of the Congo.

This book is the culmination of the field experiences and trips, interviews at UN headquarters and a quarter-century of studying UN peacekeeping. It incorporates and publicizes the findings of the two reports I have written for the United Nations and of work done at Sandia National Laboratories. Through the research I discovered just how far behind the United Nations is in employing modern technology. I joked with UN staff that I wanted to help bring the United Nations into "the 1990s"!

I observed a growing "monitoring technology gap" of several dimensions. This gap exists between the United Nations' mandates and its means, between the nations contributing to UN operations (especially between developed and developing nations), between the United Nations and some of its important partner organizations in the field (for example, the European Union and the North Atlantic Treaty Organization), and even between the United Nations and some parties it is supposed to be watching closely. Some warring governments, rebels and criminal gangs have better surveillance technologies than either the United Nations or the national police/military forces with which the United Nations works in war-torn lands.

Through this life work, I hope to help advance the technological capacity of the United Nations, making practical and forward-looking recommendations without appearing too critical of UN staff struggling to make do with what they have. I have sought to illustrate the centrality of the monitoring functions in United Nations' operations, and describe the capabilities and drawbacks of the range of technologies based in outer space, in airspace or on the ground. I hope to increase awareness not only

of the United Nations' deficiencies but also of its future potential. The world organization can strengthen its "information power" using both human and technological sources, including social media based on the Internet, to better serve as an instrument of peace.

In this book I develop the main thesis about the tremendous utility of technologies for monitoring in peacekeeping (Chapter 1) before providing a background overview of the evolution of peacekeeping (Chapter 2), showing the expansion of monitoring requirements over time. I assess the United Nations' many needs for impartial information and intelligence (Chapter 3) and survey the broad range of technologies that can be applied to the problem (Chapter 4). Aerial surveillance (Chapter 5) turns out to be a key information-gathering method but one that is greatly underutilized in UN missions, like many other technologies. This was borne out in case studies of both traditional and modern multidimensional missions in the field, with some notable and encouraging exceptions (Chapters 6 and 7). What UN headquarters' policies and standards exist for the creative use of monitoring and surveillance technology? The subtitle of Chapter 8, "Starting from near zero", points to the answer. Why is the United Nations so far behind most modern militaries? Several answers are found by looking at the challenges and problems in deploying technology (Chapter 9). Given the United Nations' sputtering efforts at improving its technological proficiency, I make a series of recommendations (Chapter 10) on general capacity-building and on deploying specific technologies for specific missions. My conclusions (Chapter 11) are prefigured in this preface but I also suggest a few ways forward.

A physical scientist by training and a political scientist by current profession, I tried to marry the two fields while pursuing a convoluted career. Benefiting from a decade of teaching officers in the Canadian Forces and other militaries, I incorporated their experiences into the research. I was able to test some ideas on officers with experience using technology in the field. As an "operational professor", I also sought to go to the field to observe UN operations first-hand. Through this work, I have sought to determine how peacekeeping can make effective use of modern tools. This research experience has enhanced my conviction that, with better technological means and connectivity, the United Nations can save more lives, alleviate more suffering and foster more of the harmony that is so desperately needed in this world.