CHAPTER 3

The Civil
Aviation Analogy

PART I

International Cooperation
to Protect Civil Aviation Against
Cyber Crime and Terrorism

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One of the most frightening images of cyber terrorism is a scenario in which terrorists take over the air traffic control system to cause an aircraft to crash or two planes to collide in flight. H. H. Whiteman, director general for Security and Emergency Preparedness of Transport Canada, places this possibility at the worst-case extremity of a wide range of ways in which information systems could be used to interfere with civil aviation operations.

Transportation systems are important national and international infrastructures that are especially attractive targets for malicious or reckless attack with potentially serious casualty and economic consequences. They have been favored targets of terrorists and criminals for decades. They are also becoming increasingly dependent on informa-

tion systems, and this dependency is a source of vulnerabilities for hostile information operations. For four important reasons, civil air transport could be singled out for particular attention with respect to international cooperation to combat cyber crime and terrorism:

1. Civil aviation is one of the most widespread and extensively interconnected international infrastructures. It is one of the primary industries for interconnecting and integrating the world, and it spans almost every country on earth. In the United States alone, according to Vidyut Patel of the U.S. Federal Aviation Administration (FAA), almost 300,000 passenger aircraft took flight during 1999, not counting cargo, military, and noncommercial private planes. Each day, this transportation sector is entrusted with millions of lives. The direct and indirect—that is, as a supporting infrastructure for the activities of businesses and governments—economic value of this sector is enormous.

2. The civil aviation infrastructure is extraordinarily dependent on computer-telecommunications information systems. Some of the most prominent and widely used systems include those for air traffic control, navigation, reservations, and aircraft flight control. Others are used extensively for airport and airline management. Individual flights can now be tracked on the Internet in close to real time. Patel stated that more than 180 different information systems have gone through the FAA security certification process. Increasingly, these information systems have become critical to the complete spectrum of activities in this industry. Peter Neumann of SRI believes many of these systems are poorly designed with respect to security and are at risk to GPS jamming, electromagnetic interference, denial of service, Trojan horses, disgruntled employees, and other threats.

3. Civil aviation has a long history of being a target of terrorists. Aircraft and airports have been threatened and attacked all over the world over the course of decades. The extensive vulnerabilities and dramatic consequences of attacks against civil aviation make for very high profile events. The extensive use of, and dependence on, information systems provide the potential for new forms of both crime and

terrorism. Although few well-known events have occurred so far, they include a range of prospective failures from chaos created in baggage-handling systems to an in-flight collision. Industry and governments are extremely sensitive even to the appearance of threats and vulner-abilities. A collapse of public confidence in civil aviation safety, and a failure to manage public expectation, may have serious and wide-spread economic and social consequences.

4. There are near-universal international forums for cooperation already in existence concerning air transport. Prominent among these are international agreements that go back to 1919, with the dawn of international commercial aviation immediately after World War I. Even then, the unique vulnerabilities of aircraft and the potential for the loss of life resulted in cooperative agreements to improve safety. As Mariano-Florentino Cuéllar, of Stanford's Consortium for Re-search on Information Security and Policy (CRISP), describes, these ultimately have expanded to include a major new focus on the inten-tional acts of criminals and terrorists to interfere with air transport either in the air or on the ground. Around 180 sovereign countries are signatories to these agreements, putting them among the most univer-sally accepted of international agreements. They have arguably been very effective in that they have denied havens to attackers and served as umbrella agreements for other cooperative efforts that have collec-tively done much to curtail physical terrorism and to apprehend and punish people who engage in attacks against civil aviation.

For all these reasons, we believe that it would be timely and pru-dent to devote attention to developing explicit forms of international cooperation to deal with the vulnerabilities of and prospective threats to this infrastructure. It is a good example of an important sector whose protection can be pursued quickly and within the context of an existing and near-universal international regime that has already proved itself effective against similar problems over a long period of time. Dealing with the problems of cyber crime and terrorism in one major sector may also serve as a useful example and precedent for others, or for international cooperation more generally.

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To these ends, Whiteman presents a comprehensive overview of the problems of security in civil aviation. These include an overview of threatening information operations and a description of important forms of international cooperation, including the constructive roles played by the International Civil Aviation Organization (ICAO), which was created under the 1944 Chicago Convention and now operates under the United Nations. He pays particular attention to issues of prevention. Cuéllar then reviews the existing international agreements for the protection of civil aviation against terrorist attacks. He identifies some problems related to attacks via information systems that are not covered by existing conventions and, in keeping with a focus on international agreements elsewhere in this volume, proposes a draft extension to the 1971 Montreal Convention to rectify these problems. Both Whiteman and Cuéllar make it clear that civil aviation safety and security have greatly benefited from an effective and sustained regime of de facto cooperation under the framework of an extensive international treaty structure. We would hope this will be explicitly extended to cover information systems.