Preface

This volume is a collection of expanded papers selected from the 2013 International Symposium on Aviation Psychology (ISAP) that was held May 6–9 at Wright State University in Dayton, Ohio.

The first ISAP was held in recognition of the unique and difficult challenges posed by the aviation environment to the field of applied psychology. Dr Richard Jensen convened the “First Symposium on Aviation Psychology” at Ohio State University in Columbus, Ohio in April of 1981. In the foreword to the proceedings of that first symposium the goals were clearly laid out, “The objective of this symposium was to critically examine the impact of high technology on the role, responsibility, authority, and performance of human operators in modern aircraft and air traffic control systems.” This was a very ambitious objective for a small conference held in America’s heartland.

Nevertheless, the objective was met and the “First Symposium on Aviation Psychology” was a resounding success! There were 210 attendees for this first gathering and the Proceedings of the Symposium contained 43 papers and abstracts. Considered and debated were many of the central challenges of aviation such as cockpit display and control design, automation, selection, workload, and performance assessment. The meeting was also successful in attracting participants from the varied communities that have a stake in aviation psychology. There were attendees and presenters from academia, military, government regulatory agencies, and industry (including airframe manufacturers and airlines). And even in this first iteration of the meeting there was a healthy presence of international representation from such nations as Canada, Austria, Saudi Arabia, Germany, Great Britain, and Israel.

A clear outcome of the First Symposium was the recognition that many challenges would remain and require diligent research in the future. It was also decided that a regular symposium on aviation psychology would be a very beneficial venue to encourage focus on aviation psychology’s evolving challenges and a forum to consolidate the findings and to sharpen the questions and debates central to the advance of a safe aviation environment.

Consequently, a symposium has been held biennially since 1981. In 2003 the symposium was hosted in Dayton in conjunction with celebrations of the 100th Anniversary of the Wright Brothers’ first flight. Beginning that year, conference logistics have been managed through Wright State University. However, Dick Jensen continued to serve as the Symposium Chair until 2007. Following his retirement, it was decided that the symposium should continue. Since 2009, the symposium has been managed through a collaboration between the Department of Psychology at Wright State University and the Air Force Research Laboratory.
(AFRL) at Wright–Patterson Air Force Base. The continued success of the symposium could not have been possible without the support from the Air Force Office of Scientific Research for the 2009 and 2011 meetings. The present volume is a direct outgrowth of the seventeenth ISAP held at Wright State University in 2013.

The 32 years-span separating the first and seventeenth symposium has witnessed both the enduring challenges and rapidly-changing technological advances confronting aviation psychology as well as evolving theoretical and methodological psychological paradigms in meeting these challenges (see Chapter 1). Over the years, the conference has continued to focus on the objectives outlined for the original meeting in 1981—to critically examine the role of humans in the context of changing technologies and operational contexts. And the conference has continued to attract broad participation that spans research and operational communities, and that includes a strong international contingent.

The present volume highlights the inherently intricate involvement of human interaction with a vast and complex aviation system in order to accomplish a mission that the human is ill-equipped to accomplish without significant technological support. For example, care must be taken that the demands placed on any individual or team do not exceed their capabilities. Consequently in aviation psychology the interface design is a major concern to ensure that the information needed by the human operator(s) is presented in understandable formats at an efficient rate of transmission. Importantly, the synergy of the human capabilities (some innate and many acquired via training) and the information provided via the human’s senses and the system’s displays must provide an understanding that can support effective decision making and control. In order to validate the success of interface designs and training regimens, aviation psychology has had to develop assessment tools to measure mental workload and situation awareness in relation to the impacts on operational effectiveness. To optimally support the human the system must at times utilize automation to take action without direct human control. However, this must be carefully managed in order to not disrupt the human’s understanding of what is happening. It has become clear that advances and improvements in automation change, but do not diminish, the importance of the role of humans in aviation systems.

Along this vein, our Keynote Speaker, Dr Nancy Leveson presented an excellent overview of a systems perspective on aviation psychology illustrating how the human’s presence in a system contributes to or defends against errors and their consequences. Following this, another Keynote Speaker, Dr James Lackner, provided an intriguing description of his discovery of how human’s terrestrially-evolved senses are subject to illusions when subjected to the unique demands of aerospace flight. A third Keynote Speaker, Dr Max Mulder, explored some of the implications of advanced automation and increasing mission complexity for the design of flight deck displays. All three speakers have contributed chapters based on their keynote addresses.
The remaining chapters were selected from among the technical papers presented during the meeting. They reflect both the emerging and enduring challenges facing aviation psychology today. The chapter topics span from flight deck and air traffic control developments in preparation for NextGen operations; pilot factors, especially human aircrews interacting with each other or with automation; and exciting new approaches toward increasing the understanding of and training for modern aviation operations.

We are especially proud to include two chapters whose lead authors were among students who competed in the Stanley N. Roscoe Best Student Paper Competition for the seventeenth ISAP. Kathleen Van Benthem co-authored the chapter on “Individual Pilot Factors Predict Simulated Runway Incursion Outcomes” and Jan Comans co-authored the chapter on “Risk Perception in Ecological Information Systems.” We congratulate Jan for winning the Best Student Paper Award.

Despite the dramatic changes in the technologies present within the aviation system, many of the challenges confronted by the chapters in this volume were foreshadowed within the 1981 proceedings. This is not surprising because operational effectiveness and safety still depend on coordination between technologies and humans. Developing the human–machine synergy is the enduring challenge of aviation psychology and the chapters of the current volume are excellent examples of some of the best contemporary approaches for addressing that challenge.