As I reflect on my long association with ATM research and with the Quarterly, I think it is appropriate that this, the 15th anniversary issue, is devoted to the best papers from the US-European biennial ATM R&D Seminar. The seminar is internationally recognized as the premier venue for researchers in the air traffic management field to get together to discuss the latest research results and to identify research needs. Its success and, above all, the quality of the papers and the discussions surrounding those papers, serve as evidence of the maturation of ATM research, particularly in the US and Europe, over the past decade.

The Quarterly has been a vital contributor to this maturation process. Along the way, it has also matured and the quality of its papers has seen continuous improvement. While I, as the editor, would like to take some credit for this, the credit really must go to the editorial board for bringing the best research papers to the Quarterly and for its active involvement in the peer review process and to the excellent work of the managing editor, Ned Spencer. We have been fortunate to have on the editorial board some of the leading scientists in our field and leaders of most of the prestigious European and North American organizations involved in ATM. They have played an active role in bringing you, the reader, the best possible refereed papers in ATM research. Together we have set forth an editorial policy to make sure that the scope of papers includes the most current and relevant topics, and to include each year at least one special issue on a topic of particular interest.

A healthy ATM research community is more important than ever. In the past, ATM research in Europe and in the US has been criticized for failing to make the transition to implemented operational improvements. Among the reasons cited was that there was not really a need for new operational concepts, and thus no customer for research results. This situation is rapidly changing with Europe’s SESAR initiative and the NextGen initiative in the United States. There is a recognition that the established methods for operating the ATM system will not be able to deal with the growth in traffic, the rise in cost of operations, and with the mounting environmental pressures in the coming decades. A transformation, based on the concepts of operation laid out by SESAR and NextGen, is necessary, but such a transformation cannot succeed without the contributions of the ATM research community.

Several themes that underlie this transformation provide the direction that research must take:

- The role of the controller must change from aircraft separation to managing traffic flow;

- The transformed system must be more readily adaptable to change and more scalable to changes in demand;

- System capacity in all domains (en route, terminal, arrival/departure, and surface operations) must increase significantly;

- Operations must become more efficient and designed to meet user preferences;
- System capacity and performance must be much more resilient to disruptions due to such things as adverse weather;

- Noise and emissions must be contained to acceptable levels to make aviation an environmentally friendly mode of transportation; and

- Transformation will require us to address higher level issues that deal with the overall air transportation system enterprise. These issues range from a better understanding of ATM system behavior to understanding and enabling the fundamental changes, many of a cultural nature, which will be needed to succeed.

A broad range of research is necessary to achieve the transformation. My personal views of the most important research topics suggested by these themes are:

Defining the role of humans and machines as we move towards higher levels of automation. This involves understanding how people and machines, on the ground and in the air, all work together during normal and abnormal (failure) situations. The future system must be “forgiving” when problems are encountered by both people and machines;

Reducing separations, particularly in the arrival phase, as we move to higher density operations. Research issues include taking advantage of our understanding of wake vortex behavior, specific methods for reducing the means and standard deviation of inter-arrival spacing, more efficient surface operations;

Fundamental understanding of the safety of new operational paradigms, and finding ways to prove the safety (safety case) as new control paradigms are introduced;

Managing gate-to-gate flows in a trajectory based system, perhaps one with 4D contracts between the service provider and the aircraft. Some of the hard research problems are the proper relationship between global and distributed planning, automation support for flow planners, achieving ATM system stability in dealing with uncertainty, and methods for equitable accommodation of user preferences;

Establishing mechanisms whereby the system can safely “evolve” into a transformed state, including the transfer and insertion of new technologies, and operations during system transition steps to provide continual progress in safety and capacity along the way;

Overcoming the delays due to weather phenomena (estimated to be almost 2/3 of all delay today). Research must find techniques for better understanding these phenomena, including prediction of the movement of hazardous weather, and the means to give the ATM system more agility in responding to weather, at both the tactical and strategic level;
Finally, research into enterprise level issues must bring basic understanding of the non-linear, adaptive behavior of the air transport system, understanding how to bring about the cultural change necessary as one attempts to implement new roles for people and organizations, and a myriad of policy issues, including methods for equitably dealing with airspace and airport demand that exceeds capacity.

The last six years as editor of the Quarterly have been both fun and also a challenge for me, but it is time to gradually move into retirement. This is my last issue as editor of the Quarterly, but I am leaving it good hands with a new editor who is dedicated to continuing the Quarterly’s tradition of excellence and the policies to make it relevant as we embark on the journey toward SESAR and NextGen. Please join me in welcoming Dr. Tom Edwards, Director of Aeronautics at NASA Ames Research Center, as the new editor.