



Applying Human Factors to Improve Forecasting

Course Description

There are increasing demands by the public and private sectors for weather information being placed on weather services worldwide. These increased demands have resulted for a number of reasons, including global warming, urbanisation, changes in leisure activities (i.e., sports and outdoor activities requiring detailed weather information), and businesses (i.e., vineyards, power utilities) exploiting the economic benefits of detailed weather information. With these increased demands for weather information comes a reasonable expectation of accuracy. In addition, “Each year, tens of thousands of lives are needlessly lost and many billions of dollars in avoidable economic impact result because of the inability to reliably forecast and warn decision makers and the public about impending weather hazards.”[±] This has never been more in the minds of the public than now, given the devastation in the hurricane ravaged Gulf Coast states in the United States in 2005, and other natural disasters from around the world. Therefore, in addition to possible legal issues,[†] weather agencies must improve weather predictions to yield financial savings[‡] and savings in life, property, and infrastructure.

Course Objectives

Conditions such as stress, fatigue, work schedules, equipment design, new technology, standard operating procedures, organisational cut backs, training, decision making under uncertainty and time pressure, and communication within the weather services and with outside organisations all influence human performance. To blame an individual for producing a poor forecast is to ignore all these factors and more, and stopping at this “conclusion” does little to help in reducing recurrence and improving operations. Decades of research in safety-critical and high-risk environments (i.e., aviation, medicine, nuclear power) has shown that between 70 to 90 percent of accidents and incidents can be traced to some form of human error; with some arguing 100 percent when viewed systematically. The notion of an “Organisational Accident” proposed by Professor James Reason illustrates that errors can occur at the management level – in the development of policy and procedures – in the same way that errors can occur on the frontline (i.e., shop floor, cockpit). This course will examine how human performance issues (i.e., stress, situational awareness) and organisational factors influence operations in the workplace. A comprehensive and systemic approach to identifying and understanding these factors has proven particularly useful in the aviation industry, and others, in helping organisations improve safety and their operations. This course will also explore the potential use of such a programme and possible benefits of understanding these factors in the weather forecasting domain.

[±] United States Group on Earth Observations (2004). Societal benefit technical reference document: Improving weather forecasting. Retrieved November 20, 2005 from http://iwgeo.ssc.nasa.gov/docs/review/Weather_Technical.pdf.

[†] Klein, R., and Pielke, R. A. (2002). “Bad weather? Then sue the weatherman!” A review of legal liability for predictions and forecasts. Part I: Public sector forecasts. *Bull. Amer. Meteor. Soc.*, **83**, 1791–1799.

[‡] Jones, D. (2001). Forecast: 1 degree is worth \$1B in power savings. *USA Today*, 19 June. Retrieved November 20, 2005 from <http://www.usatoday.com/money/general/2001-06-19-weather-forecast.htm>.



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Course Outline

- Weather Hazards and their Costs in Various Domains
- Introduction to Human Factors
- Human Error
- Human Performance (e.g., stress, fatigue)
- Operational Decision Making in the Weather Domain
- Team Dynamics in the Workplace
- Information dissemination and communication
- Situational Awareness
- Automation and Technology in the Workplace
- Organisational Influences
- Quality Management System (QMS)
- Case Studies from around the world
- Group Exercise using the Critical Incident Technique

Who should attend?

Weather technicians and observers, forecasters from any domain (i.e., marine, aviation, public, military), supervisors and management of government and private weather services. Those involved in verification, informatics, training, disaster management, insurance, academia and research.

Take home

- Comprehensive course notebook
- Industry examples and solutions
- Certification of completion

Course Particulars

- **Course Duration:** 5 days.
- **Fee:** \$1975.00 CAD; bulk rates available for companies.
- **Location:** Various locations – In-house available.

Queries

For more information please contact:

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Instructors

John W. Dutcher, BSc (Av)

John received a Bachelor of Science (Aviation) with minors in Management and Psychology from The University of Newcastle (Australia) on scholarship from the Canadian government. In addition to specialising in Human Factors, John also completed courses in advanced Aviation Meteorology under meteorologist Martin Babakhan of The University of Newcastle (Australia). John has a Canadian Flight Dispatcher Licence, Glider and Private Pilot Licences. In Australia he has a Commercial Pilot Licence (frozen), and has completed the Australian Air Transport Pilot Licence (ATPL) syllabuses for Flight Planning (B727-200), Air Law and Operations, Human Performance and Limitations, and Meteorology.

For three years John mentored under Martin working on "weather decision making," international aviation meteorology for long-haul flights, and short-term mesoscale forecasting for vineyards and aviation operations; including severe weather. Following this, John worked with Martin on the development of pilot self-briefing resources and advanced meteorology training programmes for an international airline's pilots and dispatchers. In addition to training, John worked with Martin on a number of research projects including the development of a "Code Grey" Forecasting system and Fog Model for Sydney's Kingsford Smith International Airport (YSSY) as well as developing research and presenting findings to a Boeing/Environment Canada research group on high altitude ice crystal aircraft icing events in the Australasian region.

Martin and John have developed the Meteorology in Aircraft Accident Investigation (METI) course for the Southern California Safety Institute (SCSI). John has also authored the Weather Investigation chapter in the upcoming ICAO Aircraft Accident Investigation Manual (in press). In May 2006, John developed and taught a course in Weather Risk Control Systems (Wx-RCS) to Occurrence Investigators of the South African Civil Aviation Authority (SA CAA) in Johannesburg. John also taught Applied Meteorology and Meteorology for Accident Investigations to the SA CAA. In April 2006, at invitation, John guest lectured on the concept of Wx-RCS to the facility of the College of Aeronautics at Florida Institute of Technology (FIT) in Melbourne, Florida. In September 2006 John also guest lectured on this concept at the Regional Aviation Association of Australia (RAAA) convention in Coolumb, Queensland, Australia.

In addition to "pure meteorology" John developed and taught a course on Applying Human Factors to Improve Forecasting for the South African Weather Service (SAWS) in May 2006. John also recently conducted research into Weather Forecaster Decision Making with Dr Mark Fleming of Saint Mary's University (SMU) in Halifax for the Meteorological Service of Canada (MSC). This Scoping Project involved conducting Cognitive Task Analysis interviews to explore forecasters' operational decision making, and forecasting processes. This scoping project was positioned to assist the MSC in future training of forecasters, development of 'good forecasting processes' and development of the new forecaster workstation (NinJo).

John has taught Meteorology to pilots of the Canadian Owners and Pilots Association (COPA), Civil Air Search and Rescue Association (CASARA) in Halifax, Canada and instructor pilots for Transport Canada. In September 2006, at the request of QBE Insurance Group – Aviation, John developed and facilitated a workshop on thunderstorm forecasting for regional airline pilots in Brisbane, Queensland, Australia.

In Human Factors John has conducted training for Southern California Safety Institute (SCSI), Honeywell Aerospace - Aftermarket Aviation Services, Transport Canada, COPA, CASARA, the Canadian Department of National Defence (including the Armour Corps), and other organisations. John is a researcher in the Department of Psychology at Saint Mary's University (SMU) and has worked in Human Factors and OH&S with Dr Mark Fleming. He has also worked with Drs Mark Fleming and Steven M. Smith on a research project using Applied Psychology to improve the effectiveness of health promotion efforts (i.e., hand hygiene, stair climbing).

G. Michael (Mike) Doiron

Mike graduated from Transport Canada Air Services Training Center in Ottawa 1972 and was posted to Halifax, Nova Scotia. Mike acquired considerable operational experience in both the Marine and Aviation environment in Emergency Procedures, Search and Rescue activities, Meteorology, Flight Planning and Air Ground communications.

In 1980 Mike served as Manager of the Halifax Flight Information Center. He was responsible for a large operational staff providing Aviation services over a diverse geographic area. In 1996 Mike accepted a position with System Safety, Transport Canada. His duties included providing Safety Awareness training in Crew Resource Management, Pilot Decision Making, Human Performance in Aircraft Maintenance, Human Factors in ATC Operations, Company Aviation Safety Officer and Human Factors in Airport Operations.

Mike conducted Research and Development of new Safety and Awareness Programs based on identified incident trends. Presently serves as a Risk Management and Safety Management Systems facilitator for Transport Canada. Responsible for maintaining the Occurrence reporting system for the Atlantic Region and served as the Minister's Observer on a number of high profile aircraft accidents, most notable being the SWR111 MD11 accident September 2, 1998 and the MK B747 Cargo accident in October of 2004. Mike has recently completed a 14-month assignment as an Accident Investigator with the Transportation Safety Board of Canada.

Mike completed the Certificate Program in Aviation Safety Management with The Southern California Safety Institute in May 2001. He is a member of the International Society of Air Safety Investigators (ISASI). Mike has been a member of the Civil Air Search and Rescue for 20 years and a member of the Canadian Owners and Pilots Association. He was the delegated examiner for Industry Canada for issuing restricted radio licenses. In 1990 he was awarded the Transport Canada Certificate of Achievement.