





- * The Team

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- * Emphasise the complexity of coordination in ATC
 - * Outline NextGen Technologies
 - * Identify some of the common ways in which coordination breaks down
 - * Place these breakdowns in a theoretical framework of team functioning
 - * Examine the extent to which NextGen will change these breakdowns

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- * ATC is a complex coordination system with multiple interacting components (people)
 - * Has both distributed teamwork and co-located teamwork
 - * Has formal (rule-book) and informal (opportunistic) work practices
 - * Is safety-critical

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- * The FAA has forecasted that air traffic in the USA will double over the next two decades
 - * In order to meet this increased level of demand new technologies will need to be introduced
 - * These new technologies promise to provide considerable benefits in terms of
 - * enhancing operations
 - * improving safety
 - * However, there needs to be a thorough human factors evaluation of these systems

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- * Automatic Dependent Surveillance-Broadcast (ADS-B)
 - * System-Wide Information Management (SWIM)
 - * NextGen Data Communications
 - * NextGen Network Enabled Weather (NNEW)
 - * National Airspace System Voice Switch (NVS)



“A breakdown occurs when there is a failure of coordinated decision making that leads to a temporary loss of ability to function effectively.”

[Bearman, Paletz, Orasanu & Thomas, 2010, p177]

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- * 15 former air traffic controllers participated in an hour long interview
 - * Interviews were conducted in two parts.
 - * In part one participants were asked to describe situations involving breakdowns in coordination between the controller and flight crew
 - * In part two participants were asked a number of general questions about breakdowns and NextGen technologies.
 - * Participants had an average of 28 years of experience and an average age of 55. One participant was female.
 - * The data was analyzed using a bottom-up thematic analysis technique

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- * Adjacent sector controllers
 - * Radar controller (r-side) and assistant (d-side)
 - * Relieving and handing-over controller
 - * Instructors and trainees,
 - * Supervisors and controllers
 - * Oceanic controllers and the service that relayed information to the pilots.

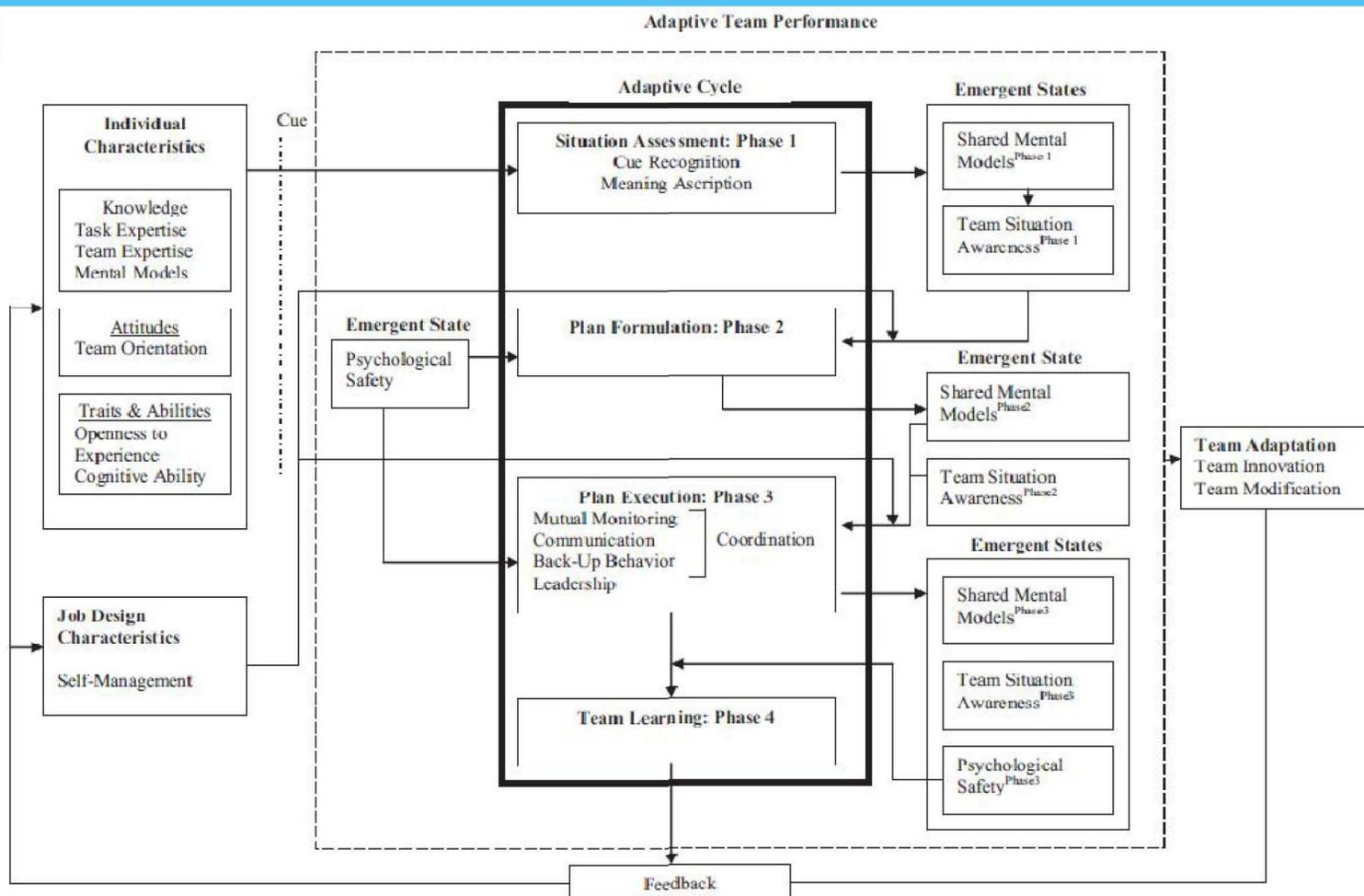
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- * Using non-standard terminology and incorrect format
 - * Saying one thing and meaning something else
 - * Misunderstanding the intent of other controllers
 - * Not being clear about what authority has been transferred when another controller requests control of an aircraft in their airspace

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- * Forgetting to transfer control of aircraft to the next controller
 - * Changes to the structure of sectors
 - * Neglecting to pass on information during handover
 - * Information about flow rates weren't always passed on to the controller
 - * Neglecting to pass on information that would have been extremely useful to another controller

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- * Neglecting to watch what the other controller was doing when there was an assistant
 - * D-side controllers acting in unexpected ways
 - * Perceiving information without really comprehending it
 - * Instructors being out of the loop

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- * Different comfort levels with non-standard solutions
 - * Personality
 - * Ongoing conflict between controllers
 - * Non-communicative people
 - * Prickly individuals
 - * Unprofessional behaviour
 - * Expectation
 - * People taking short-cuts (e.g. dropping call signs)
 - * Assuming that the other controller will do something

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- * Dividing a sector into two
 - * Aircraft falling between sector boundaries
 - * Handing off an aircraft that does not fulfil the requirements for the next controller
 - * Noise in the control rooms
 - * Incorrect data entry



Burke, Stagl, Salas, Pierce, and Kendall (2006)

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- * It seems likely that NextGen technologies will reduce at least some of these causes of breakdowns because of
 - * Automation reducing the interaction between controllers
 - * Datalink communications
 - * The ability to drag and drop routes
 - * Common information sources
 - * However, NextGen technologies are still at an early stage of implementation
 - * There are likely to be other issues that are created by NextGen technologies that need to be considered

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- * ATC represents a complex coordination network
 - * A number of causes of breakdowns could be identified
 - * Breakdowns tend to disrupt controllers shared situation awareness
 - * NextGen Technologies will reduce some of these issues