Leveraging Technology to Develop and Maintain Pilot Knowledge and Skills

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Training Programs

► Building Block Approach

► Identify best training tool to meet Training Objectives

► Adequate opportunity for sufficient repetition and practice to develop new skills and maintain existing skills
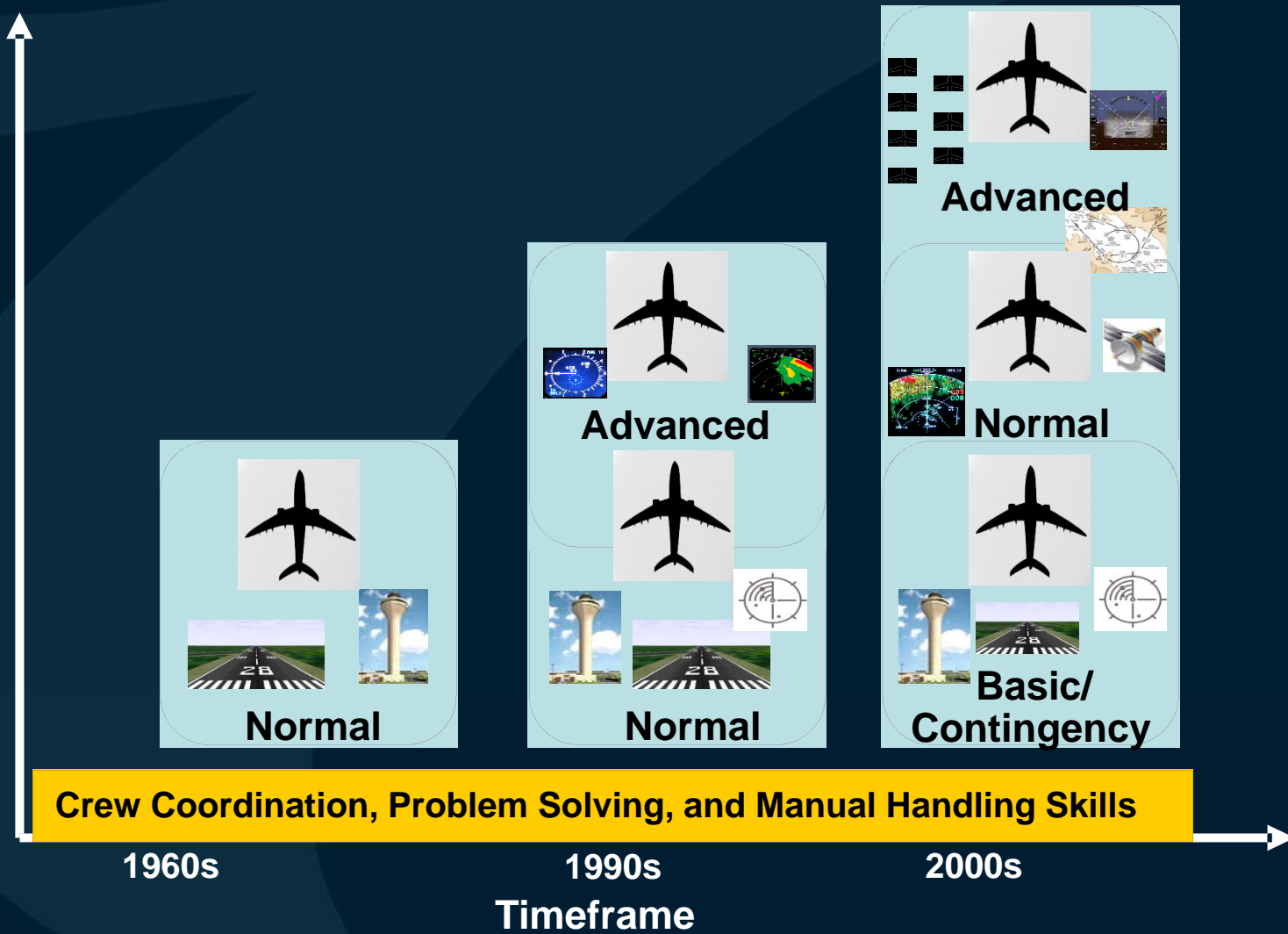
► Technology is one tool

Technology is not a Silver Bullet

► Primary Pilot Skills to be developed and maintained

- Manual Flight Operations
- Task Management
- Flight Path / Energy Management
- Managing Malfunctions
- Crew Resource Management
- Decision Making

Pilot Knowledge and Skills Evolution*

*Courtesy PARC/CAST Flight Deck Automation Working Group

Scope of Operation / Interrelationships - Pilot Knowledge and Skills Needed

Advanced

Advanced

Normal

Normal

Normal

Basic/Contingency

Crew Coordination, Problem Solving, and Manual Handling Skills

1960s   1990s   2000s

Timeframe

Evolution of Safety through Pilot Training

System-of-Systems Manager

► Managing tasks within the flight deck is complex and requires managing:

- flight deck workload,
- distractions, and
- tasks generated by others inside and outside the flight deck

► Using today's technology, training does not always prepare the pilot to be a system-of-systems manager

Flight Path Management*

► Regulatory requirements focus on performing discrete maneuvers instead of operational tasks

► Many programs don't train pilots how to use the automated systems to help fly the airplane

► Few programs explicitly address managing off-path deviations

*Courtesy PARC/CAST Flight Deck Automation Working Group

Training Effectiveness Study*

► FMS training can be improved to address operational situations and tasks encountered in operations

► In the first 6 months of flying:

- 61% had multiple problems using FMS
- 25% said they were adequately prepared

► 42% stated FMS training did not adequately cover operational use

* Courtesy Boeing

Opportunities for Improvement

► Airmanship training

► Partial system failures

► Transition between manual and automated flight

► Train for the unknown

► More "no-jeopardy" training

► Prevention

► Startle/surprise

Employing Improved Technology

► Pilot training

► But just as important
- Training managers
- Instructor pilots
- Training program

► All must understand the training objectives, tools, platforms and methodologies used

Validate Technology Contributions

Use valid evidence to determine whether technology and training methodology actually contributes to improved pilot training

Pilot Competency

► Pilots still retain their role flying their aircraft and managing the operation

► Need to define what skill-sets pilots need for line operations

Systems Approach

► Technology must be looked at in the context of a systems approach

► System Integration Considerations:

- Complexity

- How it is to be used for training

- Instructor pilot

- Pilot competencies

- Operator Policies and Procedures

Future Pilot Training

► Instead of only providing scripted training on discrete maneuvers, leverage technology and safety data to also provide

- Unscripted training, to include surprise
- Training for the unknown

► Improve safety by also evaluating the entire system, not just a single component (the pilot)

Training Device Design

▶ Human-centered Design Principles

▶ Human Performance

▶ Human Error

▶ Ease of use by the Instructors

▶ Does it meet specific Training Objectives

Selecting the Right Training Device*

► Keep training objectives at the center of the decision

► Some devices may be more effective than others at teaching certain tasks, and therefore matching the right training tool to the right training objective will be key

* Courtesy Research Integrations – "Flight Crew Training for NextGen Automation"
http://researchintegrations.com/findpub_byid.aspx?ID=24

Part-Task Training

► Great for developing individual maneuver training elements/tasks

► Final Composite Evaluation needs to be done in a Flight Training Device with motion that has the highest level of fidelity and features available

Pilot Education

► Need more focus on combining a thorough Education with Training

► Leverage Technology to
- Train competency in technical and non-technical skills
- Develop Airmanship skills
- On-going pilot improvement education

Contact Information

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