Understanding and Managing Human Error

Kathy H Abbott, PhD, FRAeS

Captain Robert Sumwalt

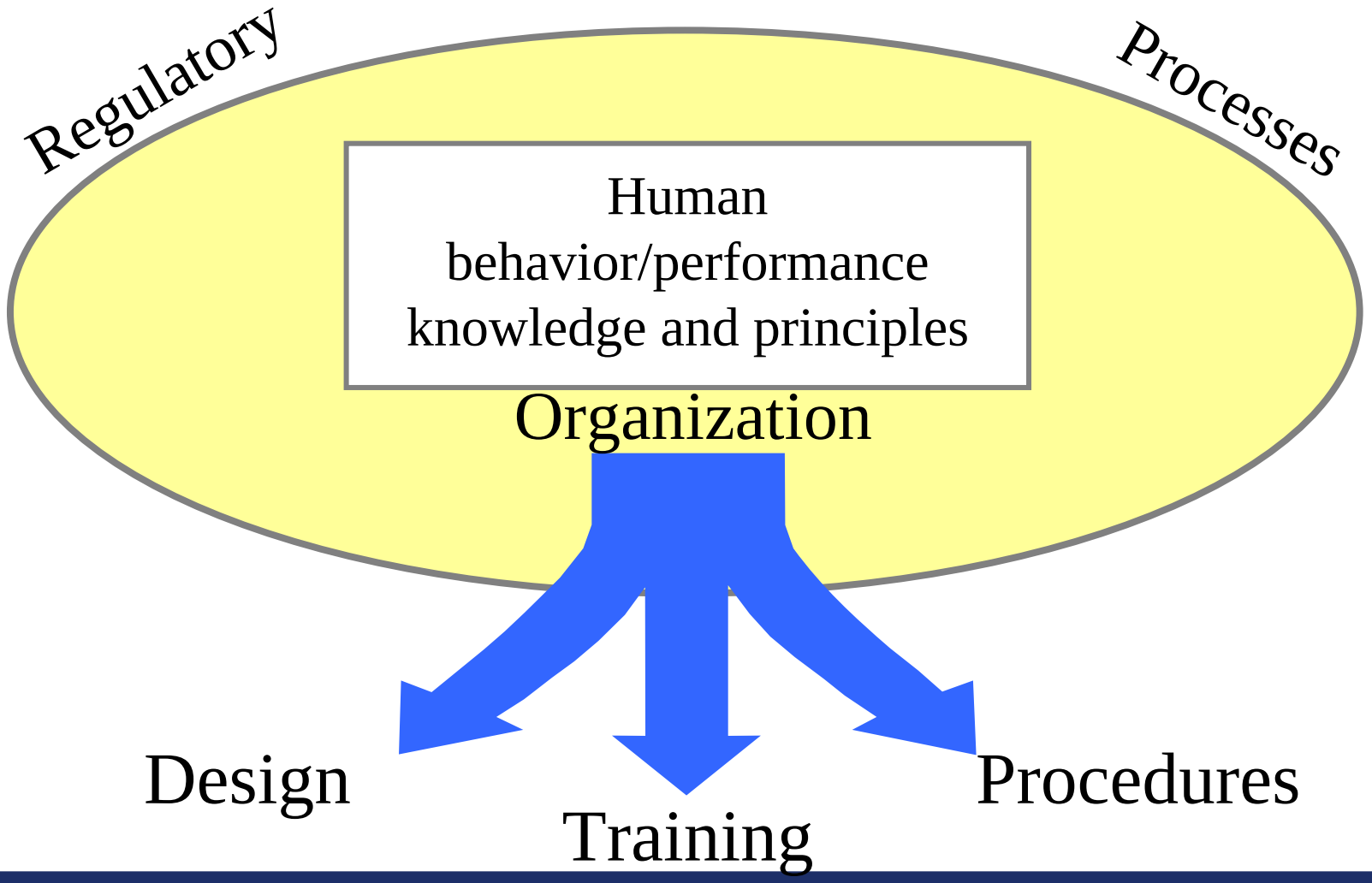
Prof. Scott Shappell

Federal Aviation Administration

Overview of Tutorial

- **Human error – an overview**
- **Error and aviation safety**
- **Human Factors Analysis and Classification Scheme**
- **Threat and Error Management**
- **Regulation for design-related flight crew error**
- **Closing remarks**

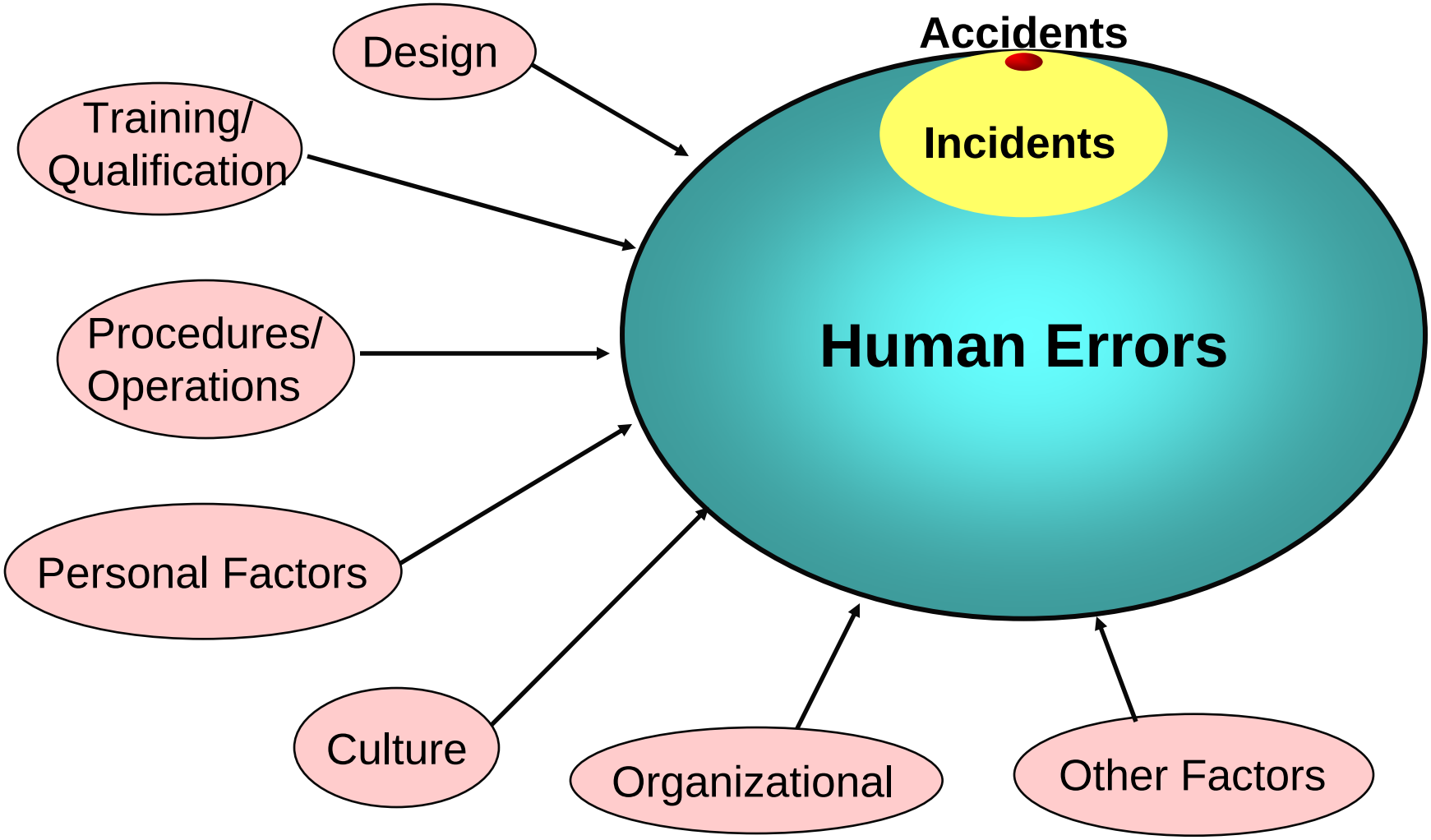
Knowledge About Human Behavior & Performance



Perspective

- **Two thirds to three quarters of all accidents have human error cited as a primary factor**
- **Changes in technology fix some issues but may introduce new ones**

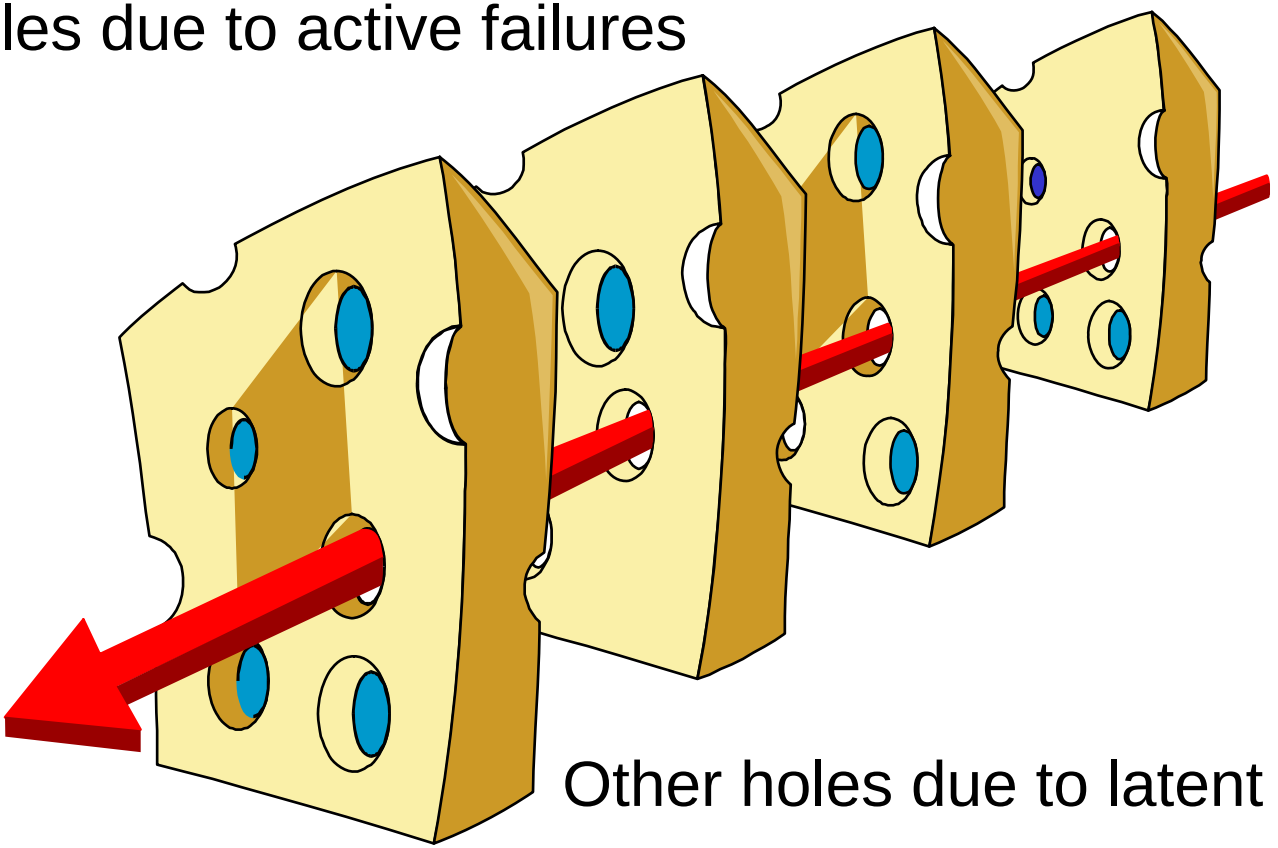
Many studies cite pilot errors as primary factors in a majority of accidents



To improve safety, ask *why* errors occurred

Reason's Swiss Cheese Model (2008)

Some holes due to active failures



Hazards

Losses

Other holes due to latent conditions

Error Management

- **It is not possible to prevent all errors**
  - "Error is the down side of having a brain"
  - "Learning does not occur without errors"
- **Experienced pilots make just as many errors as less experienced pilots *but:***
  - *they make different types of errors*
  - *they manage them differently*
- **The number of errors tends to decrease in more demanding situations but recovery from errors also decreases**
- **Error prevention, detection, and recovery**

Types of Errors – One Classification Scheme

- **Slips - meant to do the right thing but incorrect action**
- **Lapses - omitted an item**
- **Mistakes - Intention was incorrect**
- **Violations - intentionally deviated from SOP or accepted procedure *note: not necessarily a legal violation***

Courtesy Aeromexico

HOLDING

ACT RTE 1 LEGS 1/2
059°
YARBE 76NM ---/------
050°
TIMMY 8NM ---/------
051°
LGC 23NM ---/------
047°
HONIE 12NM ---/------
050°
TIROE 11NM ---/------
<RTE 2 LEGS
RTE DATA>
TRK 090 MAG
YARBE
1509.5z
76.0NM
40

Error-Provoking Factors

- **Hurry**
- **Primacy effect**
- **Inadequate feedback from systems**
- **Insufficient situation awareness**
- **Workload - low or high**
- **Mismatches in tasks**
- **Cognitive biases**
- **Organizational policies**
- **Non-standardized interfaces**

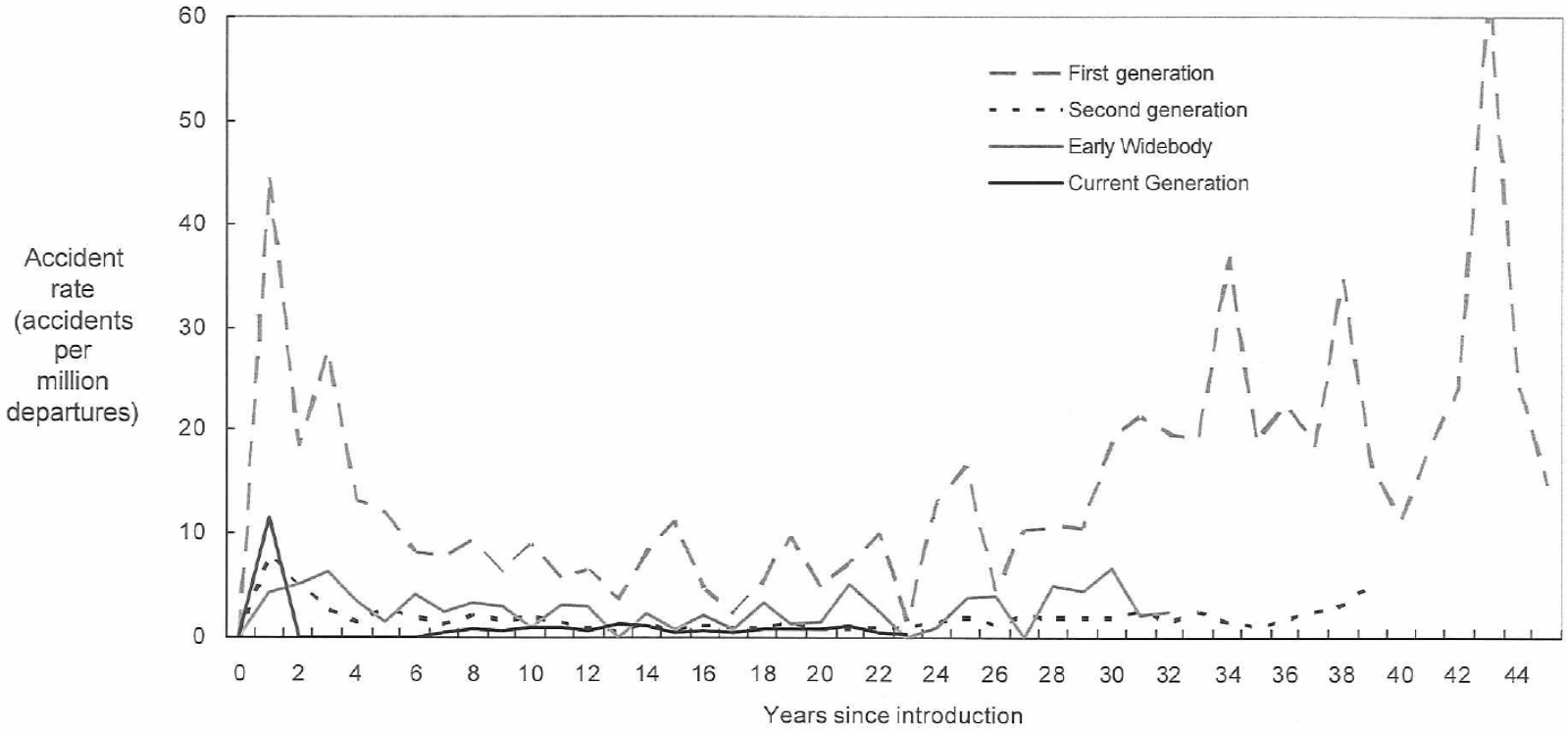
Map Displays

Error-Provoking Factors (continued)

- Inconsistencies
- Distractions/interruptions
- Insufficient knowledge and skills
- Fatigue
- Something that differs from cultural norms
- Language issues
- Many others…

Accident Rates by Years Following Introduction

Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2003



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