



BRIEF HISTORY OF CRM

1 | Welcome

Facilitator:
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职业经历及专业

教育/专业背景

- 工商管理硕士 MBA / 澳大利亚墨尔本 RMIT 大学
- 法学硕士 (Juris Doctor/LLM) / 台湾东吴大学法学院
- 电子工程/计算机工程本科BS / 台湾龙华科技大学

飞行员: 机型签注A319/320/321/330/340/MD11/744

- 飞航机械员 / 747-200
- 乘务员 / 737/A300/747-200/747-400/MD-11
- 航空器事故调查员-飞机 / FAA (USA)
- 航线检查员 / FAA (USA)
- 上海吉祥航空/飞行教员
- 工业电子技术士 / 中国台湾
- 辐射侦检技术士 / 台湾原子能委员会

现职:

- 上海吉祥航空飞行教员机长
- 中国民航PEPEC民航英语执照评分员

Introduction To Facilitator

A

2

**Introduction to
C-rew (Cockpit)
R-esource
M-anagement**

**In the early 70s',
continuous major aviation
accidents triggered the
call for the remedy to
stop the trend.**

Accidents Reshaped the History

2-1

1956 | **GRAND CANYON** | TWA FLIGHT 2 & UNITED
FLIGHT 718

- **Improvements in air traffic control system**
- **Creation of FAA**

Accidents Reshaped the History

2-2

1972 | **MIAMI FLORIDA** | EAL 401

Fixation, Workload Management

Accidents Reshaped the History

2-3

1978 | **PORTLAND** | UNITED FLIGHT 173

Fixation, Workload Management

Accidents Reshaped the History

2-4

1979 | Chicago | AMERICAN AA 191

Improvement: MX Procedure

Accidents Reshaped the History

2-5

1983 | **CINCINNATI** | AIR CANADA FLIGHT 797

Change: Lavatory smoke sensors

Accidents Reshaped the History

2-6

1985 | **DALLAS/FORT WORTH** | DELTA FLIGHT 191

Change: Downdraft detection

Accidents Reshaped the History

2-7

1985 | Japan | JAPAN AIRLINES 123

Improvement: Mx Procedures

How it all gets started

Excluded bomb, hijacked, shot down, explosion, unknown, etc.

≐ [166](#) major crashes recorded during 1970s

≐ [168](#) major crashes recorded during 1980s

≐ [230](#) major crashes recorded during 1990s

Accidents
Reshaped the
History

2-8

3

**FAA CAMI (USA)
“TheHistory of CRM”**

FAA

4

So what is it, the CRM?

“Oh I believe in resource management all right.....you are the resource, and I am the management! ”.

第一代-驾驶舱资源管理 - IATA

1ST GENERATION- COCKPIT RESOURCE MANAGEMENT -IATA

Problem Focus 问题针对性



- Business Management orientation
商业利益导向（空难发生后的损失巨大）。
- Interpersonal Relationships/ Leadership Styles
人际关系及领导风格。
- Psychobabble language distant from Pilots
飞行员听不懂的心理学呓语。
- The “Unassertive” Co-pilot
畏首畏尾的副驾驶。

第二代-机组资源管理 – IATA

2ND GENERATION- CREW RESOURCE MANAGEMENT - IATA

Problem Focus 问题针对性



- Error Chain & Accident Causality
差错链以及空难发生的根本原因
- Teambuilding Games
团队组建的演练
- Situational Awareness and Stress Management Concepts
情境意识以及压力管理理念的提出
- Cluster Knowledge (Decision Making, Briefing, etc.)
明确的识别了机组运行时技术与非技术区块的行为

第三代-代次提升的机组资源管理 – IATA/FAA

3RD GENERATION-ADVANCED CRM – IATA/FAA

Problem Focus 问题针对性



- CRM Integration with technical training / performance

CRM 开始从理论的引导建立，逐渐导入到基础性的培训以及能力的识别

- Instructor CRM Training

开始导入对于教员CRM理念的培训

- Included Dispatchers, Flight Attendants, Engineers

CRM理念上涵盖的对象逐渐向外扩张到签派、乘务员、机务

Source: IATA 2005

第四代-代次整合的机组资源管理 - IATA

4TH GENERATION-INTEGRATED CRM - IATA

Problem Focus 问题针对性



- CRM embedded in procedures/checklists (e.g. approach checklist)
CRM的理念开始具体落实到实际的操作程序，例如近进检查单
- Specialized topics e.g. Automation
开始关注在更细化的议题，例如自动化
- Performance based CRM
从CRM理念的演示开始转换到关注能力的表现

第五代-差错与威胁的预防（管理） - IATA/FAA

5TH GENERATION- ERROR MANAGEMENT – IATA/FAA

Problem Focus 问题针对性



■ Ubiquity of Human Error

确认了基于人性因素的不可测性，可以导出人为错误无所不在

■ Manage Errors by 对于错误的管理可以透过下面操作来实现

- Avoidance 对于错误事前的防范措施
- Trapping 错误发生前及时识别与制止
- Mitigation 错误发生后消除以及结果的管控

okay, but what do you DO?

5

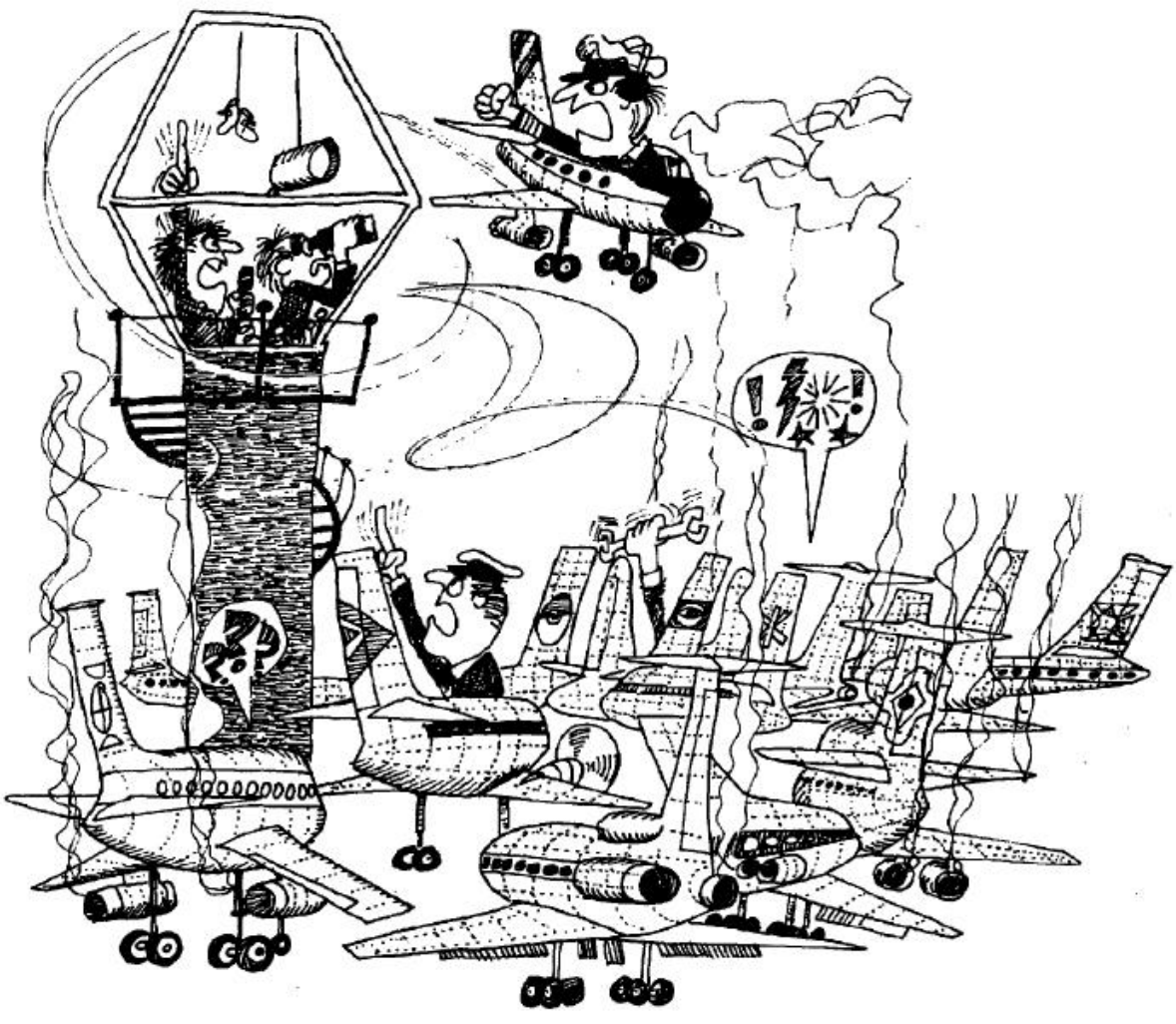
Does it work?

The number speaks for itself.

6

Objectives Learned

- ⇒ Safety and Efficiency?
Safety=No incidents nor accidents
Operational proficiency
- ⇒ Proficiency(Edward's SP model)
Effectiveness=Do the right thing
Efficiency=Do the things right



Source: ICAO DOC 9683 pp:1-1-14

Our working Environment

CRM群集- 技术性的和非技术性的

THE CLUSTERS OF CRM – TECHNICAL & NON TECHNICAL



1 | Aviation
Pilots' non-technical skills (NOTECHS)

5 | Trauma
Non-Technical Skills (T-NOTECHS)

Bridge Resource Management (BRM) | **2**
Marine industry

Oil offshore well control (WOCRM) | **6**
Oil Well Operations

3 | Surgeons
Non-Technical Skills (NOTSS)

7 | IAEA (Atomic) Nuclear industry
Non-Technical Skills (NTS)

Non-Technical Skills (ANTS) | **4**
Anaesthetists

Non-Technical Skills (NTS) | **8**
Fire Fighting Industry

Variations of Crew Resource Management (CRM)

CRM has been applied in several domains, several examples include:

1 | SAW

情境意识
Situational Awareness

沟通
Communication

COM | **2**

3 | WLM/LTW

Workload management
Teamwork 团队分工

Problem-Solving
解决方案

PSD

| **4**



“CRM” without Pro Thinking

Problem? SA

✓ YES

Communication?

✓ YES

Tasks Allocation

✓ YES

Workload Management?

✓ YES



CRITICAL THINKING

Question?



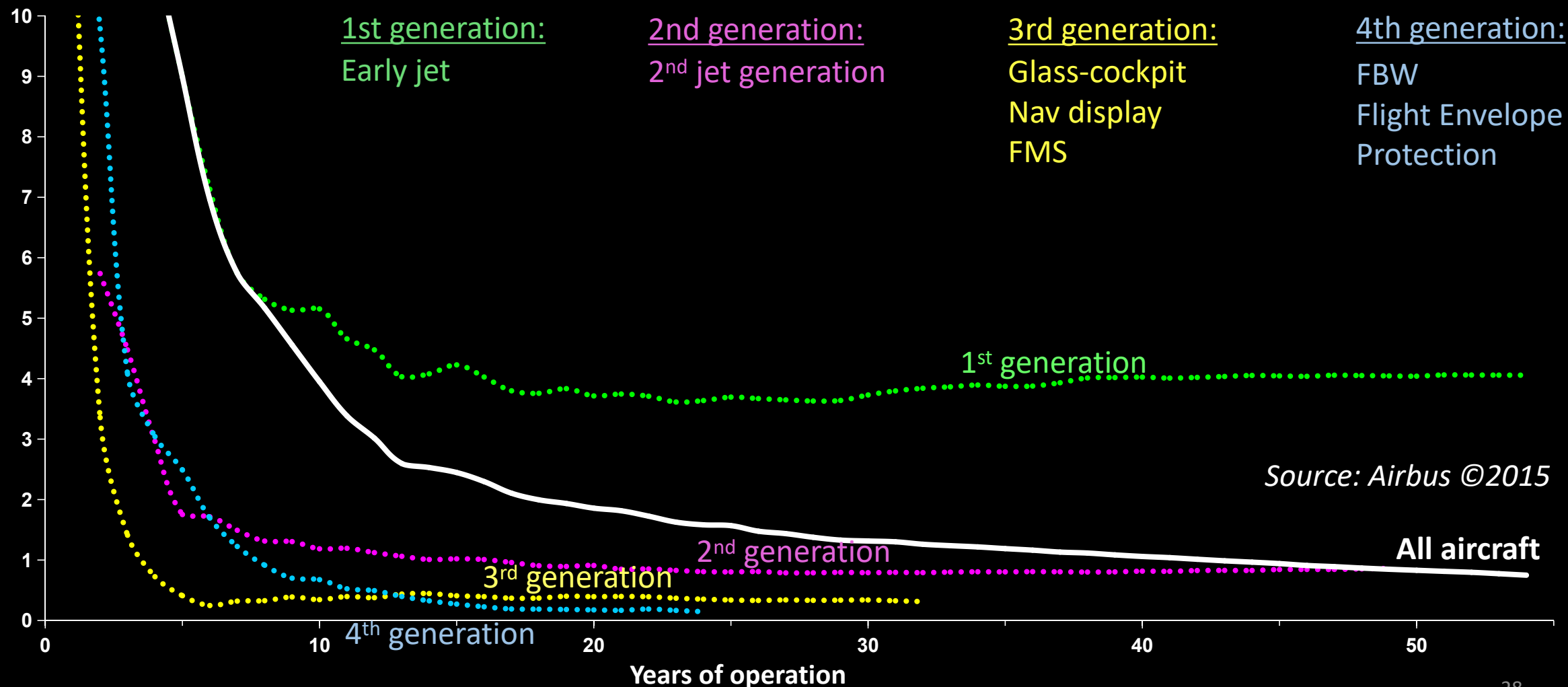
See you in the near future for further elaborations.

GuruMaster.org

重大失事率- DEC. 2012

FATAL ACCIDENT RATE – DEC. 2012

Fatal accident per million departures

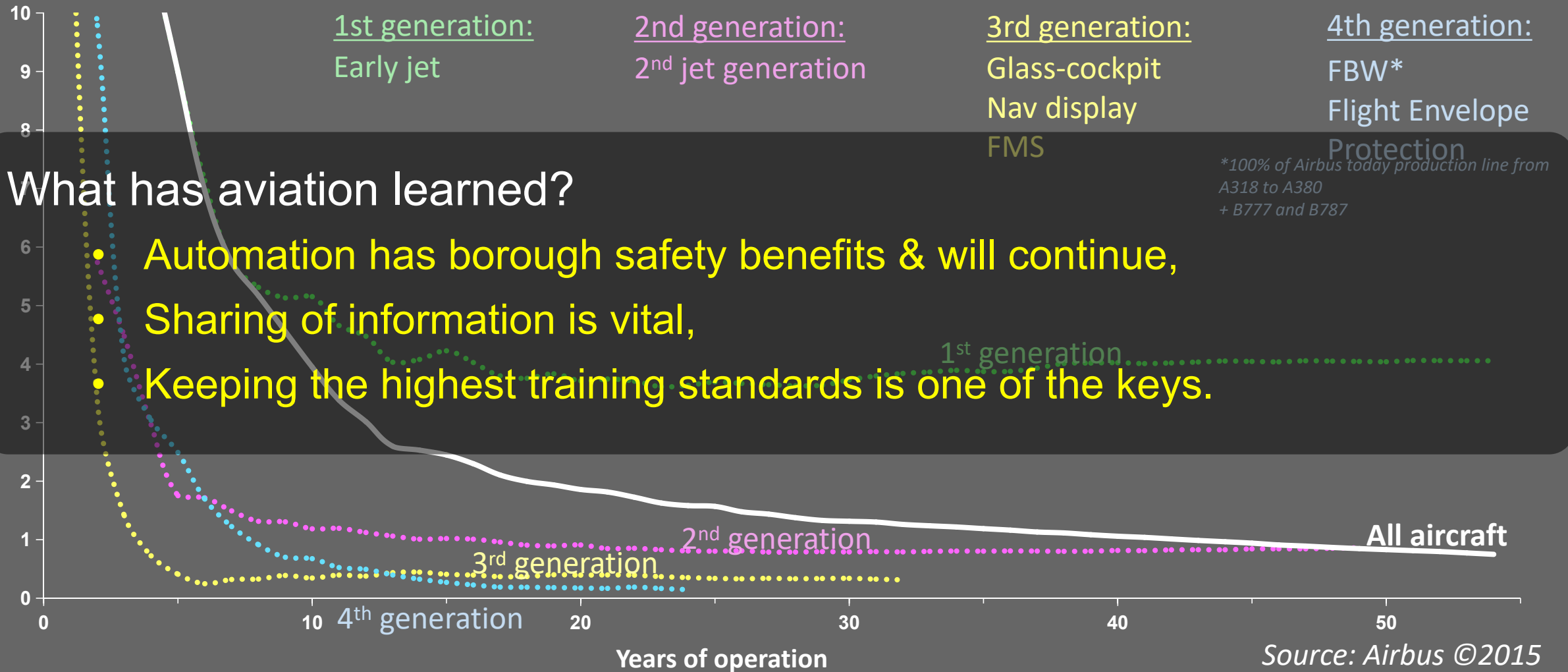


Source: Airbus ©2015

重大失事率显著获得降低的启示

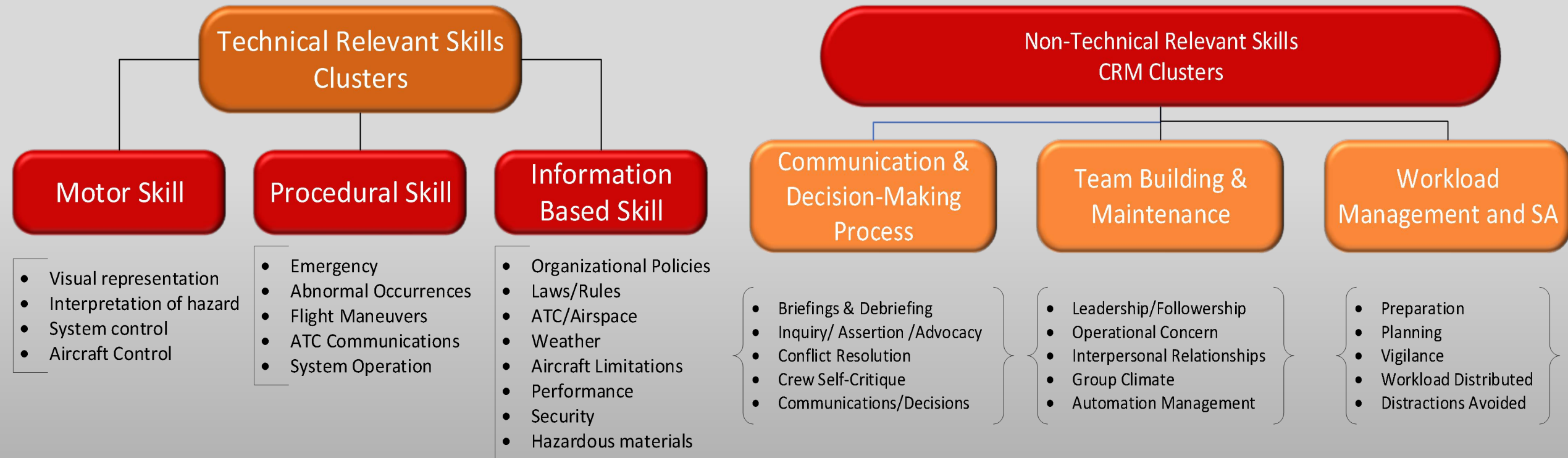
WHAT ENLIGHTENMENT WE HAVE BY DRAMATIC LOWERING A/R

Fatal accident per million departures



CRM群集- 技术性的和非技术性的

THE CLUSTERS OF CRM – TECHNICAL & NON TECHNICAL





CIVIL AEROSPACE MEDICAL INSTITUTE

中文字幕 (Caption) by : Capt. Edward Kan
Courtesy of CAMI/FAA