

# *Emergency Planning – An Airports Perspective*

*5th . International Conference For fire Brigades in the Oil & Chemical Industry  
17 -18 November 2009, Mol Plc. Danube Refinery, Százhalombatta*

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## Fire Department Frankfurt Airport – Overview

## Emergency Planning – An Airports Perspective



# Airport Fire Department – Facts



228 Employees

3 Fire Stations

94 Fire Fighters/Shift

54 Fire Fighters On-Duty 24/7

24 hr. Shift System

>60 Vehicles

>45 Swap-Out Containers







St. 3

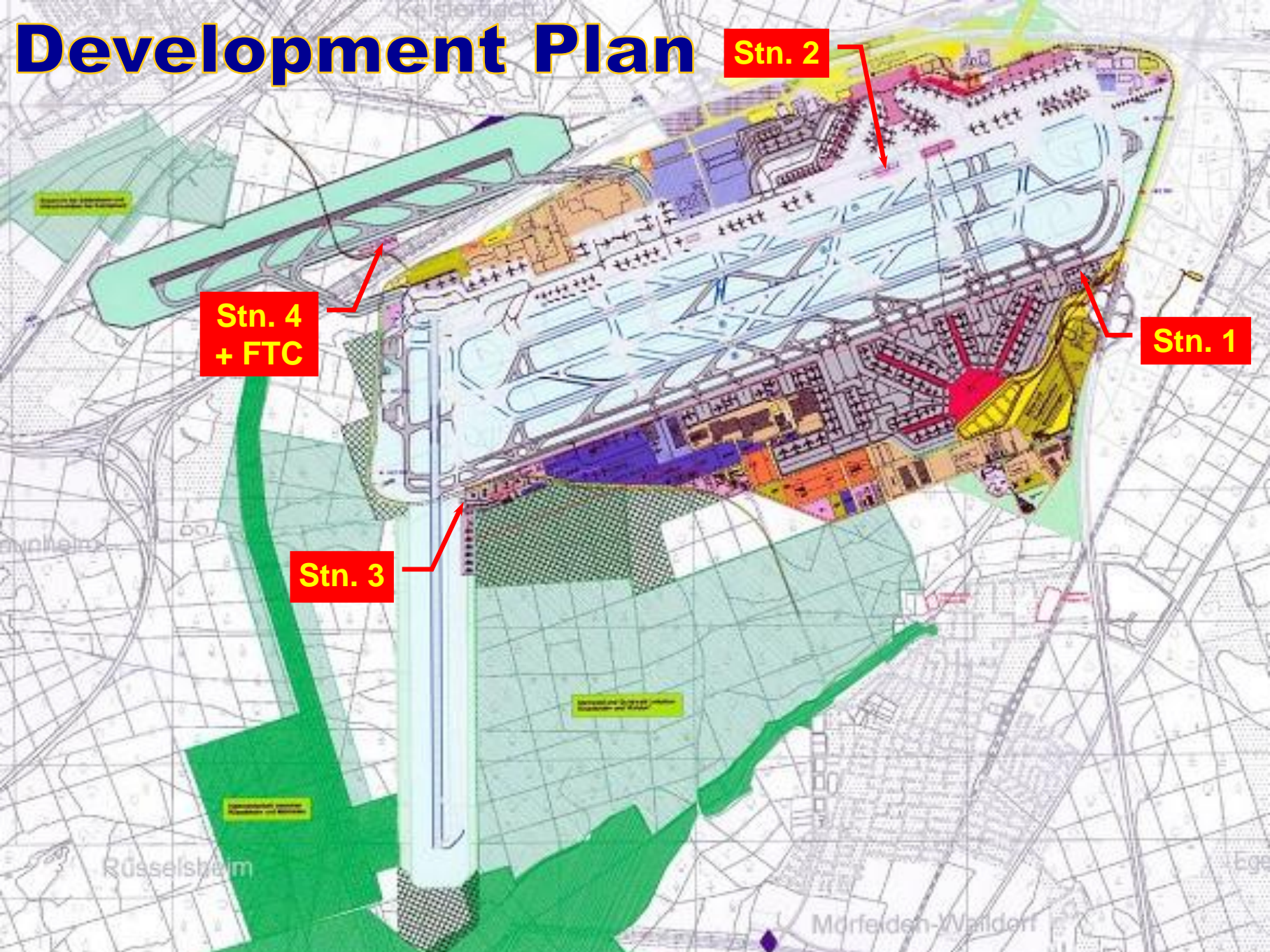
St. 2

FTC

St. 1



# Development Plan



# *Main Tasks*

Aircraft Rescue & Fire Fighting (ARFF)

Structural Fire Fighting / Industrial Fire Fighting

Hazardous Materials / Technical Rescue

Fire Prevention / Fire Training

Disabled Aircraft Recovery

First Responder Emergency Medical Service (EMS)





# *Emergency Planning – An Airports Perspective*



Challenges



Hazard & Risk Analysis



Emergency Planning Principles

# ***Going Global: From Airport City to Aerotropolis***

Airports “urban growth generators”

Business and Industrial Parks

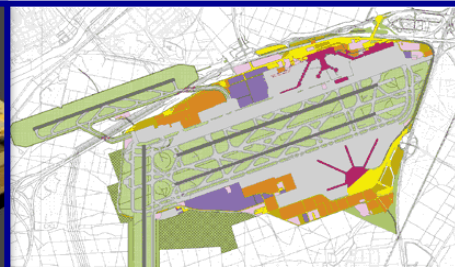
Logistic Centers

Rail and Seaports – Mass Transportation

Retail & Commercial

Media and Communication

Hotels, Tourism, Entertainment





# ***The Challenge for Airport Fire Services***



AEROTROPOLIS means, that

- ☞ The main task of the Airport Fire Services is no longer limited to aircraft rescue and fire fighting
- ☞ Increased risk potential equals = increased fire and rescue responsibilities
- ☞ **CHANGE MANAGEMENT**
  - ☞ Increased Resources (Manpower, Equipment & Facilities)
  - ☞ Qualification & Training
  - ☞ Quality and Benchmarking

# ***The Fire & Rescue Challenge of New Large Generation Aircraft***


- 
- A large white commercial airplane, likely an Airbus A380, is shown in flight against a blue sky with light clouds. The aircraft is angled upwards and to the right, with its two engines visible. The text of the list is overlaid on the left side of the image.
- ➡ Aircraft Rescue & Fire Fighting Key Concerns
  - ➡ Evaluating Aircraft Rescue & Fire Fighting Capability
    - ➡ A look at Past, Present & Future Requirements
  - ➡ Preparing For New Large Aircraft Operations
    - ➡ Testing Current Capability
    - ➡ Advanced ARFF Technology
    - ➡ Pre-Emergency Planning
    - ➡ Training

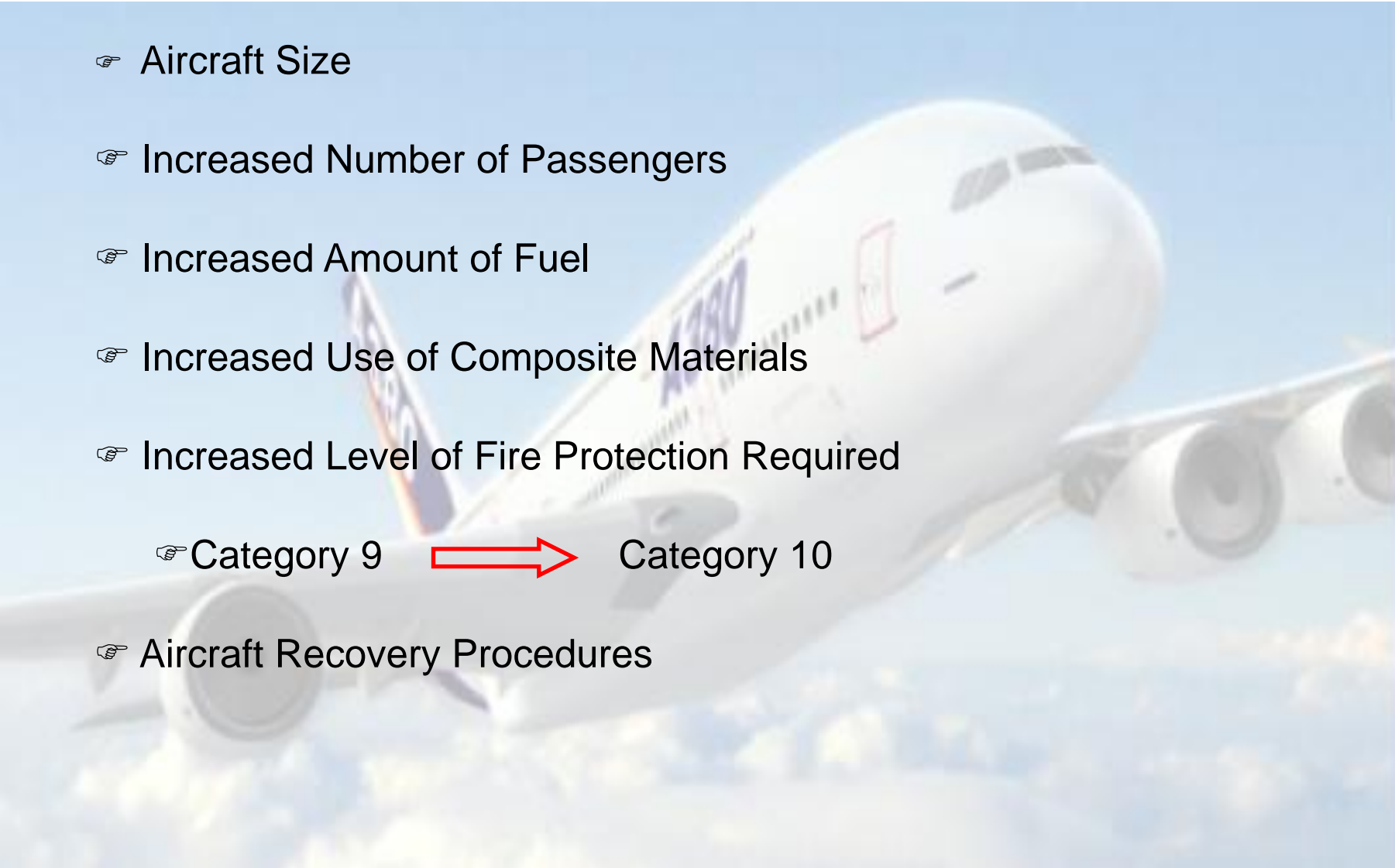


# ***The Fire & Rescue Challenge of New Large Generation Aircraft***



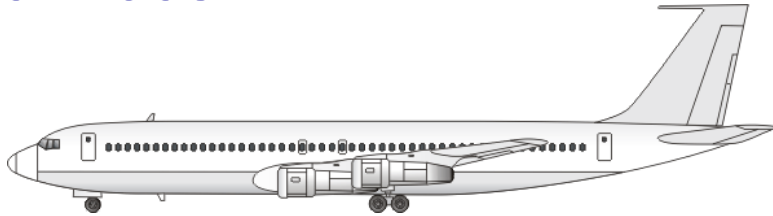
# New Large Aircraft – Key Concerns

- ☞ Aircraft Size
- ☞ Increased Number of Passengers
- ☞ Increased Amount of Fuel
- ☞ Increased Use of Composite Materials
- ☞ Increased Level of Fire Protection Required
  - ☞ Category 9  Category 10
- ☞ Aircraft Recovery Procedures

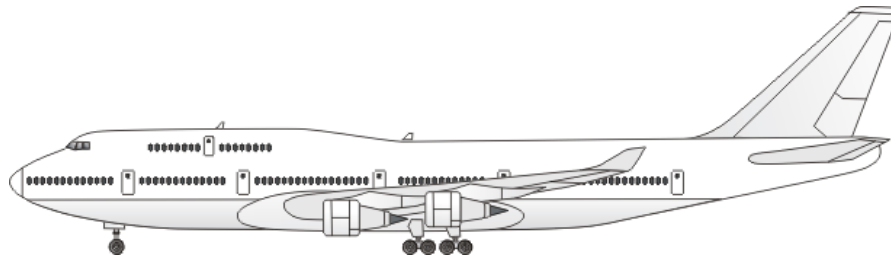




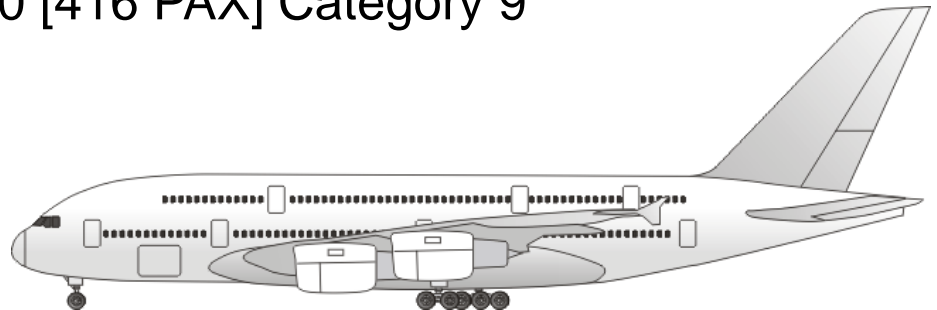
# ***The Evolution of Aviation and ARFF Services***



Boeing 707-320 [142 PAX] Category 7



Boeing 747-400 [416 PAX] Category 9

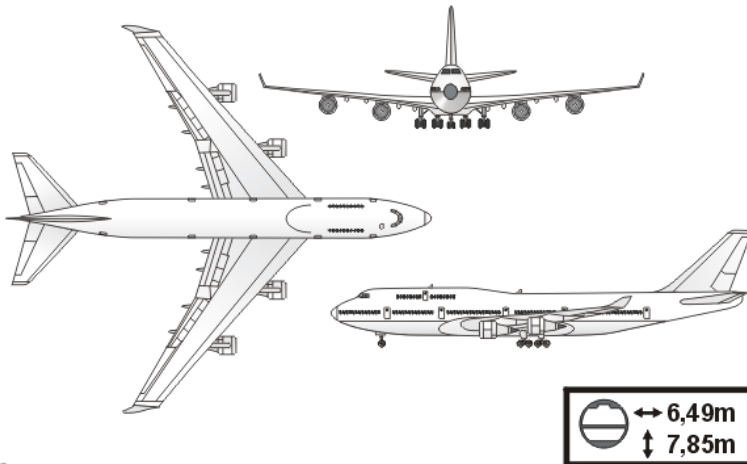


Airbus A380-800 [555] PAX] Category 10

# Aircraft Comparisons

**Boeing 747**

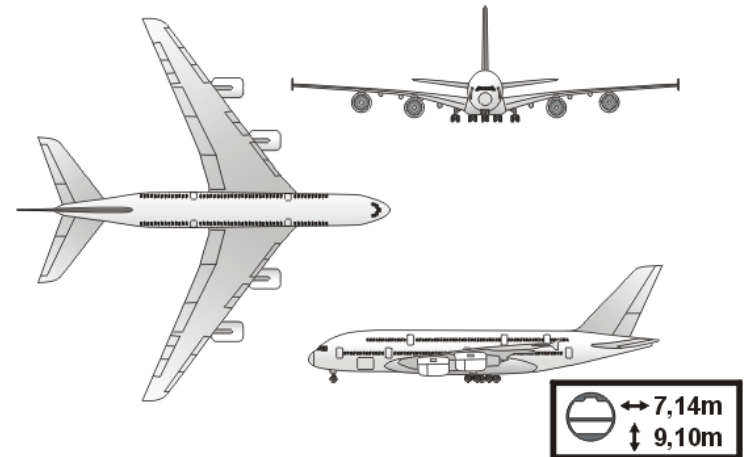
B 747 - 400



© Andreas Lochmeier

**Airbus A380**

A380 -800



© Andreas Lochmeier

Length:	70.7m
Wingspan:	64.5m
Height:	19.3m
Pax:	416



Length:	72.7m
Wingspan:	79.7m
Height:	24.1m
Pax:	555

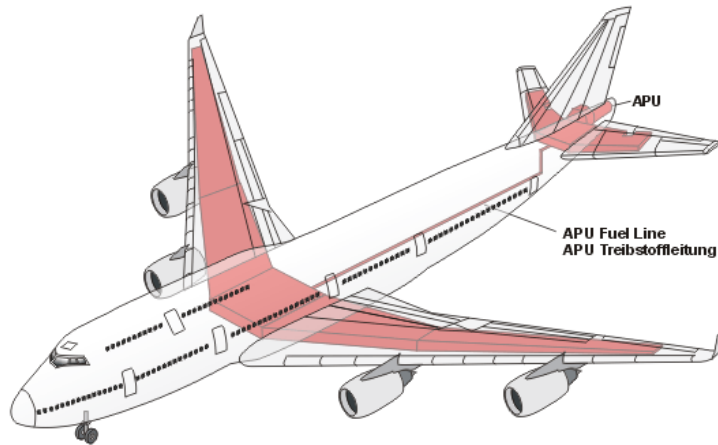


## ICAO – Airport Classification

Airport classification	Fuselage length	Fuselage width
1	0 bis < 9 m	2 m
2	9 m bis < 12 m	2 m
3	12 m bis < 18 m	3 m
4	18 m bis < 24 m	4 m
5	24 m bis < 28 m	4 m
6	28 m bis < 39 m	5 m
7	39 m bis < 49 m	5 m
8	49 m bis < 61 m	7 m
9	61 m bis < 76 m	7 m [B747-400]
10	76 m bis < 90 m	8 m [A380-800]

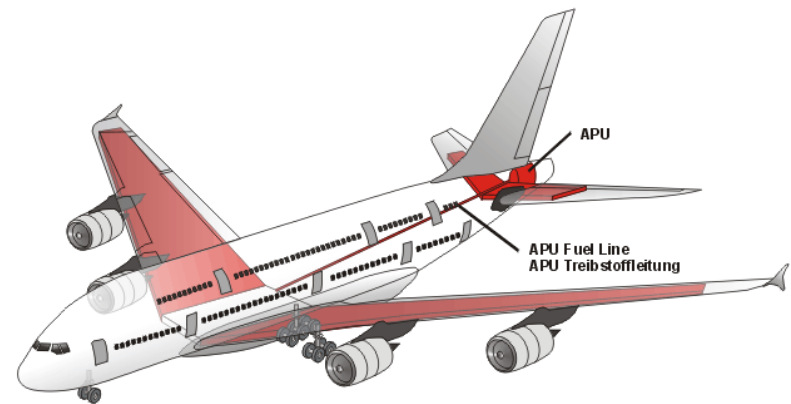
# Fuel Capacities - Comparison

**Boeing B747 - 400**



© Andreas Lochmeier

**Airbus A380**



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254,000 Liters



355,000 Liters

# Fire Fighting Agent Requirements

Frankfurt Airport



ARFF Station: 3

ARFF Station #2 = 34,500 liters

ARFF Station #3 = 34,500 liters

## Configuration:

3 ARFF Units, Engine-Rescue Unit,  
Rescue Stairs & Command Unit  
[Staffing = 18]

Total On-Duty 24/7 = 54

## Annex-14 Requirement:

## Actual Requirement based on formulas:

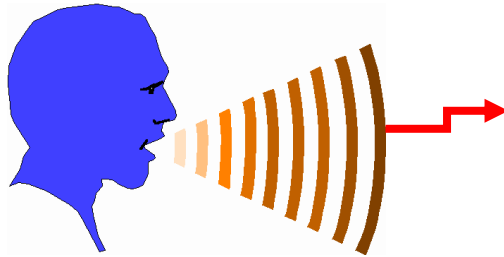
For the A380-800:	32,300 lt (Cat 10)	27,803 lt
For the B747-400:	24,300 lt (Cat 9)	24,789 lt ...
For the B777-300:	24,300 lt (Cat 9)	26,190 lt ...



Actual water requirements calculated for the A380 allow a 14% margin over current ICAO Annex-14 minimum requirements ...

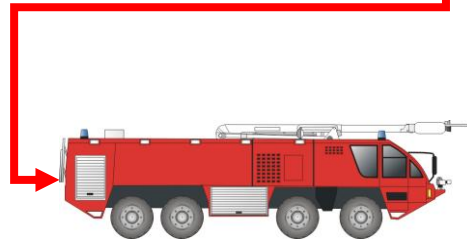
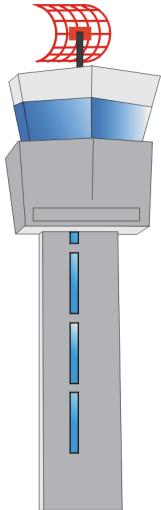


# Response Time / Extinguishing Agent



**Max. 3 Minutes**

**BOEING 747 -400**



**Min. 4500 lpm**



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**4 Minutes = min. 3 Vehicles (24300 / 9000 lpm)**

# Response Time / Extinguishing Agent

**Max. 3 Minutes**

**Airbus A 380**



**4 Minutes = min. 3 Vehicles (32300 / 11200 lpm)**

# Aircraft Door Heights - Comparison

## Boeing B747



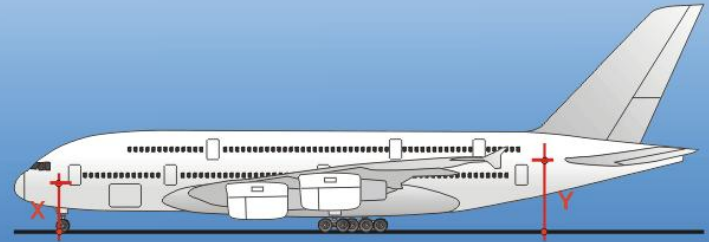
**X = 4.87 m**

**Y = 7.47 m**

**X = 16ft.**

**Y = 24ft. 6in.**

## Airbus A380



**X = ~5.20 m**

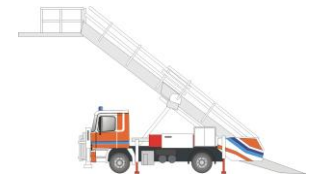
**Y = ~7.95 m**

**X = 17ft.**

**Y = 26ft**

Emergency Access/Egress


No major differences in door heights



***Key Concern – Increased No. of PAX in Upper Deck***



# Airport Category – ARFF Vehicles Required

Category	Vehicle
1	1
2	1
3	
4	
5	
6	
7	2
8	3
9	3
10	3

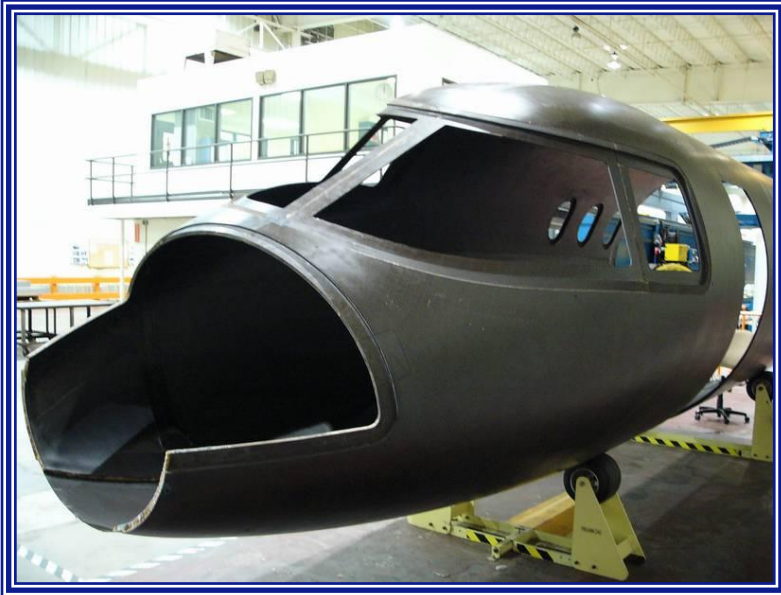
Category	Vehicle
1	1
2	1
3	1
4	
5	
6	
7	3
8	3
9	4
10	4

# ARFF Vehicle Technology



- ➡ High Reach Elevating Turret – 15m
- ➡ Night Vision/Infrared Camera
- ➡ 12,500 Liters Water
- ➡ 1,500 Liters AFFF 3%
- ➡ 500 kg Dry Chemical Powder
  - ➡ Hydro-Chem Technology
- ➡ Electronic Taxiway Navigation Array (ETNA) GPS
- ➡ 0-80 km/h = < 30 seconds, 140 km/h

# Composite Materials In Aircraft Construction



**Carbon Fiber Reinforced Plastic (CFRP)**

**Glass Fiber Reinforced Plastic (GFRP)**

**Quartz Fiber Reinforced Plastic (QFRP)**

**Glass Reinforced Aluminum Laminate (GLARE)**

## **Advantages**

**Physical Strength**

**Light Weight**

**Resistance to Corrosion**



# Use of Composites in Aircraft

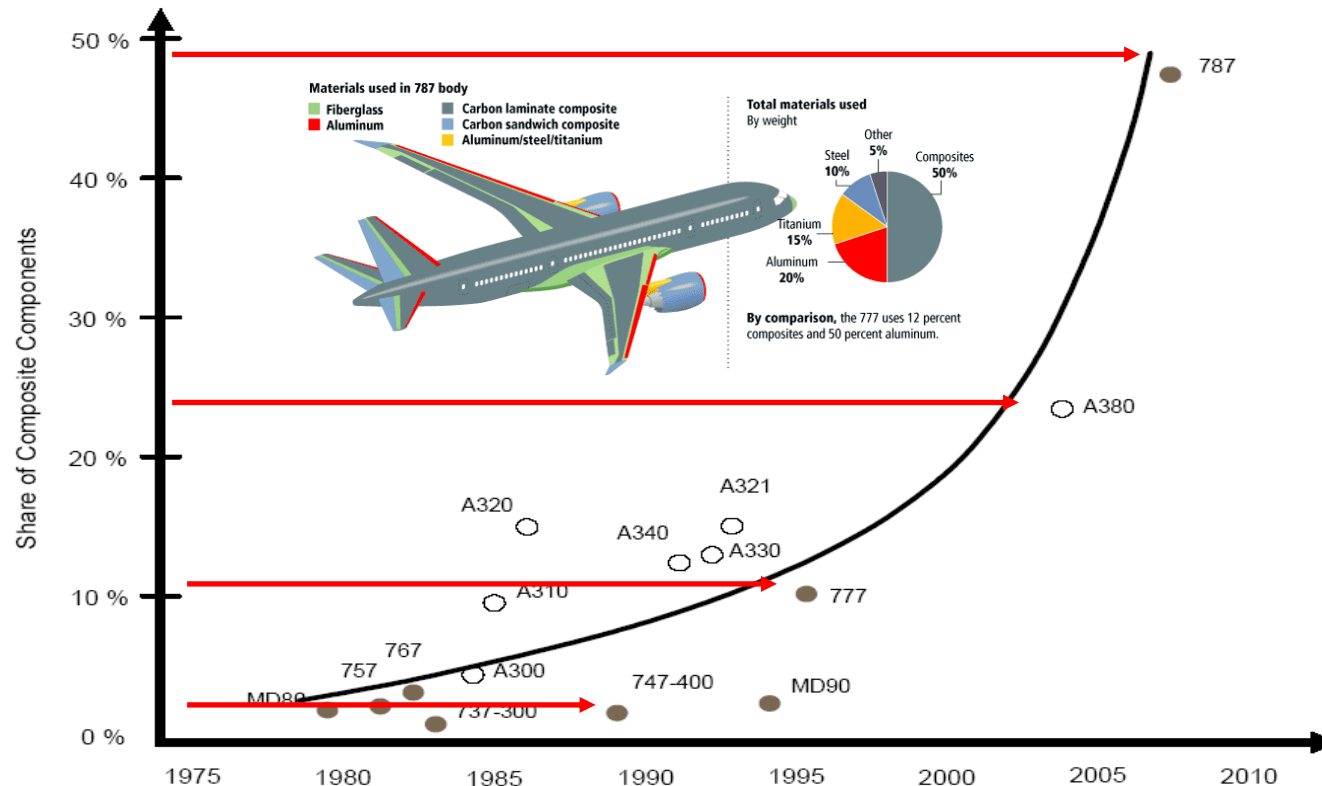


FIGURE 1-2 Percentage of composite components in commercial aircraft. SOURCE: *The Research Requirements of the Transport Sectors to Facilitate an Increased Usage of Composite Materials. Part I: The Composite Material Research Requirements of the Aerospace Industry*. Report prepared by EADS Deutschland GmbH, Corporate Research Centre, June 2004.

# Aluminum Fuselage vs. Composite Fuselage



Aluminum Fuselage



Composite Fuselage

Concern: Fuselage Integrity Upon Impact ?

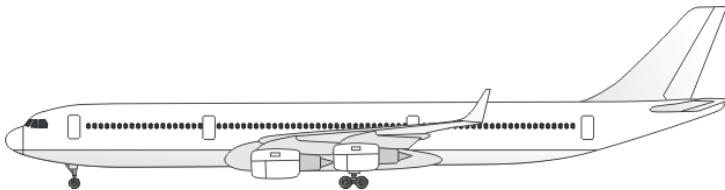
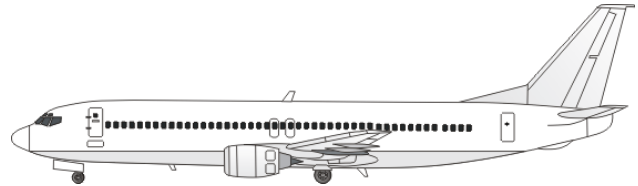
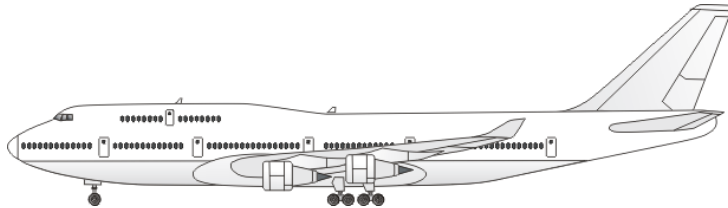
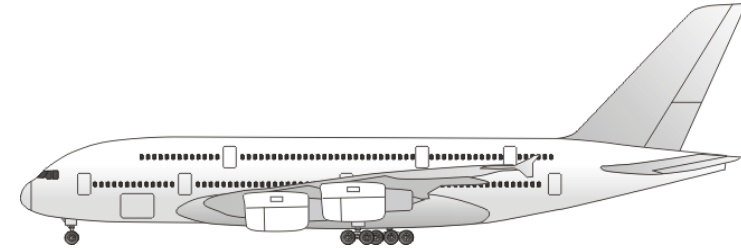
# Emergency Preparedness - Key Issues

- ☞ Hazard and Risk Analysis
- ☞ Pre-Emergency Planning
- ☞ Acquisition of Resources Based On Risk Potential
- ☞ Qualification and Training – Competency Based Training
  - ☞ ***“Train as if your life depends on it.....because it does”***
- ☞ Testing and Maintaining Your Emergency Response Posture





# Hazard & Risk analysis



***Types of Aircraft.....Size, Fuel Loads, Passengers?***

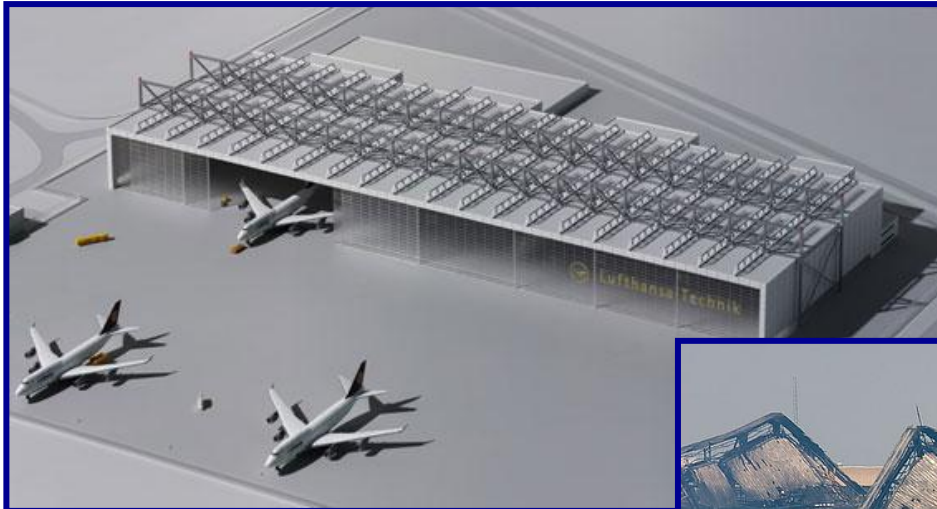
# Hazard & Risk Analysis - Airport Infrastructure



□ Train from airport to city center



# Aircraft Maintenance Facilities and Hangers



Fire Suppression Systems

Pre-Emergency Plans





# Fuel Storage Facilities



Sufficient Fire Fighting  
Agent Available?

Hazard Control Measures





# Airport Terminal & Business Centers



High Occupant Loads

Installed Fire Fighting Appliances?

Sufficient Means of Egress?

Evacuation Plans?



# Cargo & Logistic Centers



High Fire Loads

Hazardous Goods



Sprinkler Protection?

Sufficient Water Supplies?

# Hazardous Materials



Types of Cargo ?

Storage Locations/Procedures ?

Airport Hazmat Team

Level of Training



## ***Disabled Aircraft Recovery***

Level of Training

Equipment Availability



Aircraft Recovery Plan?

Recovery Team Organized?





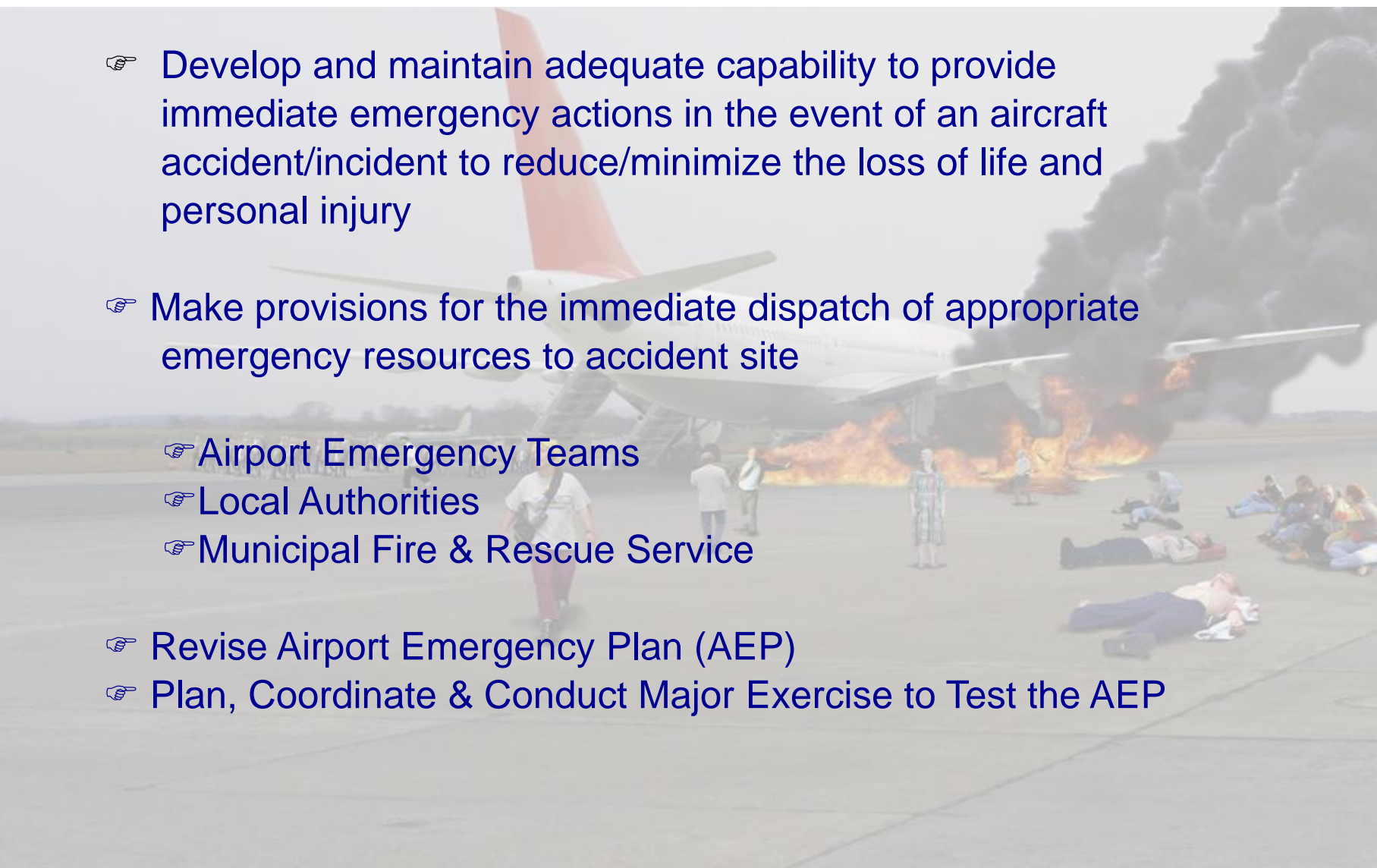
## ***Aircraft Accidents Happen.....***



Sufficient Resources Available?

How Effective is the Airport Emergency Plan?

# Emergency Planning

- 
- A background image showing a large commercial airplane on a runway. The rear section of the plane is engulfed in flames, with thick black smoke billowing into the sky. Several people are visible on the tarmac; some are standing, while others appear to be lying on the ground, suggesting an emergency response scenario.
- ☞ Develop and maintain adequate capability to provide immediate emergency actions in the event of an aircraft accident/incident to reduce/minimize the loss of life and personal injury
  - ☞ Make provisions for the immediate dispatch of appropriate emergency resources to accident site
    - ☞ Airport Emergency Teams
    - ☞ Local Authorities
    - ☞ Municipal Fire & Rescue Service
  - ☞ Revise Airport Emergency Plan (AEP)
  - ☞ Plan, Coordinate & Conduct Major Exercise to Test the AEP

# ***Airport Emergency Plan Document***

## **Purpose and scope:**

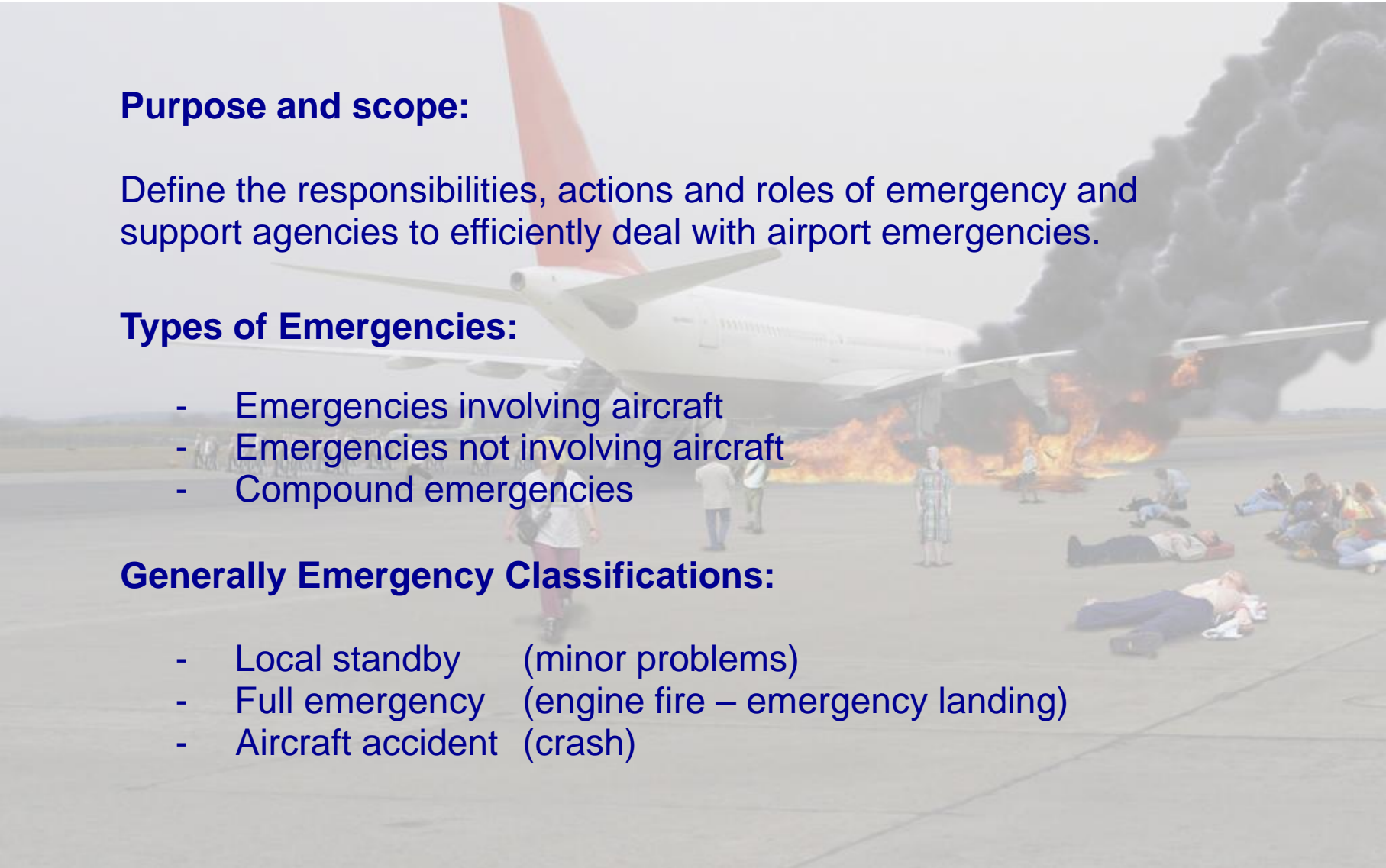
Define the responsibilities, actions and roles of emergency and support agencies to efficiently deal with airport emergencies.

## **Types of Emergencies:**

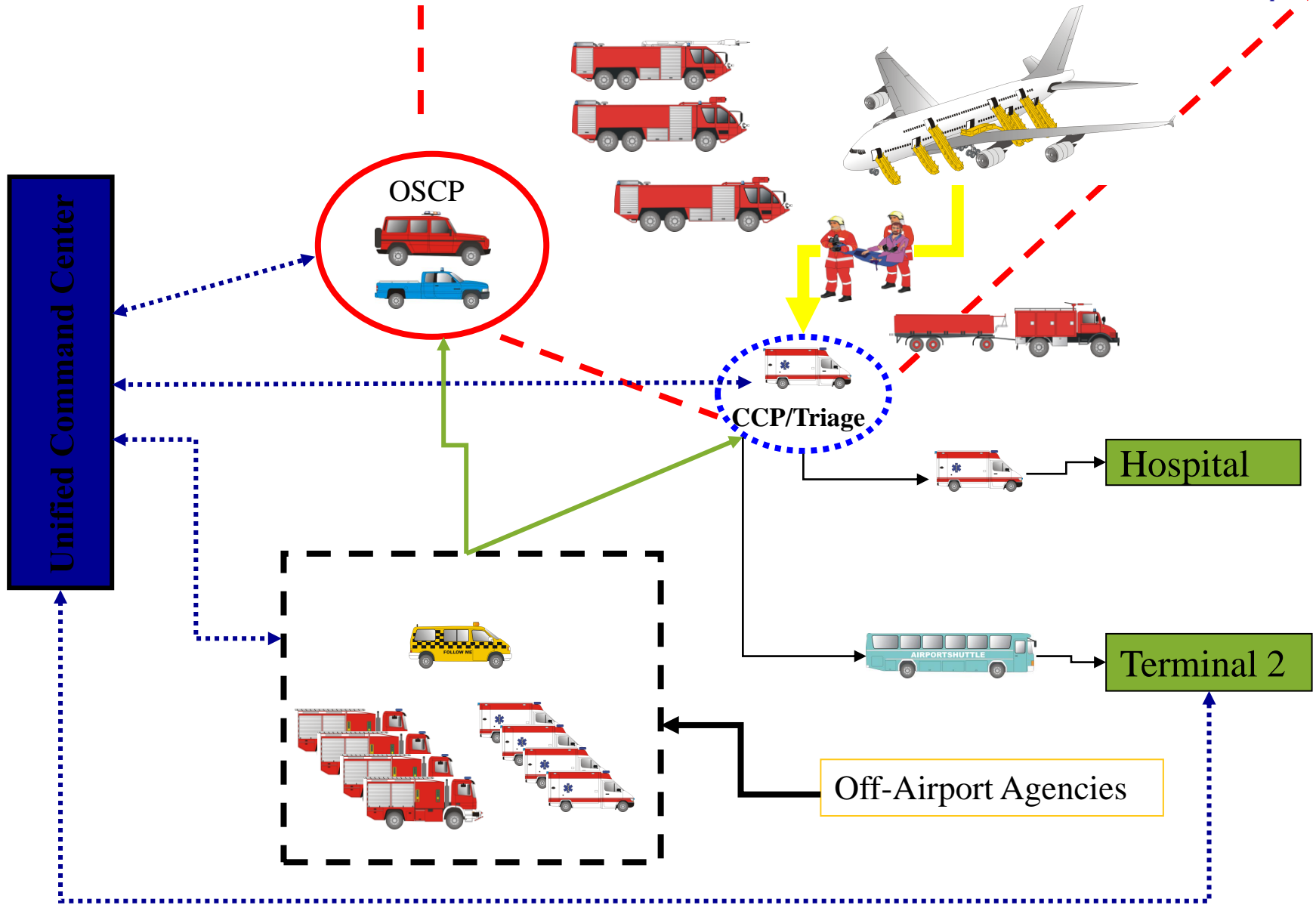
- Emergencies involving aircraft
- Emergencies not involving aircraft
- Compound emergencies

## **Generally Emergency Classifications:**

- Local standby (minor problems)
- Full emergency (engine fire – emergency landing)
- Aircraft accident (crash)



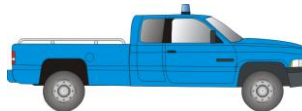
# Mass Casualty Incident Planning





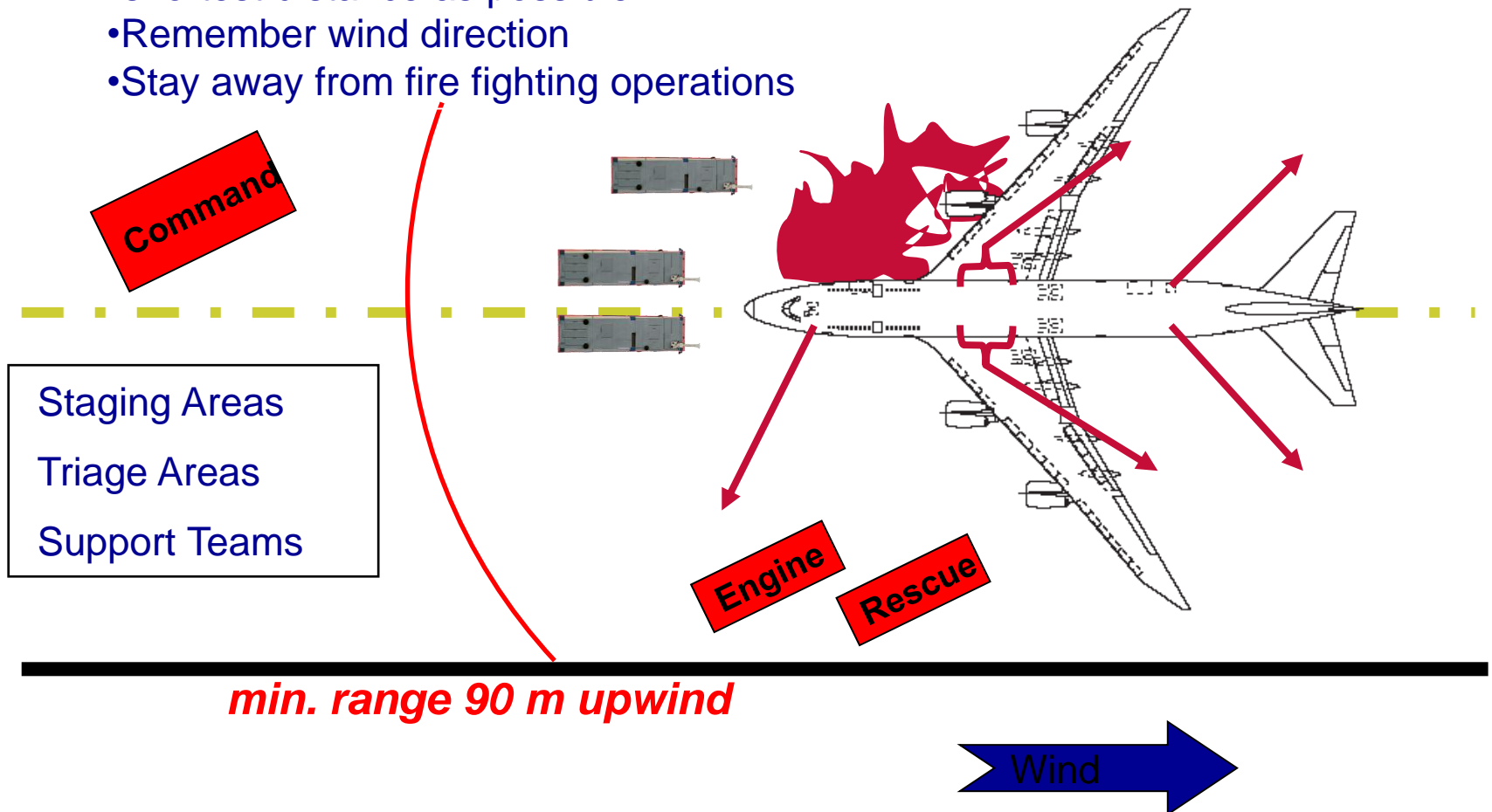
# Emergency Planning & Exercising

- Rescue & Fire Fighting
- Medical Care
- Security
- Evacuation
- Incident Management/Coordination
- Transportation
- Staging Areas
- Passenger Services
- Public Relations



# Triage and Medical Care

- Establish the needed areas in the shortest distance as possible
- Remember wind direction
- Stay away from fire fighting operations



# Resource Acquisition

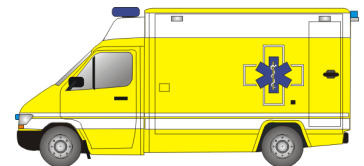
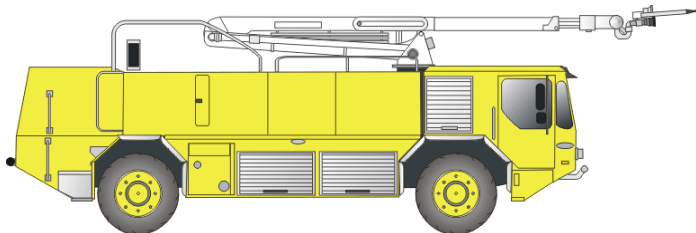
Manpower

Agents



Vehicles

Support



# Qualification & Training Standards

- ☞ Competency Based Training – “Skill Based Training”
  - ☞ Train with a purpose
  - ☞ Establish “realistic” training objectives

## ☞ Minimum Airport Fire Fighter Qualification Standards

- ☞ International Civil Aviation Organization
- ☞ National Fire Protection Association





# Live Fire Training Facilities



*Train as if your life depends on it.....because it does!*



# Live Fire Training Facilities/Simulators



*Photos Compliments of*

 **Kidde Fire Trainers**  
A UTC Fire & Security Company



# Change Management & The Airport Fire Service



- ✎ Adapt Broader Visions
  - ✎ Look into the future
- ✎ Cooperative Leadership
  - ✎ Internal
  - ✎ External
- ✎ Cross-Jurisdictional Cooperation
- ✎ Develop Management/Leadership Skills
  - ✎ Within all ranks
- ✎ Advancements In Technology
  - ✎ Look for Better ways of doing business
- ✎ Human Resource Development & Equipment # 1 Priority!



***Thank You for Your Attention***

