

Ground Handling



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Preface

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Part I

Problem Analysis

0.1 Emergency Protocols

Occasionally unexpected emergencies occur, which the airport needs to respond to. A standard service manual for handling potential emergencies exists. When designing systems for airports it is relevant to know how they handle emergency landings: Which runways to shut down and prepare for the emergency, how to handle incoming and outgoing traffic and other airport services. The manual suggest following plan for an aircraft accident on the airport:

In general a lot of different organisations is involved in these emergencies, each with their own responsibilities. The airport traffic services includes following:

Chapter 4 RESPONSIBILITY AND ROLE OF EACH AGENCY FOR EACH TYPE OF EMERGENCY

4.1 AIRCRAFT ACCIDENT ON THE AIRPORT 4.1.1 General The airport emergency plan shall be implemented immediately upon an aircraft accident occurring on the airport. For this type of emergency, responding agencies are expected to take action as described in 4.1.2 to 4.1.10 below. 4.1.2 Action by air traffic services 4.1.2.1 Initiate emergency response by using the crash alarm communication system (See Figure 8-1). 4.1.2.2 Notify the rescue and fire fighting service and provide information on the location of the accident, grid map reference and all other essential details, including time of the accident and type of aircraft. Subsequent notification may expand this information by providing details on the number of occupants, fuel on board, aircraft operator, and any dangerous goods on board, including quantity and location, if known. 4.1.2.3 Close the affected runway and minimize vehicle traffic on that runway to prevent disturbance of accident investigation evidence (See 4.1.5 2) f)). 4.1.2.4 If required, initiate communications to the police and security services, airport authority, and medical services in accordance with the procedure in the airport emergency plan. Provide the contacts with grid map reference, rendezvous point and/or staging area and airport entrance to be used. 4.1.2.5 Issue the following Notice to Airmen (NOTAM) immediately: "Airport rescue and fire fighting service protection unavailable until (time) or until further notice. All equipment committed to aircraft accident." 4.1.2.6 Verify by written checklist that the actions above were completed, indicating notification time(s) and name of person completing action.

4.3 FULL EMERGENCY 4.3.1 General The agencies involved in the airport emergency plan shall be alerted to "full emergency" status when it is known that an aircraft approaching the airport is, or is suspected to be, in such trouble that there is a possibility of an accident. 4.3.2 Action by air traffic services 4.3.2.1 Notify the airport rescue and fire fighting service to stand by at the predetermined ready positions applicable to the planned runway and provide as many of the following details as possible: a) type of aircraft; b) fuel on board; c) number of occupants, including special occupants — handicapped, immobilized, blind, deaf; d) nature of trouble; e) planned runway; f) estimated time of landing; g) aircraft operator, if appropriate; and h) any dangerous goods on board, including quantity and location, if known. 4.3.2.2 Initiate notification of the mutual aid fire department(s) and other appropriate organizations in accordance with the procedure prescribed in the airport emergency plan, providing, if necessary, the rendezvous point and airport entrance to be used.

4.4 LOCAL STANDBY 4.4.1 General The agencies involved in the airport

emergency plan shall be alerted to “local standby” status when an aircraft approaching the airport is known or is suspected to have developed some defect but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing. 4.4.2 Action by air traffic services Notify the airport rescue and fire fighting service to stand by as requested by the pilot, or stand by as local airport agreements require at the predetermined ready positions applicable to the runway to be used. Provide as many of the following details as possible: a) type of aircraft; b) fuel on board; c) number of occupants, including special occupants — handicapped, immobilized, blind, deaf; d) nature of trouble; e) planned runway; f) estimated time of landing; g) aircraft operator, if appropriate; and h) any dangerous goods on board, including quantity and location, if known.

In conclusion, a runaway can be assigned to "full emergency" or "local standby" statuses, and when an accident occurs, the affected area is closed and traffic through the area is minimized. Furthermore, a signal of NOTAM is issued to notify that airport rescue and fire fighting services are all currently occupied.

-source Airport Services Manual, Part 7 by International Civil Aviation Organization (ICAO) Second Edition - 1991

0.2 Prices and Services

Fuel is an important part of Ground Handling, since it is required to make aircrafts fly. Aalborg Lufthavn has an agreement with the Shell corporation to get their fuel supply from them. The fuel that is used is called 100LL, and is a very common aircraft fuel, it is priced at DKK 19.85 pr. liter, which means that if you would have to fill up a Boeing 737-800, which can contain 26,020 liters, it would cost DKK 516,497 + the startup fee.

As described above you can see that there is a lot of money going around in an airport, even when you take just one airplane into account. the airplanes need to get filled up often, since a Boeing 737-800 uses 3,200 liters of fuel pr. hour when it is in the sky. This means that if you where to fly from Aalborg to Copehagen it would cost, just in terms of fuel, DKK 47,640.

0.3 Luggage

Luggage is loaded on the plane using tugs, which transport containers with luggage. The Boeing 747 has seats for 416 passengers(<http://alturl.com/w7bfj>) and can carry roughly 6,500 kg of luggage. 9,568 kg if plane would be entirely booked and every passenger had a 23 kg checked luggage, and in this estimate, the hand luggage is not taken into account. To transport such an amount of luggage, tied planning and careful transport is necessary in order to bring the luggage on the airplane in a timely fashion.

Novia and SAS Ground Handling are two ground handling companies that have the responsibility of loading luggage(<http://alturl.com/y9jcc>). If a passenger's luggage is, by mistake, sent with a wrong plane, the passenger can contact the airline company, and then they will talk with the ground handling company, that handled the luggage. In Aalborg Lufthavn, luggage is equipped with a RFID chip that allows the airport to track the luggage, so as to make it easier to locate lost luggage.

0.4 Stakeholders

Personal

- Security
- Flight controllers
- Emergency crew
- Clean up crew <http://alturl.com/3onjh>
- Catering staff
- Mechanics
- Flight Crew
- Baggage handlers
- Boarding Personal

The Airport

- Administrators

The Airline companies

- SAS, Lufthansa, Norwegian, etc...

Passengers

- Check-in
- Delays

0.5 Organization

Supply chain(Fuel, Water, Food) Infrastructure(Taxiing, Gates)

0.6 Technology

Computers Smartphones GPS Internet(Servers) Databases(Arrivals,

0.7 Existing Solutions

(FILL IN LATER!)

0.8 Solutions

Make an information system to achieve:

- Optimized infrastructure(Taxiing, Passengers, Fuel)
- Prices(Total Price for ground handling services)
- Servers bases solution, accessible on various platforms/interfaces
- Passenger handling(Baggage Boarding, Food, Water)

0.9 Problem Statement

Ground handling companies often hire low-paid workers, who work in an environment where they are exposed to congestion, stress, noise, jet-blast, extremes of weather and sometimes low visibility conditions. Stress is a very big part of the work in an airport, especially for the ground handlers, since airlines do not make money while the aircraft is not in the air; hence the ground handlers are very pressed on time. In many places it is also the workers who are responsible for delays and in case of a delay can be deducted in salary.

When a worker is stressed he is more likely to make mistakes, which could lead to serious accidents. These accidents can first and foremost become dangerous for the workers because they can be hurt as a result of an accident. A survey made by ACI[citation needed] in 2004 showed that out of 15,119,020 aircraft movements 3,233 had accidents, concluding that 0.214% of all turnovers had accidents.

Accidents do not only lead to dangerous situations for the workers, but can also become very expensive for the companies; first of all because of the cost of the repair, but also because the aeroplane will then have to spend more time on the ground.

0.9.1 Problem Formulation

Most of the delays and errors that happen to aeroplanes are caused by the ground handlers, who service the planes. Is it possible to reduce stressfactors and optimize performance for ground handlers, by making an information system, that can dynamically manage ground handlers' tasks throughout the day?

0.10 Airtraffic from Aalborg Airport

By 2013 there were more than 6.000 official airline flights from Aalborg airport, of them, the most common types of aircraft are shown in the table below:

Aircraft	Flights
BOEING 737-800	2919
AIRBUS A-320	2544
FAIRCHILD DORNIER 328	1080
EMBRAER ERJ 190-100	732
AIRBUS A-321	725
FOKKER 70	723
SAAB 2000	370

Aalborg Airport, also have a private airtaxi service called North Flying, which can fly private person [<http://www.aal.dk/b2b/north-flying/#.UveuHvldVYU>].

2.500 cargo flights are made daily [<http://www.aal.dk/b2b/cargo-fragt/#.UveuFfldVYU>].

Part II

Product Development