The Pit Stop 20 Project

How SAS Became the World's Most Punctual Airline

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Outline

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2. Problem Domain

3. Innovative Solutions

4. The Need for Continuity

Market Dynamics and Deregulation

International flights were governed by bilateral agreements between countries:

- High entry barriers

- Monopolistic practices

- Exorbitant fares

Even the domestic flights were regulated:

- Nationally owned airlines flew loger, popular flights

- Private firms flew shorter trips between less popular designations

Market Dynamics and Deregulation

In 1997, the European Union agreed to deregulate the aviation market.

Private airlines started to compete on price. Ryanair is a good example:

- Limited service
- Cost-efficient online booking system
- Secondary airports

Market Dynamics and Deregulation

The market was changing rapidly and SAS was forced to reconsider its business structure:

- "The Businessman's Airline"

- Good service

- Punctuality

- The Pit Stop 20 Project

Problem Domain

The SAS administration assembled a project team of chief pilots and managers from flight deck and cabin crew, with consultants from McKinsey & Company.

Means of measuring punctuality:

- ACARS (Aircraft Communication Addressing and Reporting System)

- European delay standard with regard to scheduled block-off time

- Improved measurement with block-on times and stricter margins

Problem Domain

Interval	Definition
≤ 3 min	On time
$(3 - 15)$ min	Slightly delayed
≥ 15 min	Delayed

Problem Domain

Today we have access to intuitive web interfaces that presents all available alternatives and relevant data, including:

- Flight time

- Carbon emission

- Price

Back in the days, the majority went to different travel agencies for travel services who:

- Ranked the flights in order of shortest flight time

- Presented them in groups of 10 per page

Thus, it was necessary to establish a swift turnaround process combined with a reasonable schedule that could be attained.

Problem Domain

By analysing punctuality in relation to how long the aircraft was standing on the ground, the project team concluded that there was *no* correlation between punctuality and ground-time:

- The last 10 minutes before departure comprised most activity

- The idle time could be reduced without affecting punctuality

- Productivity could be increased

Problem Domain

It is economically desirable to keep the aircraft in the air as much as possible:

- Boeing 737-700: ~ $82.4M

- Boeing 737-800: ~ $98.1M

Shortening the turnaround process with 20 minutes would enable an extra 80 routes per day - corresponding to approx. 11500 additional passengers.
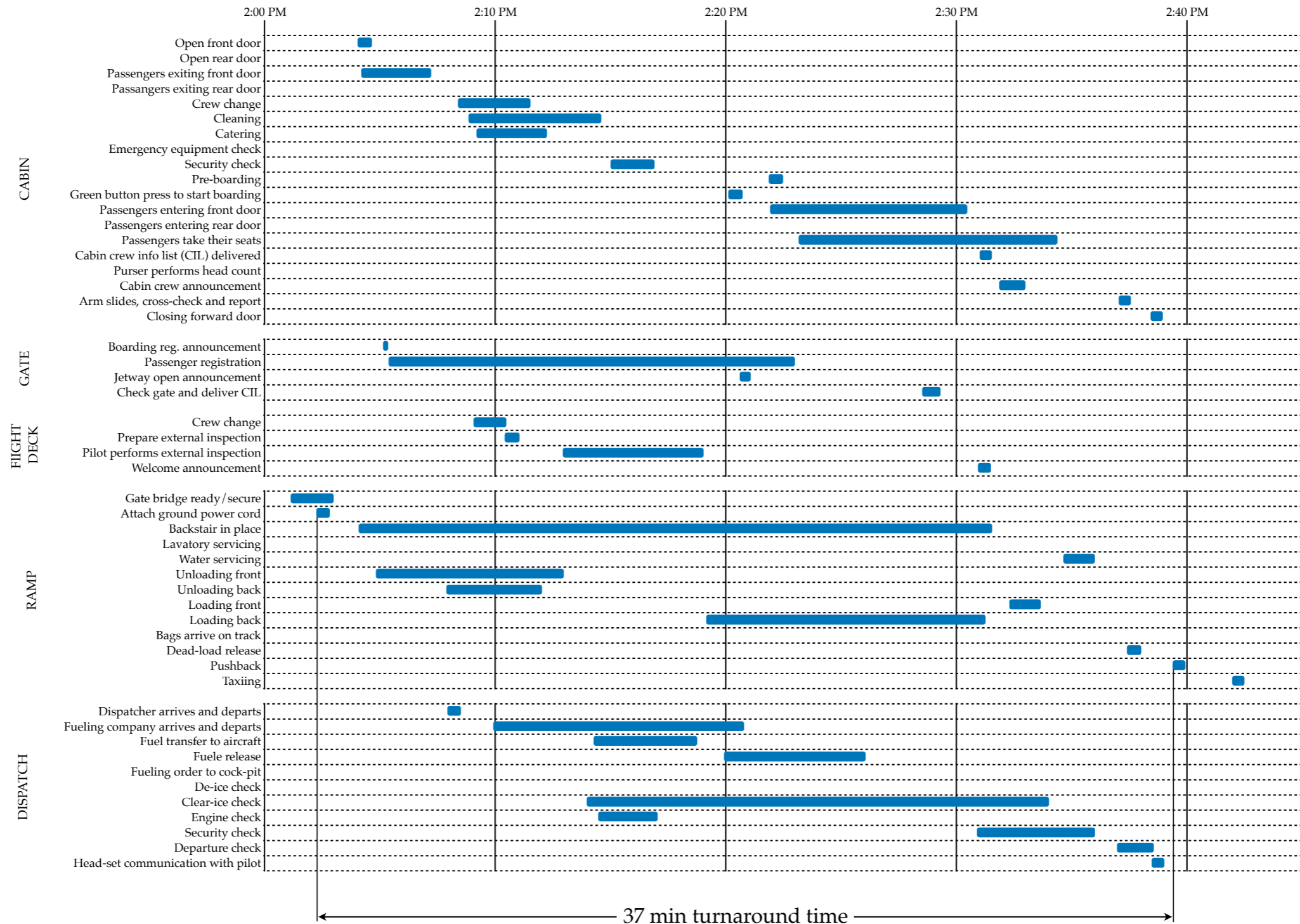
Problem Domain

Regular observations of selectively chosen turnarounds were scrutinized in terms of:

- Involved actors

- Tasks and sub-tasks

- Adjacent activities onboard the plane

All involved steps and their time consumption were displayed in flow-diagrams:

- Determined common delay causes

- Enabled a complete redesign of the turnaround process

- Tailored process descriptions

Problem Domain

Problem Domain

Procedure	min saved
Use backstairs during boarding and disembarkation	3-5
Minimized clearing	3
Minimized catering	3
Boarding with clear gate and cabin announcements	3
Coordinated cabin crew parallelizing checks and efficient crew change	2
Welcome announcement on time	2
Pre-boarding of all passengers to jet-way	1

Problem Domain

Redesigning the overall turnaround process were not enough. In order to effectively eliminate further bottlenecks, one or more *reasons* had to be identified and reported:

- Delay codes (e.g., 31 = late cockpit crew)

- Captain + gate crew were responsible for identifying the correct delaying factor(s)

Problem Domain

The team worked hard to induce commitment and honesty into every aspect of the improvement process, engaging all the individuals involved in the turnaround process:

- Information meetings

- Group discussion

- Emails

By admitting that a delay was caused by oneself, only then could the true reasons be unveiled and act upon accordingly.

Problem Domain

Each Friday, gathered data and delay codes were presented and discussed among the project team and representatives form all the involved actors.

They created a robust process that could deliver on time services repeatedly, without having to be dependent on large time buffers:

- 5-10 min buffer at Arlanda

- 10 min buffer for domestic line stations during the winter

- Some extra ground crew workers managed by the control center

The Friday meetings became an opportunity to study future situations (e.g., bad weather, large tournaments or political events) that could affect the air traffic and decide upon a suitable strategy.

Innovative Solutions

1. The Push-to-Talk Technology

2. The Boarding Bluestrap

3. The Backdoor Exit Construction

The Push-to-Talk Technology

A swift turnaround process requires full transparency among all the involved actors and efficient coordination of task. An enhanced communication was necessary to:

- Refill the aircraft as passengers exit or board the aircraft

- Resolve seat allocation problems in a timely manner

- Efficiently move any oversize luggage between the cabin and the cargo comportment

- Speed up the the de-icing process

The Push-to-Talk Technology

On the ground, the ground crew workers and the gate manager communicate via radios, over a specific frequency:

- Ensures convenient handling when wearing gloves and hats during the cold season

- Can only be used for a limited number of channels which made them unfeasible onboard the aircraft

The team concluded that they had to combine the use of phones and radios into one single system.

The Push-to-Talk Technology

Fjord Networks was hired to find a solution. They developed a prototype device that:

1. Received calls form mobile phones

2. Redirected them to the same radio frequency used at the gates (specified by the dialed number)

However, the aircrew had to mute their phones not to disturb the other communication. A new prototype was created in the shape of an extended mobile application, with functionality similar to a standard radio: in order to enter a conversation, the pilots had to ``push'' a red button on the screen.

The Boarding Bluestrap

From the moment the cabin is ready until the first passenger enters the aircraft, approx. 3 min pass.

The bluestrap was invented to advance boarding. Passengers were allowed to walk down the jet bridge until they were stopped at the bluestrap, stretching across the gateway, just before entering the aircraft.

The cabin crew could (using the push-to-talk application) contact the gate crew *before* they were done with all their preparations. When perfectly timed, the first passenger would board the aircraft the moment the cabin was ready.

The Backdoor Exit Construction

SAS was the first airline to start using the backdoor for boarding and exit.

It was considered a safety risk, since the passengers risked coming too close to the fuel-vents under the wings and the hot engines.

A LEGO-prototype solved the problem.

The Need for Continuity

In accordance with the ever changing nature of requirements engineering, SAS was forced to sustain their hard work in order to remain as the world's most punctual airline. However, the SAS administration experienced a decline in motivation and engagement:

- The number of meetings were brought down

- The provision of education and training reduced

- The amount of gathered data diminished

After having everyone *focused* on time performance, once the incentive was removed, so was the engagement.

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CS 645 — Software Requirements Specification & Analysis