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FINAL REPORT Nr.4-02/4-11-(4/2012)

OF THE AIRCRAFT SERIOUS INCIDENT

LOSS OF SEPARATION DURING FINAL APPROACH BETWEEN THE AIRCRAFT LIBERTY AEROSPACE XL-2, REGISTRATION YL-EON and WizzAir AIRCRAFT AIRBUS A-320, REGISTRATION HA-LPI, FLIGHT WZZ7BU, ON JULY 08, 2011

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia is a governmental, independent of all aviation authorities' organization, established by law to investigate and determine the cause or probable cause of accidents and serious incidents that occurred in the civil aviation, as well, if necessary for enhancing flight safety, incidents.

The sole purpose of such investigation is in accordance with Annex 13 of the Convention of Chicago, as well as the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC is to prevent accidents and incidents and, if the Bureau finds it appropriate, to issue safety recommendations. The purpose of an investigation conducted under the responsibility of the Transport Accident and Incident Investigation Bureau Republic of Latvia is not to apportion blame or liability.

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Abbreviations

ILS-
VOR-
IFR - Instrumental Flight Rules
RWY - Runway
ATCC - Air Traffic Control Centre
ACC - Area Control Center
ATRACC - ATC System for Riga Area Control Centre
A-SMGCS - Advanced-Surface Movement Guidance and Control System
ATIS - Automatic Terminal Information Service
AWOS- Automated Weather Observing System
RIMCAS - Runway Incursion Monitoring and Conflict Alert System
ACFT - Aircraft
ARCC - Aeronautical Rescue Co-ordination Centre
ATC - Air Traffic Control
UTC - Universal Time Coordinated
ABI - Advance Boundary Information
ACI - Area of Common Interest
ACT - Activation Message
LAM - Logical Acnowledge Message
AoR - Areas of Responsibility
CWP - Controller Working Position
Report RVSM - Reduced Vertical Separation Minimum
ODS - Operator input and Display System
NM - Nautical mile
FT - Feet
Z – Zulu = Universal Coordinated Time (UTC)
STAR - Standard Instrument Arrival Route
ESARR5 - EUROCONTROL Safety and Regulatory Requirement on ATM personnel
FIR - Flight Information Region
ATS - Air Traffic Services
HMI - Human Machine Interface
EHSI - Electronic Horizontal Situational Indicator
OSUP - Operational Supervisor
VMC - Visual meteorological condition
SAR - Search and Rescue
CISM - Critical Incident Stress Management
SSR - Secondary Surveillance Radar
CWP - Controller Working Position
ESARR - Eurocontrol Safety and Regulatory Requirement
PANS-ATM - Procedures for Air Navigation Services - Air Traffic Management
STCA - Short-Term Conflict Alert
CTR - Control Zone
FL - Flight Level
RBPS - Radar Bypass System
OLDI - On-Line Data Interchange
COP - Coordination Point
TMA - Terminal Control Area

Synopsis

Unless stated otherwise the time in this Report is UTC

On Friday, July 08, 2011 at 10:27 UTC the serious aviation incident – loss of separation standards during Final Approach to RWY 18 occurred in Riga International Airport between two passenger aircraft. The aircraft XL-2, registration YL-EON performed planned IFR training flight with 1 ILS and 1 VOR approach. During first ILS approach pilot of XL-2 reported to TWR controller on Final and received clearance to continue ILS to RWY18. While XL 2 was on glide slope for RWY 18, WIZZAIR A320 was instructed by controller to line up and to wait, as well as was re-cleared after departure to climb to FL2500. At the same time tower controller informed XL-2 about WIZZAIR A320 departing and instructed XL-2 to continue approach. A moment later WIZZAIR was cleared for take off. Pilot of XL-2 saw that WIZZAIR A320 is to close and go around was dangerous already in that situation, because WIZZAIR A320 was cleared for take off already. XL-2 requested immediate right turn for separation. TWR controller instructed XL-2 to fly heading 270° without any climb instructions. Cleared altitude for XL-2 was given later by APP controller. Minima separation standards between XL-2 and A320 were infringed.

Picture 1

Picture 2

Notification

The Transport Accident and Incident Investigation Bureau of the Republic of Latvia was notified about the incident on Monday, September 05, 2011 from Safety Investigation and Data Section Aircraft Operation Division CAA of Latvia.

Flight Safety Report has been received from pilot YL-EON concerning loss of separation during final approach to RWY 18.

TAIIB Authorities evaluated the received information relevant to that case and initiated collecting data for investigation into this serious incident, under the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago 1944) and the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, as well as forwarded request to LGS and Wizard for providing any relevant available information regarding to the aircraft and personnel data of flight crew involved in the serious incident.

1. FACTUAL INFORMATION

1.1. History of the incident

On July 8, 2011 at 10:27 UTC in the Riga FIR airspace, the minimum separation between two aircraft during approach occurred. The aircraft involved were WizzAir Airbus A320-232, registration HA-LPI on a flight from EVRA (Riga) to EGGW (London) and private aircraft Liberty XL2, registration YL-EON which performed planned IFR training flight with 1 ILS and 1 VOR approach in the Riga International airport (EVRA).

At **10:14:08** the pilot of XL-2 which has performed IFR training flight reported Riga Approach Controller on frequency frequency 129,925 readines for approach: “Riga Approach YL-EON we are ready for ILS approach if possible”.

At **10:21:13** Controller Riga Approach instructed YL-EON: "YL-EON 11 miles from touchdown, turn left heading 210, cleared ILS approach RWY 18, report when established localizer"
YL-EON approved the clearance: "Left heading 210.Cleared for ILS approach 18, will report established YL-EON"

At **10:22:59** APP Controller issued instruction**: "**YL-EON, confirm established**"**

YL-EON reported: "Established, YL-EON"

APP Controller issued instruction for YL-EON**:**"YL-EON **Due to inbound traffic please keep high speed on final.** Contact Riga tower 118.1"

YL-EON confirmed clearance: "Keep high speed. Riga Tower 118,1, Y-EON "

There was following traffic situation for Riga Tower Controller (Picture 3) at 10:23:

On departure were 4 (four) aircraft A320 (AFL160), F50 (BTI3FV) F50 (BTI412) and A320 (WZZ7BU).

At **10:20:19** Airbus 320 AFL160 was staying on holding point RWY18 and requested 2 minutes delay. Tower controller confirmed 2 minutes delay

At **10:22:10** AFL160 declared readiness for departure and got clearance to take-off.

At **10:23:35** the Liberty XL2 (YL-EON, transponder code - squawk 1608)first contacted Tower controller on frequency 118,1 MHz, reported on final and received instruction to continue ILS to RWY 18.

Picture 3

RWY 18

At **10:24:13** F50 BTI3FV was cleared for take off.

At **10:24:26** F50 BTI-412 was instructed to line-up RWY18 and wait.

At **10:25:31** BTI-412 was cleared for take-off.

At **10:24:33** A320 WIZ -7BU reported "holding point 18", YL-EON with squawk 1607 was on final to RWY 18 at altitude 2300FT, W=107KN with heading 178 degrees.

At **10:25:35** YL-EON with squawk 1607 was on 5NM final to RWY 18.

At **10:25:39** YL-EON with squawk 1607 was on final to RWY 18 at altitude 1800 FT, W=108 KN with heading 183 degrees.

At **10:25:42** WIZ-7BU was cleared to line up RWY 18 and wait.

At **10:26:09** YL-EON with squawk 1607 was on final to RWY 18 at altitude 1500FT, W=110KN at distance 4.1 NM from touchdown.

At **10:26:37** Controller instructed YL-EON to continue approach and informed about departing traffic A-320;
YL-EON at that time was on final to RWY 18 at altitude 1200FT, W=117KN with heading 185 degrees at distance 3.1 NM from touchdown.

At **10:26:40** F50 BTI-412 departed from RWY18 at altitude 300FT, W=128KN, WIZ-7BU was on take -off position.

At **10:26:46** YL-EON was on final to RWY 18 at altitude 1100FT, W=116KN with heading 185 degrees at distance 2.6 NM from touchdown and reported "Continue approach YL-EON, Traffic in sight".

At **10:27:00** BTI-412 was at altitude 900FT, W=130KN. with heading 186 degrees.

At **10:27:09** YLEON with squawk 1607 on final to RWY 18 at altitude 800FT, W=129KN with heading 184 degrees at distance 2 NM from touchdown.

WIZ-7BU was on take -off position

F50 BTI-412 at altitude 1000FT, W=133KN. with heading 186 degrees.

At **10:27:11** A-SMGCS **"ALERT"** distance less then 2NM between traffic. (Picture 4)

Picture 4

A-SMGCS “ALERT”

At **10:27:20** YLEON with squawk 1607 at altitude 700FT, W=120KN with heading 191 degrees, separation 0,5 NM between traffic.

At **10:27:20 Controller changed climb altitude for WIZ-7BU and recleared climb altitude from 2500FT to 1500FT**

At **10:27:27** WIZ-7BU approved clearance.

At **10:27:32** Controller cleared WIZ-7BU for take-off from RWY18.

YLEON with squawk 1607 was on final to RWY 18 at altitude 700FT, W=118KN with heading 185 degrees at distance 1,2 NM from touchdown.

WIZ-7BU was on take-off position.

F50 BTI-412 at altitude 1600FT W=142KN with heading 186 degrees

At **10:27:39** A-SMGCS **"ALERT"** distance less then 1NM between traffic.

Picture 5

At **10:27:46** YLEON pilot:" We requested immediate turn to right for separation"

Controller turn to right approved.

YL-EON reported "Going around, turning right immediate"

Controller: "YL-EON heading 270"

Pilot of YL-EON approved heading 270 degrees.

Controller did not give altitude clearance for YL-EON.

At **10:27:48** WIZ-7BU started take-off rolling.

At **10:28:01**YLEON with squawk 1607 at altitude 300FT, W=92KN with heading 187 degrees, separation was 0,5 NM between traffic.

WIZ-7BU performed take-off rolling.

At **10:28:16** aircraft YLEON with squawk 1607 was at altitude 300FT, climbing to 500FT, turning to the right.

At **10:28:46** TWR Controller: "YL-EON contact Riga Approach 129,925"

1.2. Injuries to persons

There were no injuries.

1.3. Damage to aircraft

Not damage occurred.

1.4. Other damage

Objects other than aircraft not damaged.

1.5. Personnel information

Air traffic controller: Female, 31 years old
Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid).

Captain of AIRBUS A320: Male, 31 years old;
Ratings: All necessary ratings were valid;
Total flight experience – 4454 hours;
Total hours last 30 days – 86:02 hours;
Flight time last 24 hours - 5h 33 min.

First officer of AIRBUS A320: Male, 30 years old;
Ratings: All necessary ratings were valid;
Total flight experience – 2461 hours;
Total hours last 30 days – 89:58 hours;
Flight time last 24 hours - 5h 33 min.

1.6. Aircraft information

Aircraft type – Airbus A320-232, registration HA-LPI, owner aircraft - „Wizzair"; serial No.2752;
Date of manufacturing: 2006, Engine typeV2527-AS.
Liberty Aerospace incorporated XL-2, fixed wing, registration YL-EON

1.7. Meteorological information

EVRA ARR ATIS A
1020Z
EXP ILS APCH
RWY IN USE 18
RWY SFC DRY
BA GOOD
TRL 55
BIRD ACTIVITY IN THE VCY OF THE AD
WIND VRB 4KT
VIS 9999

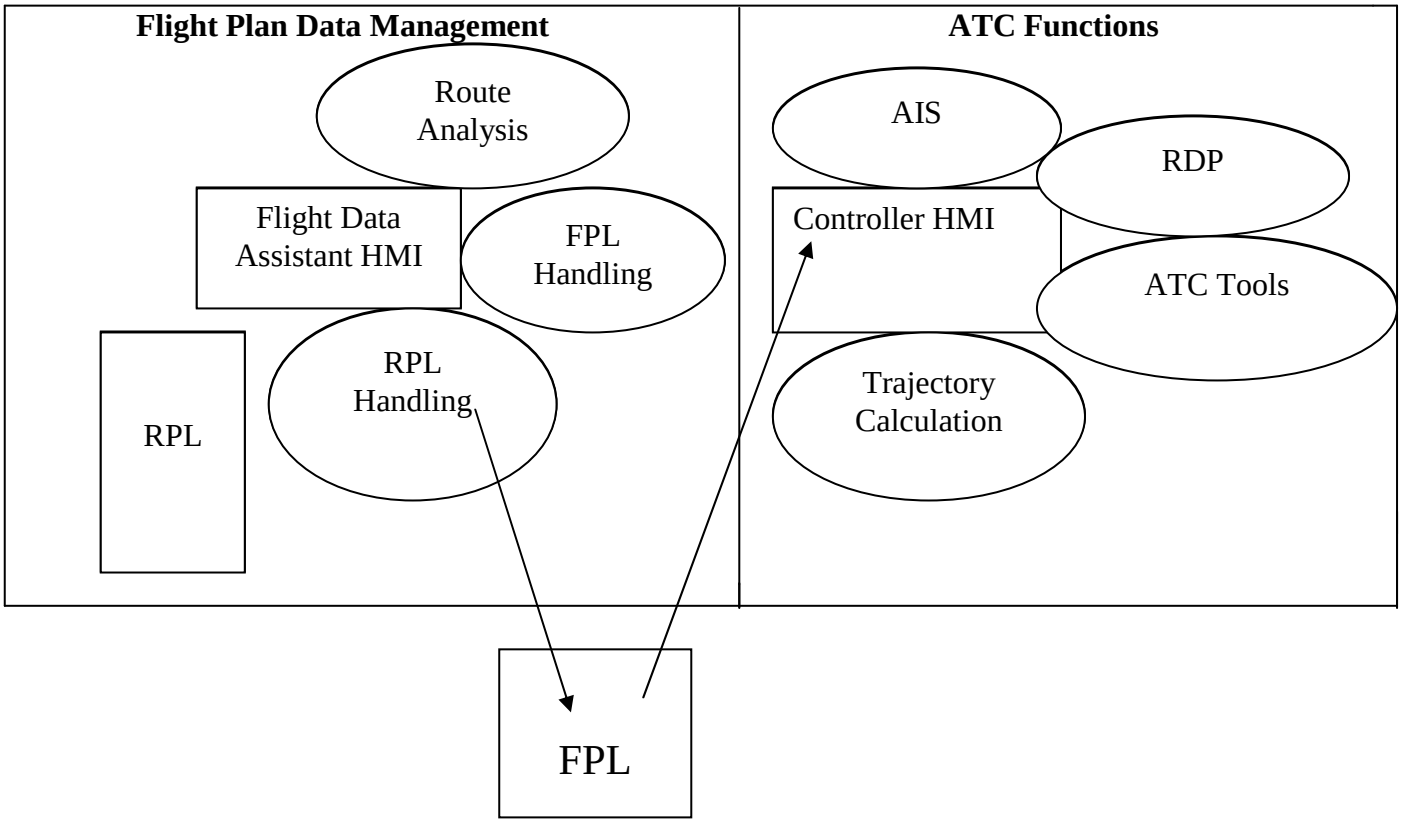
CLD SCT 4200FT
T 26 DP 14
QNH 1012
TREND NOSIG

1.8. Aids to Navigation

1.8.1. ATRACC system

The flights were under Radar control. Air Traffic Control System ATRACC+ (Manufacturer' s serial No N SI P 101.1) is an ATM system for area, approach and tower Control of the Riga FIR. From a functional point of view, the system consists of two main components: a Primary System, and a Radar Bypass System. A Primary System providing multi radar tracking advanced flight plan data integration, predicted flight trajectories, OLDI (On-Line Data Interchange), silent co-ordination and paperless HMI. A Radar Bypass System for use if the primary system should fail. The Radar Operator Workstation is common for the Primary System, and the Radar Bypass System. Four main functional blocks are defined:

- The Flight Plan Data Management block
- The ATC Functions
- The Support Functional block and the ATC-Simulator



Picture 6

The distinct border is between the Flight Plan Data Management block and the ATC Functional block.

A Flight Data Assistant, (FDA) is working with Repetitive Flight Plans, (RPLs) and passive Flight Plans, (FPLs) in the Flight Plan Data Management block while the ATC controller is working with active FPLs in the ATC Functional block. Flight plan data management is available at flight data assistant working positions. The Flight Data Assistant HMI has efficient support for editing, browsing, queue handling and specification of complex search criteria.

RPLs can be searched, created, modified and deleted manually, but also automatically based on airline time schedules on data media. FPLs are normally created automatically from RPLs or received from AFTN. They can also be searched, created, modified and deleted manually. Received AFTN and OLDI messages are processed and checked automatically and produce updates of concerned FPLs. Billing data is automatically submitted to external systems at FPL termination. For RPLs and FPLs both, route analysis is done and route details are examined against the local airspace structure for compliance with ICAO rules.

The airspace structure is defined by means of system parameters. ATC functions are available at controller working positions. Controller interaction with flights is performed through extensive use of lists and flight symbols. A trajectory describing the flight path in airspace is calculated with consideration to aircraft performance characteristics and current weather data. The trajectory's coverage of ATC sectors determines the distribution of flight data to working positions. Data from PSR and SSR radar stations is processed by means of an advanced centralized true multi-radar tracker. The resulting system tracks are associated with FPLs. Flight symbols comprising surveillance and flight plan information are presented to controllers.

ATRACC has the capability to receive and present information from a weather system called ATIS as well as AWOS (sensors) and from a time system.

1.8.2. A-SMGCS (NOVA9000) system

A-SMGCS (NOVA9000) system provides the controller with a clear and precise traffic situation picture covering all areas of the airport where aircraft movements take place. All aircraft and vehicles in these areas are presented on the controller working position both in daytime and at night, under weather conditions such as snow, wet snow, fog and heavy rain.

A-SMGCS (NOVA9000) system processes and displays radar signals received from the local SMR together with data received from additional systems and databases on the airport. The display presents pictures of the traffic movement on maps created within the system. Tabular information is presented in windows and menus.

The RIMCAS provide automatic alarms if an aircraft or vehicle infringes an active runway or other area of interest. RIMCAS (Software package designed to monitor movements on an aerodrome surface and the neighboring airspace in order to detect and identify possible conflict situations involving aircraft and other objects on pre-defined areas of the surface.

The surveillance function of an A-SMGCS (NOVA9000) system provides localization and identification of all moving and static aircraft, vehicles and obstacles at the airport presented as symbols with an attached label superimposed the airport map. By means of position and identity given from several sensors, the system knows where the aircrafts and vehicles are.

The alerting functionality provides measures to prevent collisions and runway incursions in order to ensure safe, expeditious and efficient movement at the airport. By means of the known positions and velocity, warnings and alarms can be given to system operators when appropriate.

The planning and guidance functionality provides fight plan information in Arrival and Departure lists, local vehicles local vehicles list and operational controlling of stop-bar lighting and taxiway/route lighting.

When a system alarm occurs, the System Alarm Window in the upright corner of the screen turns red. The System Alarm Window is displayed in red color as long as an alarm situation is present.

In informational status the system cannot be used for routing, guidance and surveillance purposes for the control of aircraft and vehicles.

In operational status the system can be used for identification, measuring, sequencing, positional separation purposes, situational awareness, as well as during the night or low visibility conditions.

1.8.2.1. Use of A-SMGCS display in the aerodrome control service

A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety

The information provided on an A-SMGCS display may be used for the purpose of:

- Determining the location of aircraft on the movement area and vehicles on the manoeuvering area ;
- Monitoring aircraft and vehicles on the manoeuvering area for compliance with clearances and instructions;
- Determining that a runway is clear of traffic or assisting in the assessment that a runway will be clear of traffic prior to a landing or take-off;
- Providing information on essential local traffic on or near the manoeuvering area;
- Providing directional taxi information to aircraft when requested by the pilot or deemed necessary by the controller. Such information should not be issued in the form of specific heading instructions (except in special circumstances, e.g. emergencies);
- Providing assistance and advice to emergency vehicles.

1.8.3. Runway Incursion Monitoring and Conflict Alert Sub-system (RIMCAS)

Runway Incursion Monitoring will assess target position reports from the surface movement surveillance system in order to warn of runway area incursion by aircraft or vehicles, or incursion into other designated restricted areas on the airfield, when an aircraft is due to land or take off on the active runway.

1.8.3.1. Alert Levels

An indication of an existing or pending situation during aerodrome operations, or an indication of an abnormal A-SMGCS operation, that requires attention and/or action.

RIMCAS has two alerts levels - Stage One alert and Stage Two alert.

- Stage one alert (amber colour) is used to caution the controller that a situation has occurred which needs special attention;
- Stage two alert (red colour) is used to warn the controller that a critical situation may occur.

In the event an alert is generated, **TWR controller should without delay assess the situation and take appropriate action as required.**

1.9. Communications

Riga Tower controller provides ATS using VHF radio stations on frequency 118.1 MHz, 121.5 MHz (in emergency situations). For the investigation the Controller console recordings on the frequency 118.1 MHz were used. The quality of the recordings was good.

Co-ordination within Riga FIR shall be performed using available "ATRACC+" system functionality.

Controller and crew members of YL-EON and WIZ-7BU used standard phraseology and there had not principal errors in the used phraseology.

Communication Transcript there was not essential inaccuracies in radio communications from all sides.

Within the framework of Quality Management System (QMS) Riga ATCC are worked out "Regulations and procedures on ground-to-air radiotelephony" PR-GSV/AvDN-01/ 2 which are applicable for the provision of Air Traffic Services within RIGA FIR/UIR. The provisions of this document are based on ICAO SARPs, ICAO Regional procedures. The provisions of this document are mandatory for ATS personal conducting direct ground-to-air radio communications.

1.10. Aerodrome information

The airport had not any significance for the incident.

1.11. Flight recorders

The incident reconstruction was based on A-SMGCS (NOVA9000) system processes and displays radar information and Runway Incursion Monitoring and Conflict Alert Sub-system voice communications transcript between controller of Riga ATCC and both aircraft involved in incident crew members.

1.12. Wreckage and impact information

Not damage

1.13. Medical and pathological information

Not relevant to this incident

1.14. Fire

There was no fire

1.15. Survival aspects

Not necessity to survey

1.16. Tests and research

Were not performed

1.17. Organizational and management information

Not relevant to this incident.

1.18. Additional information

Not applicable

1.19. Useful or effective investigation techniques

The incident has been investigated in accordance with Annex 13, Guidelines for Investigation of Safety Occurrences in ATM and Threat and Error Management (TEM) in Air Traffic Control.

2. ANALYSIS

2.1. General

An occurrence is usually the result of a sequence of events. All causes together form the necessary and sufficient adverse events or conditions for a particular occurrence. Therefore the investigation of the serious incident – infringement of separation standards between the aircraft Airbus A320-232, registration HA-LPI, flight WIZ-7BU and Liberty XL2, registration YL-EON, squawk 1607 is based that at least one ATM event was judged to be directly in the causal chain of events leading to this serious incident. Without that ATM event (or if there was a different order of events), the occurrence would not have happened.

The purpose of this investigation is reconstruction of the circumstances of flight in order to analyze, determine causal factors and develop recommendations on preventive actions.

2.2. Analysis of the actual situation

Investigation process has divided into three main blocks:

- **"Actors' events/conditions"** - including the active failures immediately in the course of the safety occurrence. In this layer is the main chain of chronological events leading to the undesired safety occurrence –serious incident;
- **"Local workplace triggering conditions"** – conditions, or lack of conditions and associated events that allowed the events/conditions from the first layer to happen.
- **"Organizational conditions"** – systemic organizational factors, underlying the first two layers. Within this layer are the Root Causes of incident.

Within these three layers investigation has tried to identify such factors that could contribute to this serious incident:

- ATM service personnel;
- ATM services personnel operating procedures and instructions;
- Interfaces between ATM service units;
- ATM service infrastructure/facilities and technical systems;
- Airspace structure;
- Staffing and supervision;

- ATM service provider company-LGS structure and management policy;
- Regulatory activities.

2.2.1. ATM service personnel

Investigation did not reveal any physical/physiological and psychosocial factors were involved in the events leading to the incident.

At the time of incident there were normal working practices. Investigation didn't reveal any unusual or transient factors that may have adversely affected controller's performance such as workload, fatigue, illness, personal problems, communication, automation etc..

In general Tower controller followed the Operational manual procedures and has normal working practices and working environment.

Controller underestimated real situation due to lack of operational experience of taking into account various complexities in order to manage aircraft. There was not enough situational awareness, attention, vigilance.

2.2.2. ATM services personnel operating procedures and instructions

According to Tower controller Operational manual controller has following objectives for the air traffic services:

- prevent collisions between aircraft;
- prevent collisions between aircraft on the manoeuvring area and obstructions on that area;
- expedite and maintain an orderly flow of air traffic;
- provide advice and information useful for the safe and efficient conduct of flights;
- notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Tower controller shall provide air traffic services for the following traffic:

- VFR/IFR flights entering, leaving or flying within the control zone, or otherwise operating in the vicinity of controlled aerodrome, unless they have been transferred to APP controller;
- aircraft landing and taking off;
- aircraft on the manoeuvring area in Tower area of responsibility.

The main tasks of Tower controller are following:

1. To maintain a continuous watch on all visible flight operations at and in the vicinity of the aerodrome as well as aircraft, vehicles and persons on the manoeuvring area in own area of responsibility;
2. To observe all movements of aircrafts, vehicles and people in own area of responsibility by means of A-SMGCS display at night and/or in low visibility ;
3. To issue clearances and instructions to aircraft as required for the safe and expeditious handling of aerodrome traffic by using radiotelephony communication or visual signals in case of communication failure; such clearances and instructions include the following:

- clearances to enter the control zone;
- clearances to leave / cross the control zone;
- clearances to join the aerodrome traffic circuit;
- instructions to establish a take-off and landing sequence;

- instructions to taxi to the take-off(line-up) position;
- take-off and landing clearances.

2.2.2.1. Separation minima and control procedures

According to airport Riga Tower controller operational manual DI-GSV/TWR-01/2 the following should be considered for the sequencing of departing aircraft:

- types of aircraft and their relative performance;
- routes to be followed after take-off;
- APP controller requirements, only due to the traffic situation within TMA

Establishing the required separation TWR controller shall take into account minimum pilot reaction time and time for departure clearance (conformation) issuing.

When issuing **line-up clearance**, the TWR controller **shall be sure that the appropriate separation between aircraft is provided**.

Take-off clearance **shall not be issued until**:

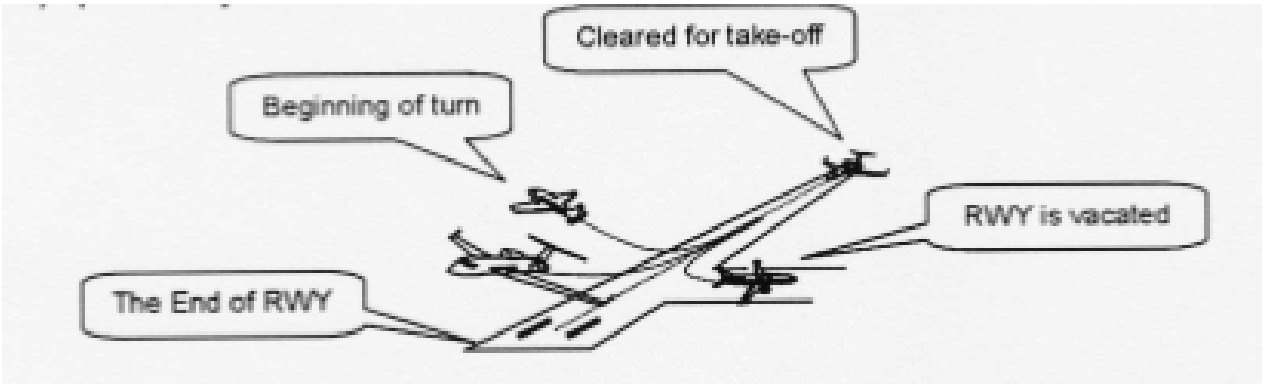
- ATC clearance is relayed to and acknowledged by the aircraft concerned.

Take-off clearance may be issued when:

- the aircraft is approaching the runway-holding position of the runway-in-use;
- the aircraft is taxiing to line up position of the runway-in-use;
- the aircraft is at line up position of the runway-in-use.

Departing aircraft shall be normally permitted to commence take-off when:

- preceding departing aircraft has crossed the end of the runway-in-use or
- has started a turn or
- previously landed aircraft has vacated the runway-in-use.



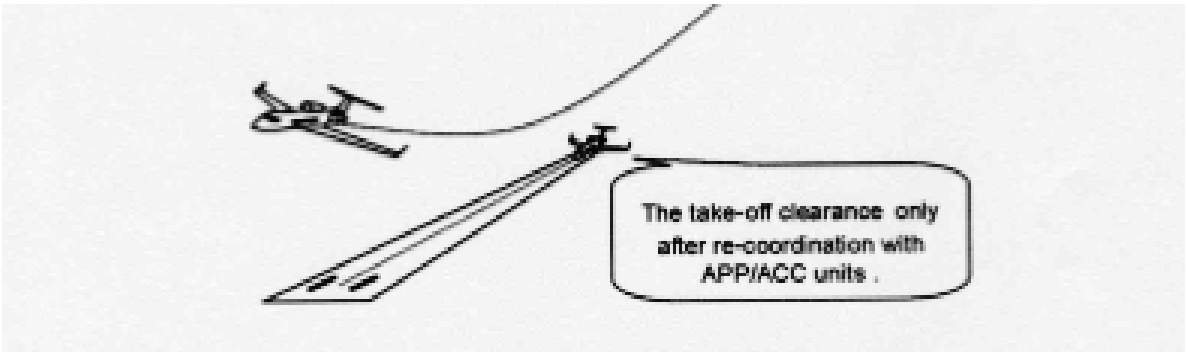
Picture 7

When issuing take-off clearance, the TWR controller has to be assured that the appropriate separation between aircraft is provided and the runway-in-use is clear of any obstacles and all operational vehicles are not closer to the runway-in-use than:

- at a taxi way/runway intersection — at a runway-holding position; and

- at a location other than a taxiway/runway intersection — at a distance equal to the separation distance of the runway-holding position.

If an approaching aircraft commences a missed approach procedure, **the take-off clearance to aircraft ready for departure from the RWY-in-use shall be issued only after additional coordination with APP.**



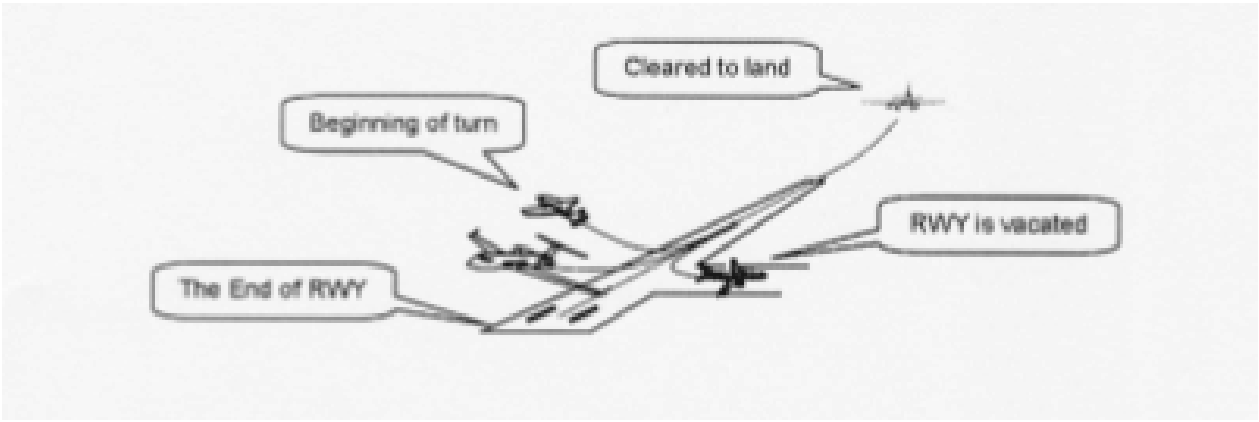
Picture 8

When issuing landing clearance, the TWR controller shall be sure that the appropriate separation between aircraft is provided and the runway-in-use is clear of any obstacles, and all operational vehicles are not closer to the runway-in-use than:

- at a taxiway/runway intersection — at a runway-holding position; and
- at a location other than a taxiway/runway intersection — at a distance equal to the separation distance of the runway-holding position.

Arriving aircraft shall not be normally permitted to land until:

- the departing aircraft has passed the end of the runway-in-use;
- the departing aircraft has started a turn;
- previously landed aircraft has vacated the runway in use.



Picture 9

An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to take-off.

2.2.2.2. Provision of separation between aircraft

Until **arriving traffic** has not crossed altitude **2500 ft** and it is handed over to the TWR controller, the **APP/ACC controller is responsible for separation provision** of this aircraft

from all other traffic within Riga TMA AoR (area of responsibility).

Until **departing traffic** has not crossed altitude **2500 ft**, the **TWR controller is responsible for separation provision** of this aircraft from all other traffic within Riga CTR AoR.

For traffic at **altitude 2500 ft** within CTR:

- APP controller shall inform Tower controller about traffic;
- APP controller provides separation for all other traffic within Riga TMA AoR ;

Tower controller provides separation for all other traffic within Riga CTR AoR.

For traffic **above altitude 1500 ft** and **below altitude 2500 ft** within CTR:

- Tower controller shall inform APP controller about traffic;
- APP controller provides separation for all other traffic within Riga TMA AoR;
- Tower controller provides separation for all other traffic within Riga CTR AoR.

TWR controller is responsible for separation between aircraft executing VFR flight in CTR zone and aircraft **executing ILS approach at altitude 1500 FT**.

Speed control:

- Normally IAS on final shall not be more than 160 (+/-10) knots until 4NM final;
- An arriving aircraft may be instructed to maintain its "maximum speed", "minimum speed", or a specified speed;
- Speed variation not exceeding of +/- 20 knots IAS should be used by the controller on intermediate and final approach;
- Speed control should not be applied to aircraft after passing a point of 4 NM from the threshold on final approach;
- Aircraft concerned should be advised as soon as speed control is no longer necessary;
- Tower controller may request a lower speed, but it should be accepted by the pilot-in-command.

2.2.2.3. Wake turbulence radar separation between aircraft

The minima shall be applied when:

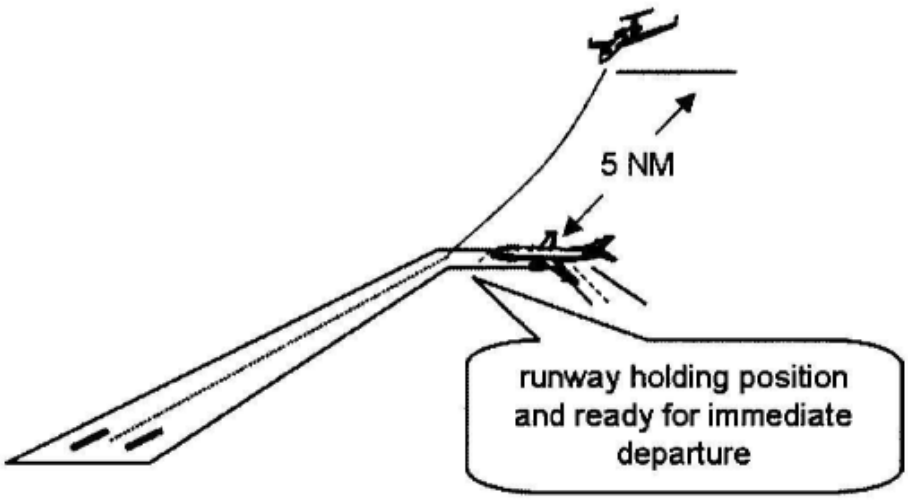
- an aircraft is operating directly behind another aircraft at the same altitude or less than 1 000 ft below; or
- both aircraft are using the same runway; or an aircraft is crossing behind another aircraft, at the same altitude or less than 1 000 ft below.

Preceding aircraft	Succeeding aircraft	Wake turbulence separation minima
HEAVY	HEAVY MEDIUM LIGHT	4.0 NM 5.0 NM 6.0 NM
MEDIUM	LIGHT	5.0 NM

If the separation between two wake turbulence categorized arriving aircraft is going to reduce below applicable minima the following mentioned below are required for succeeding aircraft:

- information about previous aircraft (type, speed and distance) and speed reduction instruction;
- if there is tendency to appropriate separation decreasing, "go around" instruction shall be issued.

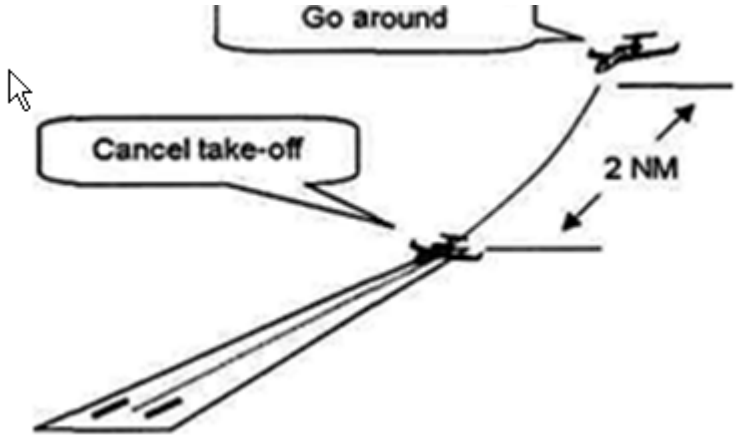
Take off clearance based on the position of the arriving aircraft making an instrument approach may be issued when departing aircraft is at the **runway-holding position** of the runway-in-use and ready for immediate take-off and the arriving aircraft is not less than **5NM** final.



Picture 10

If the departing aircraft is cleared for immediate take-off but has not started rolling, and approaching aircraft is on 2 NM final:

- the Tower controller shall cancel take-off clearance for departing aircraft and;
- instruct the arriving aircraft to go around.



Picture 11

To avoid situation defined above or when pilot is on line up position and not ready for departure, information about arriving aircraft shall be transmitted for departing aircraft in advance.

When the departing aircraft has started rolling and take-off can not be aborted, and **arriving aircraft has started go around procedure** Tower controller shall:

1. instruct the arriving aircraft:

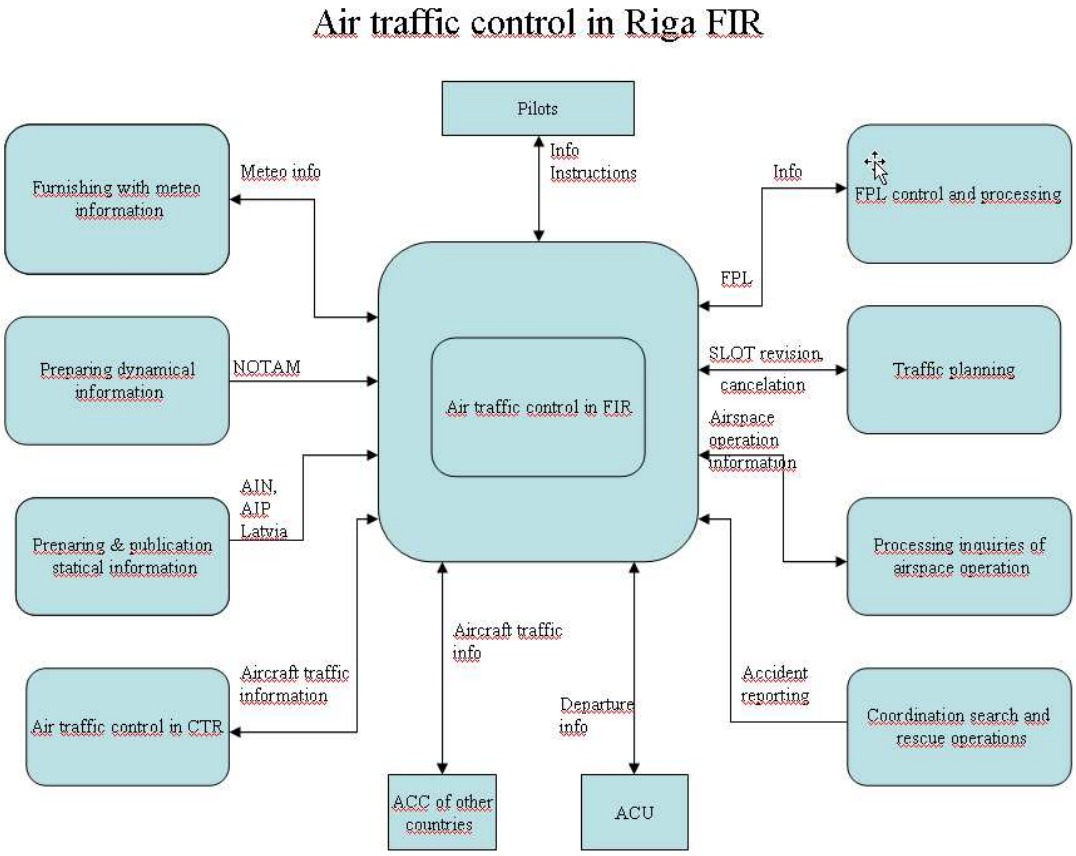
- to turn to the west (heading 270°);
- to climb to, to descend to or to maintain 1500 ft;
- to contact Riga APP;

2. inform APP controller about nonstandard go around procedure

TWR controller is responsible for separation between aircraft executing VFR flight in CTR zone and aircraft executing nonstandard IFR go around procedure.

2.3. Interfaces between ATM service units, ATM service infrastructure/facilities and technical systems

According to Law on Aviation of the Republic of Latvia the authority responsible for activities of the utilizations of the airspace of the Republic of Latvia for civil and military needs and the flight of aircraft shall be controlled by the Air Traffic Control Unit - the State Joint- Stock Company – "Latvijas Gaisa Satiksme - LGS" which is the air traffic service provider in the Republic of Latvia. Air traffic control has provided in the airspace of Riga FIR, by Latvian Air Navigation Services (LGS) staff. (See Picture 12)



Picture12

2.3.1. Transfer of control between TWR-APP

2.3.1.1. IFR arriving aircraft

Responsibility for **landing aircraft** is handed over to the TWR controller by the APP/ACC controller when this aircraft:

- is on ILS or LOC approach between **12,5** NM **and** 4 NM from the corresponding 18/36 THR and has reported to the APP/ACC controller **"established on ILS"** or **"established**

on Localizer", unless APP/ACC controller has informed the crew to report **"established on ILS" or "established on Localizer"** to the TWR controller;

- is on VOR approach between **12,5** NM **and** 4 NM from the corresponding 18/36 THR and the crew has reported to the APP/ACC controller **"on final";**
- is on visual approach, when the APP/ACC controller has cleared visual approach and aircraft is within the horizontal border of the CTR.

2.3.1.2. IFR departing aircraft

- Responsibility for providing air traffic control for **departing traffic** is handed over by the TWR controller to the APP/ACC controller **immediately after take-off**.
- Transfer of communication instruction ("When airborne contact Riga - Approach on 129,925 ") should be excluded from Take-off Clearance issued to pilot.

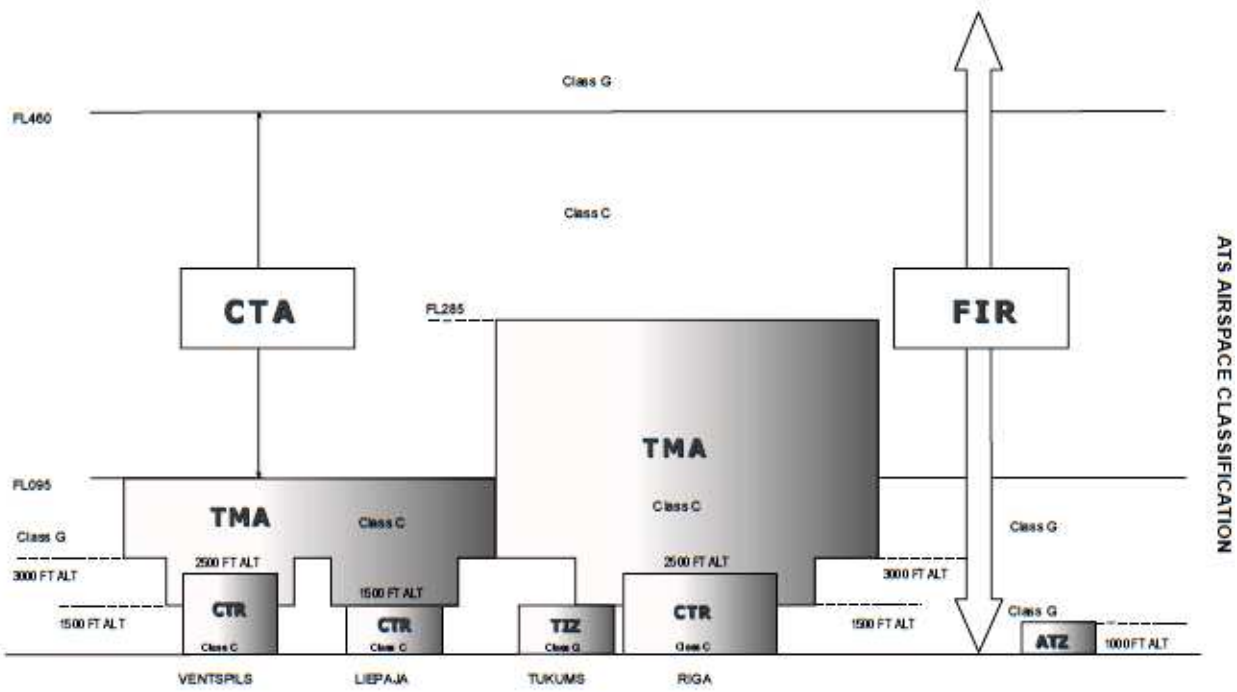
If the aircraft is going to leave CTR at altitude 1500 ft or less, responsibility for air traffic control provision **is not handed over to APP/ACC**.

Tower controller is responsible for separation between aircraft executing VFR flight in CTR zone and aircraft executing (LOC) approach at altitude 1500FT.

Tower controller should monitor APP frequency (129.925) to be aware that departed traffic has been successfully transferred to APP controller.

2.4. Airspace structure

For the ATS provision the following areas of responsibility (AoR) are established within Riga FIR/UIR: Sector EAST, Sector SOUTH, Sector NORTH, Riga TMA, Riga CTR, Liepaja TMA, Liepaja CTR, Ventspils TIA and Ventspils TIZ. Sector WEST provides ATS within NORTH AoR, SOUTH AoR, Liepaja TMA AoR, and Ventspils TIA.



Picture 13

Class	Type of fllight	Separation provided	Service provided	VMC visibility and distance from cloud minima	Speed limitation	Radio com-munication requirement	Subject to an ATC clearance
C	IFR	IFR from IFR IFR from VFR	Air traffic control service	Not applicable	Not applicable	Continuous two-way	Yes
	VFR	VFR from IFR	Air traffic control service for separation from IFR; VFR/VFR traffic information (and traffic avoidance advice on request)	VFR 8 km at and above FL100 5 km below FL100 1500 m horizontal; 300 m vertical distance from cloud	250 kt IAS below FL100	Continuous two-way	Yes

The sectorisation of ATS airspace, route structure and capacity didn't have an effect to incident.

2.5. Staffing and supervision

The Tower controller had all necessary ratings. The analysis of documentation determined that Tower controller according to service provider LGS controllers schedule for July, 2011, began working shift on July 8 at 07:30, Controller has logged in ATRACC+ system at 07:35:10 and logged out at 07:52:28 after working hours 1:17:18. Controller had 1 hour rest brake. Tower controller logged in ATRACC+ system for a second time at 9:58:25 and has worked only for 30 min since rest brake time until incident occurred.

In operational respect Riga Tower staff on duty subordinates to Tower supervisor. Tower supervisor subordinates directly to the Chief of Riga Tower. Tower supervisor is the senior operational chief in respect of ATS in Riga CTR, coordination with ATS units concerned and with other services connected with ATS.

Tower supervisor duties are shift work organization, which includes:

- pre-shift briefing;
- shift takeover/handover;
- fulfillment of air traffic controller's duties (if necessary);
- after-shift debriefing (if necessary).
- organization of substitution of air traffic controllers during the shift;
- constant control of the work of the shift;
- coordination and information exchange with concerned units;
- control of serviceability of all equipment used for ATS provision;
- decision-taking and emergency alerting control according to the prescribed procedures.

Investigation didn't reveal any incompleteness of supervision.

2.6. ATM service provider company-LGS structure and management policy

2.6.1. Safety Management System

For promotion SAFETY MANAGEMENT SYSTEM (hereinafter SMS) in the State Joint-Stock Company – "Latvijas Gaisa Satiksme - LGS" has assigned following personnel roles.

Quality Assurance Department manager	Safety Management department manager	Safety Committee

In accordance with EUROCONTROL Safety Regulatory Requirement ESARR 3 „USE OF SAFETY MANAGEMENT SYSTEMS BY ATM SERVICE PROVIDERS ATM" service-providers shall have in place a safety management system.

SMS has embraced air traffic control services provider - the State Joint- Stock Company – "Latvijas Gaisa Satiksme - LGS". SMS is founded on "cooperation approach" according to terms of EUROCONTROL document "Safety and Quality Relationships Guidelines". Because there has established, operated and has in continuous improving process QMS (ISO 9001:2000), SMS has integrated taking into account special requirements of SMS and Commission Regulation (EC) No 2096/2005 of 20 December 2005 laying down common requirements for the provision of air navigation services. For implementation, maintenance and monitoring SMS in the State Joint-Stock Company "Latvijas Gaisa Satiksme - LGS" has established as obligatory joint Safety/Quality Management Systems main procedures and Handbooks.

According to "Latvijas Gaisa Satiksme - LGS" safety responsibility terms - everyone has an individual responsibility for their own actions and managers are responsible for the safety performance of their own organizations.

In accordance with SMS Handbook the State Joint- Stock Company - "Latvijas Gaisa Satiksme - LGS" main safety management principles are:

- Safety achievement;
- Safety assurance;
- Safety promotion.

Within the framework of SMS has established risk assessment and mitigation, details of risk assessment has described in procedure “Hazards identification and risk assessment”.

Safety Occurrences assessment has established and described in procedure “Dealing with nonconformities, corrective and preventive actions”.

Safety objectives based on risk have established in terms of the hazards maximum probability of occurrence, derived both from the severity of its effect and from the maximum probability of the hazards effect.

Severity Classes 1, 2, 3, 4, 5 have determined in accordance with ESARR 4 Severity Classification Scheme in ATM.

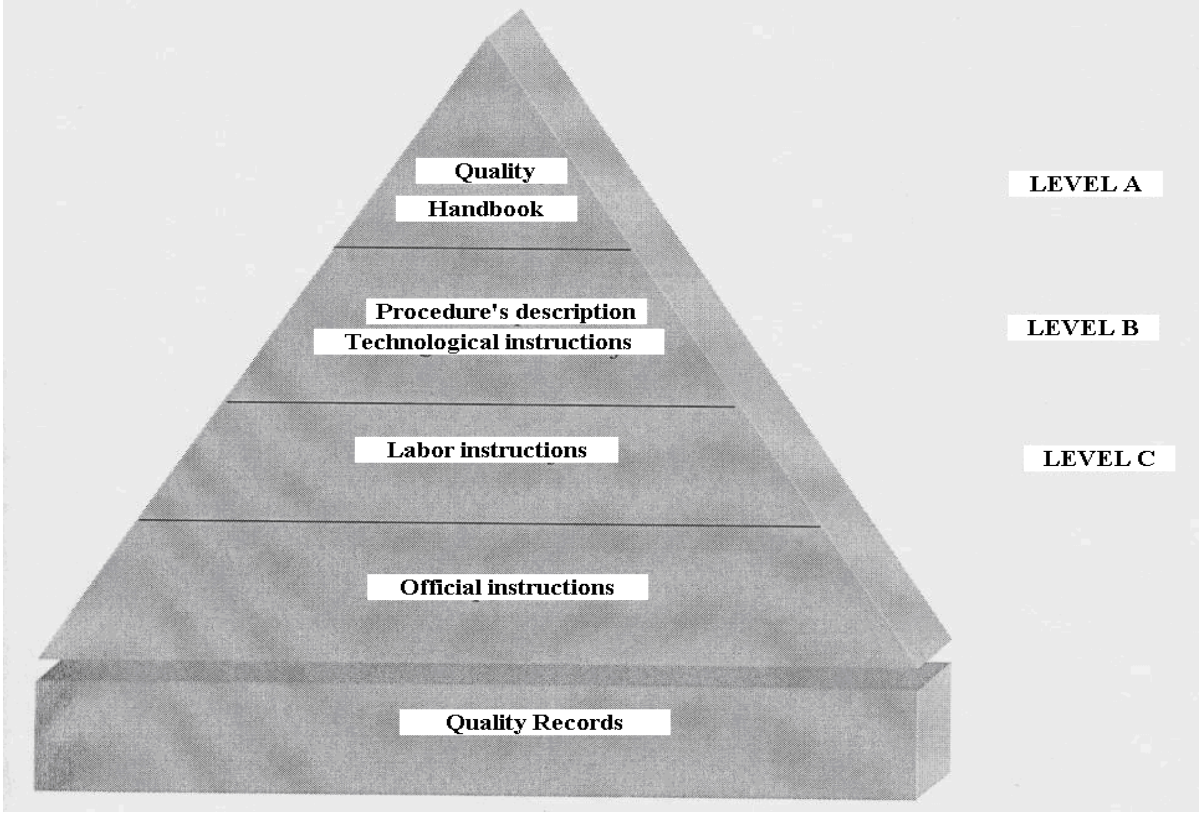
At present in Europe the quantitative definitions have calculated only for Severity Class 1 as ECAC Safety Minimum of a maximum tolerable probability of ATM directly contributing to an accident of a Commercial Air Transport aircraft of 1,55 10-8 accidents per Flight/Hour or of 2,31 10-8 accidents per flight.

For Severity Classes 2, 3, 4, 5 quantitative definitions to be determined at national level based on past evidence on numbers of ATM related incidents.

The Safety Manager is responsible for SMS performance. Department managers are responsible for immediately performance appropriate measures in subordinate departments in case when risk has indentified and appear necessity to implement improvements and corrective action taken.

2.6.2. Quality management system

Quality Management System (hereinafter QMS) document structure and hierarchy is comprised of Quality Handbook and other subordinated document categories: procedure’s description, technological instructions, flow charts, official instructions, labor instructions and quality records.



Picture 14

Picture 14 shows LGS document structure. On the top of document hierarchy is Quality Handbook, management document of higher level. Moving from the top of this structure downward, documents become more specific in their purpose and scope, and document content becomes increasingly detailed.

Performance criterion	Measurement	Sort of information/data
Safety	Number of pilot's complaints of low separation interval	Analysis of radiotelephony records Results of customer's opinion poll
	Coefficient of safety	Yearly estimation
	Rating of IATA assessment	IATA Annual Report
Regularity	Number pilot's complaints of delay due to controller's	Analysis of radiotelephony records Results of customer's opinion poll
	Number of pilot's complaints about not timely given information	Analysis of radiotelephony records Results of customer's opinion poll
Accuracy of information	Number of complaints of distortion information	Analysis of radiotelephony records Information from other ACC Information from airlines Results of customer's opinion poll

Table 1, Air traffic control performance criterions and measurement in Riga FIR

According to Quality Handbook chapter "Organizational structure, distribution of responsibilities and authorities" the person in charge for resolving all problems relating to air traffic control services safety, quality, documentation and prevention is Head of ATCC Department. Head of ATCC Department is responsible for making decisions in case of inadequate services in the field of air control.

Quality system manager is responsible:

- Quality system maintenance;
- Preparing information materials for quality management reports, it planning and organization;
- Internal audit planning and organization;
- Verification the developed and implemented corrective actions as result of internal audit;
- Planning and organization of quality management reports.

The State Joint- Stock Company – "Latvijas Gaisa Satiksme - LGS" must ensure all necessary resources for maintenance Quality Management System according to requirements Latvian and international standard LVS EN ISO 9001:2000. Person in charge for making resources available is Chairman of the Board.

The scope of the Air Traffic Control Services procedures, operations and instructions had not essential influence to incident

2.7. Regulatory activities

According to COMMISSION REGULATION (EC) No 1315/2007 of 8 November 2007 on safety oversight in air traffic management and amending Regulation (EC) No 2096/2005 National supervisory authorities shall exercise safety oversight as part of their supervision of requirements applicable to air navigation services, in order to monitor the safe provision of these activities and

to verify that the applicable safety regulatory requirements and their implementing arrangements are met. National supervisory authorities shall provide regular monitoring and assessment of the levels of safety achieved in order to determine whether they comply with the safety regulatory requirements applicable in the airspace blocks under their responsibility and shall use the results of the monitoring of safety in particular to determine areas in which the verification of compliance with safety regulatory requirements is necessary as a matter of priority.

2.8. Controllers' actions analysis

At **10:23:35** the Liberty XL2 (YL-EON) first contacted Tower controller, reported on final. Controller instructed YL-EON to continue ILS to RWY 18.

At **10:25:39** YL-EON was on 5 NM final to RWY 18 at altitude 1800FT, W=108KN heading 183°.

WIZ-7BU at **10:25:42** had clearance to line up RWY 18 and wait, YL- EON was on glideslope, maintained high speed (more than 100KN) because at **10:22:59** APP controller instructed pilot to maintain high speed on final due to inbound traffic.

At **10:26:37** TWR controller informed pilot YL- EON about departing A320 and instructed to continue approach. YL- EON was at altitude 1200FT, W=117KN at distance 3.1 NM from touchdown.

At **10:27:09** YL- EON was at altitude 800FT, W=129KN at distance 2.0 NM from touchdown. WIZ-7BU was on take-off position.

At **10:27:11** A-SMGCS stage one "ALERT" (**amber colour**), distance less then 2 NM between traffic switched on to caution the controller that a situation has occurred which needs **special attention**;

At **10:27:20**. YL- EON was at altitude 700FT, W=120KN with heading191°, separation 0.5 NM between traffic.

Almost the same time, a moment later at **10:27:32** TWR controller cleared A320 WIZ-7BU for take-off. YL-EON was at altitude 700FT, W=118KN at distance 1.2 NM from touchdown.

According to "TWR controller Operation manual of airport Riga DI-GSV/TWR-01/2" issuing **take-off clearance**, the TWR controller has to be assured that the appropriate separation between aircraft is provided.

At **10:27:39** A-SMGCS stage two "**ALERT**" (**red colour**) switched to warn the controller that **a critical situation may occur**. In such case if an alert is generated, **TWR controller should without delay assess the situation and take appropriate action as required.**

According to Item 7.4.1.4.1 of Procedures of air navigation services, ICAO Doc. 4444 ATM/501 „Air Traffic Management" in the event the aerodrome controller, after **a take-off clearance** or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to **impair the safety of an aircraft taking off or landing**, appropriate action shall be taken as follows:

- cancel the take-off clearance for a departing aircraft;
- instruct a landing aircraft to execute a go-around or missed approach.

The regulations of "TWR controller Operatio manual of airport Riga DI-GSV/TWR-01/2" are the same in accordance with ICAO Doc. 4444.

Tower controller didn't cancel A320 WIZ-7BU take-off as well as no actions was taken to solve situation didn't give any instructions for landing YL-EON.

At **10:27:46** the YL- EON was less than 1.2NM from touchdown, A320 was cleared for take-off an pilot of YL- EON saw that wake turbulence separation with could be dangerous for touch and go maneuver.

Because A320 WIZ-7BU didn't start take-off rolling yet it was clear for pilot of YL- EON that aircraft is too close to A320 and he requested immediate turn right to avoid vortex wake from departing A320. The tower controller approved right turn.

A320 WIZ-7BU didn't start take-off rolling immediately, there was some delay, it started take-off rolling at **10:27:48.**

TWR controller instructed YL- EON to fly heading 270° but didn't give climb altitude clearance.

During development of conflict situation no action was taken by Tower controller, despite A-SMGCS stage one and two "**ALERT**" warnings. Action to avoid collision between aircraft was initiated by pilot of YL- EON – initiated go around maneuver. The minimum of horizontal separation between aircraft was 0.5 NM.

According to the regulations of "TWR controller Operation manual of airport Riga DI GSV/TWR-01/2" when the departing aircraft has started rolling and take-off can not be aborted, and **arriving aircraft has started go around procedure** Tower controller shall: instruct the arriving aircraft:

- to turn to the west (heading 270°);
- to climb to, to descend to or to maintain 1500 ft;
- to contact Riga APP;
- inform APP controller about nonstandard go around procedure

The tower controller informed APP controller about A320 WIZ-7BU clearance 1500FT but **didn't inform** APP controller about YL- EON go around maneuver.

2.9. Severity Classification for Safety Occurrences in ATM

According to EUROCONTROL guidance material (ESARR 2 Guidance to ATM Safety Regulators, EAM 2/GUI 1, Severity Classification Scheme for Safety Occurrences in ATM, Edition 1.0, edition date 12-11-1999), see tables I, II, this incident is classified as **Serious Incident -A** -Loss of separation (***separation higher than half the separation minima***) which is not fully under ATC control**.** A crew avoidance manoeuvre and/or an ATC instruction allowed to reduce the risk, without eliminating it, as safety margins were still infringed.

Taking into account the Severity Classification this incident is classified as **A1**

SEVERITY	A	Serious incident	**A1**	A2	A3	A4	A5
	B	Major incident	B1	B2	B3	B4	B5
	C	Significant incident	C1	C2	C3	C4	C5
	D	Not determined	D1	D2	D3	D4	D5
	E	No safety effect	E1	E2	E3	E4	E5

1	2	3	4	5
Very Frequent	Frequent	**Occasional**	Rare	Extremely rare
FREQUENCY				

Table 2. Severity Classification Scheme for Aircraft Incidents

SEVERITY	AA	Total inability to provide safe ATM services	AA1	AA2	AA3	AA4	AA5
	A	Serious inability to provide safe ATM services	A1	A2	A3	A4	A5
	B	**Partial inability to provide safe ATM services**	B1	B2	**B3**	B4	B5
	C	Ability to provide safe but degraded ATM services	C1	C2	C3	C4	C5
	D	Not determined	D1	D2	D3	D4	D5
	E	No effect on ATM services	E1	E2	E3	E4	E5
			1	2	3	4	5
			Very Frequent	Freq uent	**Occasi onal**	Rare	Extre mely rare
			Frequency				

Table 3. Severity Classification Scheme of ATM specific occurrences according to the Severity of their Effect on the ability to provide Safe ATM Services

DEFINITION	FREQUENCY
Has never occurred yet throughout the total lifetime of the system.	Extremely rare
Only very few similar incidents on record when considering a large traffic volume or no records on a small traffic volume.	Rare
Several similar occurrences on record - Has occurred more than once at the same location.	**Occasional**
A significant number of similar occurrences already on record - Has occurred a significant number of times at the same location.	Frequent
A very high number of similar occurrences already on record- Has occurred a very high number of times at the same location.	Very Frequent

Table 4.Definitions of Accident/Incident Frequency

According to the Severity of their Effect on the ability to provide Safe ATM Services this serious incident is classified as **B3**.

2.10. Underlying Human Factors problems associated with incident

For revealing causation of this incident it was put into practice the taxonomy of the Human Factors Analysis and Classification System that describes the human factors that contribute to an incident. It is based on a sequential or chain-of-events theory of accident causation. The human contribution don't build on the person approach, that focuses on the errors and violations of individuals but is based on the system approach, that traces the causal factors back into the system as a whole. The investigation view is not that Human Error is a cause of incident but that Human Error is a symptom of trouble deeper inside a system. The classification system has four levels, each of which influences the next level. These four levels are called:

- organizational influences;

- unsafe supervision;
- preconditions for unsafe acts;
- unsafe acts of operators;

Human factors played the major role in the cause of this incident and this further reinforces the requirements to examine the role of human factors in the Air Traffic Control.

2.11. Unsafe acts of operators

The unsafe acts can be loosely classified into two categories: errors and violations.

I. Errors

During investigation here were fixed following errors that ultimately led to the serious incident:

1. Skill- Based error
There not fixed skill based errors of Controller.

2. Decision errors
Investigation stated that there was TWR controller decision error that when landing aircraft YL-EON was at distance less than 1.2NM from touchdown with high speed W=118KN, TWR controller cleared A320 WIZ-7BU for take-off.

II. Violations

Investigation stated that there was TWR controller actions were disregard for the rules and regulations of Procedures of air navigation services, ICAO Doc. 4444 ATM/501 „Air Traffic Management".

In the event when the aerodrome controller, after **a take-off clearance** has been issued becomes aware of the existence of any close proximity to the runway likely to **impair the safety of an aircraft taking off or landing** TWR controller should cancel the take-off clearance for a departing aircraft and instruct a landing aircraft to execute a go-around or missed approach.

There were not any given any instructions for both aircraft to provide safety.

2.12. Preconditions for unsafe acts

Two major unsafe subdivisions of unsafe conditions are developed:
- Substandard conditions of operators;
- Substandard practices of operators.

I. Substandard conditions of operators

Investigation didn't reveal any substandard conditions of operators such as adverse mental states, physiological states as well as physical/mental limitation.

II. Substandard practices of operators

Generally speaking, the substandard practices of operators can be summed up in two categories:
- Resource mismanagement;
- Personal readiness.

Within the context of this incident this includes coordination both within and between aircraft with air traffic control facilities. There was not revealed poor coordination.

Personal readiness failures occur when individuals fail to prepare physically or mentally for duty. Within the context of this incident there not revealed personal readiness failures when operators fail to prepare physically or mentally for duty.

2.13. Unsafe supervision

Exist four categories of unsafe supervision:
- Inadequate supervision;
- Planned inappropriate operations;
- Failure to correct a known problem;
- Supervisory violations.

Within the context of this incident there was not reveled any inappropriate supervision of operations.

2.14. Organizational factors influencing incidents

Fallible decisions of upper-level management directly affect supervisory practices, as well as the conditions and actions of operators. The most elusive of latent failures revolve around following issues of organizational influences:
- Resource management;
- Organisational climate;
- Operational process.

Within the context of this incident there were not find lack of human resources, budget resources, deficient planning, as well as were not find any adversarial, or conflicting, or when they are supplanted by unofficial rules and values and confusion abounds that could to have influence on creation of this serious incident.

3. CONCLUSIONS

During process of investigation were made the following conclusions:

3.1. Findings

- At the time of the incident the traffic was handled by Tower Controller;
- The runway in service was runway 18;
- Radio communications on the TWR frequency 118.1 MHz between the pilots of WIZ-7BU, YL-EON and the TWR controller took place in English;
- At the time of incident the workload of the controller was not high;
- The air traffic controller held valid licence and ratings and was qualified and current at the position;
- A-SMGCS stages one and two "**ALERT**"(**amber and red colour**) switched to warn the controller that **a critical situation may occur**;

- The pilot of YL- EON saw that wake turbulence separation between aircraft could be dangerous for touch and go maneuver.
- A320 was cleared for take-off when YL- EON was less than 1.2NM from touchdown;
- A320 WIZ-7BU didn't start take-off rolling immediately, there was some delay;
- According to "TWR controller Operation manual of airport Riga DI-GSV/TWR-01/2" issuing **take-off clearance**, the TWR controller has to be assured that the appropriate separation between aircraft is provided.
- When situation becomes aware in close proximity likely to **impair the safety of an aircraft taking off or landing**, TWR controller didn't cancel the take-off clearance for a departing aircraft A320 WIZ-7BU;
- During conflict situation development no actions was taken by controller to solve situation to avoid possible collision;
- It was pilot of YL- EON who requested immediate turn right for separation;
- TWR controller didn't instruct a landing aircraft YL- EON to execute a go-around;
- when the departing aircraft has started rolling and take-off **can not be aborted**, and **arriving aircraft has started go around procedure** Tower controller shall: instruct the arriving aircraft: to turn to the west (heading 270°) and to climb to, to descend to or to maintain 1500 ft;
- TWR controller instructed YL- EON to fly heading 270° but didn't give climb altitude clearance;
- TWR controller actions were disregard with the rules and regulations of Procedures of air navigation services, ICAO Doc. 4444 ATM/501 „Air Traffic Management";
- The tower controller informed APP controller about changing A320 WIZ-7BU clearance from 2500FT to 1500FT but **didn't inform** APP controller about YL-EON go around maneuver;
- To clear A320 WIZ-7BU for take-off when landing aircraft YL- EON was at distance less than 1.2NM from touchdown with high speed W=118KN was the TWR controller decision error;
- The minimum of horizontal separation between aircraft was 0.5 NM;
- Air Traffic Control System ATRACC+ (Manufacturer' s serial No N SI P 101.1) is an ATM system for area, approach and tower Control of the Riga FIR;
- The vertical separation is carried out according to ICAO Annex 2 Table of Cruising levels 3a -1000ft (300m);
- Horizontal separation (radar separation) if double SSR coverage is provided between identified, controlled aircraft not less than 5NM;
- According to EUROCONTROL ESARR 2 this incident is classified as serious Incident;
- According to EUROCONTROL ESARR 2 Severity Classification table this incident is classified as **A1;**
- According to the Severity of their Effect on the ability to provide Safe ATM Services this serious incident is classified as **B3**.
- There not fixed skill based errors of Controller;
- Within the context of this incident there was not reveled any inappropriate supervision of operations;
- Within the context of this incident there were not find lack of human resources, budget resources, deficient planning, as well as were not find any adversarial or conflicting or when they are supplanted by unofficial rules and values and confusion abounds that could to have influence on creation of this serious incident;
- At the time of incident Visual Meteorological Conditions (VMC) prevailed.

3.2. Causes

3.2.1. Root Cause

The source or origin of an event that played the major role that caused this incident - infringement the separation minima between an aircraft Liberty XL2, registration YL-EON in the final approach phase and Airbus A320, registered HA-LPI, flight WIZZ125H taking off, were the an inappropriate traffic management.

3.2.2. Contributing causes

Delay A320 WIZ-7BU to start take-off rolling immediately;

3.2.3. Primary cause

The event after which incident became inevitable.

TWR controller didn't detect developing potential conflict before clearing A320 WIZZ125H to take-off.

4. SAFETY RECOMMENDATIONS

It is recommended that the authority responsible for air navigation services in the Latvian airspace - State Joint Stock Company Latvijas Gaisa Satiksme (LGS):

Recommendation - 3-2012

Should take measures to analyze the causes of serious incidents which has happened before to predict errors what can or may happen in the future, in particular pay attention to error types that are cognitive function failures such as skill-based errors (slips and lapses), rule based errors (rule based mistakes) and knowledge based errors (knowledge based mistakes).

Recommendation - 4-2012

It is recommended to the National Authority Civil Aviation Agency of Latvia (CAA) which is responsible for the acceptance and oversight of the service provider's SMS:

Through the inspector responsible for the SMS oversight, review the State Joint Stock Company Latvijas Gaisa Satiksme (LGS) SMS currently in place to determine which components or elements must be added or modified and if necessary to propose corrective actions in particular methodology and technique for analyzing human errors in Air Traffic Management (HERA).

Riga September 3, 2012

Investigator in charge-Head of Aircraft Accident and Incident Investigation Department
Visvaldis Trubs

Director of Transport Accident and Incident Investigation Bureau
Ivars Alfreds Gaveika