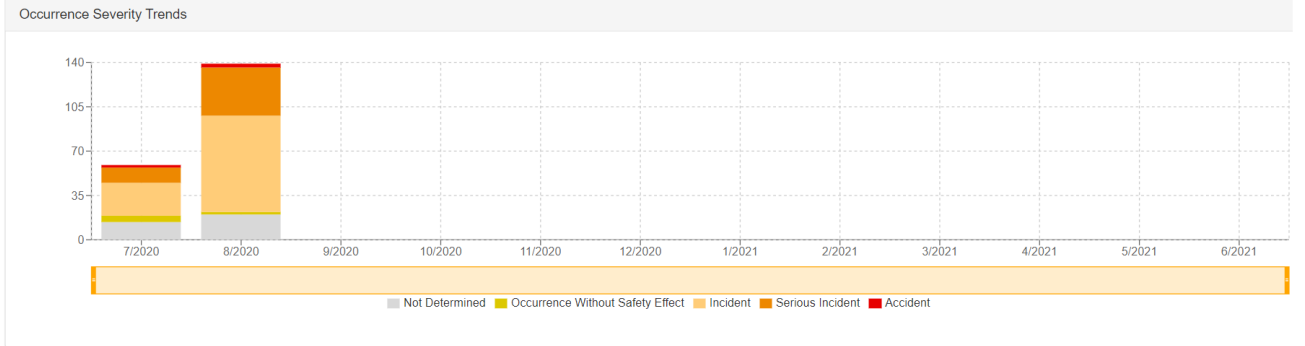


Appendix 1

Safety dashboard shows results of STAMP-based database in SBIT



Loss Event Factors

Loss events

Event Type	Count	Annual Trend
2200101 - Runway Incursion by an Aircraft	14	
2070200 - Taxiway Excursion	8	
5030200 - Aerodrome Snow/ Ice Removal Insufficient	8	
99011943 - Poor Taxiway Condition	7	
5040000 - Aerodrome Design and Operation	7	
2060200 - FOD Damage	6	
99010380 - Near Ground Collision with Moving Aircraft	6	

Related processes

Process	Count
[P] - movement area serviceability check	7
[P] - vacating runway and taxiing	4
[P] - ATC procedures	3
[P] - contamination removal	3
[P] - ground handling	1
[P] - hazard and risk management	1
[P] - landing	1

Legend

- LOSS EVENT
- [P] - ATC procedures
- [P] - approaching the stand and stopping
- [P] - contamination removal
- [P] - movement area serviceability check

controlled process controller Sub Dimension...
Export CSV

controlled process	controller	count
[P] - movement area serviceability check	movement area inspector	77
[P] - ATC procedures	ATC TWR	32
	ATC management	18
[P] - vacating runway and taxiing	pilot	39
	ATC TWR	5
[P] - hazard and risk management	safety manager	41
[P] - infrastructure maintenance	movement area inspector	22

1 2 3 4

Appendix 2

List of all unsafe control actions that occur in database of SBIT

controlled process	activity	unsafe control action	controller	count
movement area serviceability check				77
movement area serviceability check	pavement structure check			13
movement area serviceability check	pavement structure check	ignoring damaged pavement	movement area inspector	5
movement area serviceability check	pavement structure check	not detecting damaged pavement	movement area inspector	5
movement area serviceability check	pavement structure check	not informing pilots about damaged pavement	movement area inspector	1
movement area serviceability check	pavement structure check	not detecting rough pavement that causes shaking to aircraft	movement area inspector	1
movement area serviceability check	pavement structure check	not detecting insufficient strength of pavement	movement area inspector	1
movement area serviceability check	searching for FOD			13
movement area serviceability check	searching for FOD	not detecting FOD	movement area inspector	9
movement area serviceability check	searching for FOD	ignoring frequent FOD occurrence	movement area inspector	3
movement area serviceability check	searching for FOD	late FOD reporting	movement area inspector	1
movement area serviceability check	marking correctness check			13
movement area serviceability check	marking correctness check	not detecting confusing marking	movement area inspector	6
movement area serviceability check	marking correctness check	not detecting insufficient marking	movement area inspector	5
movement area serviceability check	marking correctness check	not detecting wrong marking	movement area inspector	2
movement area serviceability check	friction conditions assessment	wrong friction outputs	movement area inspector	10
movement area serviceability check	visual check of contamination	not performing contamination check	movement area inspector	7
movement area serviceability check	marking visibility check			7
movement area serviceability check	marking visibility check	not detecting badly visually seen marking	movement area inspector	5
movement area serviceability check	marking visibility check	not detecting rubber deposit on marking	movement area inspector	2
movement area serviceability check	lighting system check			4
movement area serviceability check	lighting system check	not detecting problem associated with lights	movement area inspector	3
movement area serviceability check	lighting system check	ignoring low luminous intensity of lights	movement area inspector	1

movement area serviceability check	arranging cleaning of movement area	not arranging cleaning of movement area	movement area inspector	3
movement area serviceability check	reporting friction conditions			3
movement area serviceability check	reporting friction conditions	not reporting friction conditions	movement area inspector	2
movement area serviceability check	reporting friction conditions	not providing information about braking action	movement area inspector	1
movement area serviceability check	reporting lighting deficiencies	not reporting low luminous intensity of runway center line lights	movement area inspector	1
movement area serviceability check	reporting pavement structure deficiencies	not reporting pavement structure deficiencies	movement area inspector	1
movement area serviceability check	performing friction test	performing friction test at wrong movement area	movement area inspector	1
movement area serviceability check	reporting marking deficiencies	not reporting ongoing marking deficiencies	movement area inspector	1
ATC procedures				50
ATC procedures	providing notification about operational procedures			16
ATC procedures	providing notification about operational procedures	not informing about special operational procedures	ATC TWR	4
ATC procedures	providing notification about operational procedures	providing inaccurate values of weather parameters	ATC TWR	3
ATC procedures	providing notification about operational procedures	performing procedure not permitted for particular runway	ATC TWR	2
ATC procedures	providing notification about operational procedures	issuing not clear instruction	ATC TWR	2
ATC procedures	providing notification about operational procedures	assigning unusual exit for vacating runway	ATC TWR	1
ATC procedures	providing notification about operational procedures	assigning unusual position to push	ATC TWR	1
ATC procedures	providing notification about operational procedures	providing incorrect values of weather parameters	ATC TWR	1
ATC procedures	providing notification about operational procedures	not using standard phraseology	ATC TWR	1
ATC procedures	providing notification about operational procedures	not providing information about current weather	ATC TWR	1
ATC procedures	creating ATC operational procedures			15
ATC procedures	creating ATC operational procedures	not establishing operational procedures where needed	ATC management	9
ATC procedures	creating ATC operational procedures	operational procedures are insufficient	ATC management	3
ATC procedures	creating ATC operational procedures	operational procedures are wrong	ATC management	1

ATC procedures	creating ATC operational procedures	operational procedures can not be followed	ATC management	1
ATC procedures	creating ATC operational procedures	taxiway designation is confusing	ATC management	1
ATC procedures	issuing urgent command			9
ATC procedures	issuing urgent command	issuing immediate exit too late	ATC TWR	5
ATC procedures	issuing urgent command	forcing pilot to take-off immediately	ATC TWR	1
ATC procedures	issuing urgent command	not detecting risky situation	ATC TWR	1
ATC procedures	issuing urgent command	assign not appropriate exit	ATC TWR	1
ATC procedures	issuing urgent command	not detecting crossing holding position without clearance	ATC TWR	1
ATC procedures	providing notification about other traffic			7
ATC procedures	providing notification about other traffic	not notifying pilot about traffic nearby aircraft	ATC TWR	5
ATC procedures	providing notification about other traffic	not notifying pilot about taxi route occupancy	ATC TWR	2
ATC procedures	updating ATC operational procedures			3
ATC procedures	updating ATC operational procedures	updated procedures can be hardly followed	ATC management	1
ATC procedures	updating ATC operational procedures	not updating procedures after infrastructure change	ATC management	1
ATC procedures	updating ATC operational procedures	not updating changes in aerodrome chart	ATC management	1
vacating runway and taxiing				44
vacating runway and taxiing	turn initiation			10
vacating runway and taxiing	turn initiation	choosing too high speed for exiting	pilot	6
vacating runway and taxiing	turn initiation	underestimation of surface conditions	pilot	3
vacating runway and taxiing	turn initiation	switching off lights too soon	pilot	1
vacating runway and taxiing	crossing runway			10
vacating runway and taxiing	crossing runway	crossing holding position without clearance	pilot	6
vacating runway and taxiing	crossing runway	not seeing traffic on short final during VMC	pilot	1
vacating runway and taxiing	crossing runway	stopping on runway due to confusion	pilot	1
vacating runway and taxiing	crossing runway	detecting holding position late	pilot	1
vacating runway and taxiing	crossing runway	not seeing traffic on take-off during VMC	pilot	1
vacating runway and taxiing	keeping distance from other traffic			6
vacating runway and taxiing	keeping distance from other traffic	not adjusting speed to current situation	pilot	3

vacating runway and taxiing	keeping distance from other traffic	stopping too close to another aircraft	pilot	1
vacating runway and taxiing	keeping distance from other traffic	wrongly assessed situation	pilot	1
vacating runway and taxiing	keeping distance from other traffic	continuing taxiing when taxiway is not cleared from other traffic	pilot	1
vacating runway and taxiing	selecting appropriate exit			5
vacating runway and taxiing	selecting appropriate exit	choosing closed movement area to exit	pilot	2
vacating runway and taxiing	selecting appropriate exit	choosing wrong exit	pilot	1
vacating runway and taxiing	selecting appropriate exit	choosing exit not in compliance with aerodrome chart	pilot	1
vacating runway and taxiing	selecting appropriate exit	loss of situational awareness	pilot	1
vacating runway and taxiing	turning to another taxiway	turning to wrong taxiway	pilot	3
vacating runway and taxiing	ATC assigning taxi route			3
vacating runway and taxiing	ATC assigning taxi route	assigning not appropriate taxi route for particular aircraft	ATC TWR	2
vacating runway and taxiing	ATC assigning taxi route	assigning wrong taxi route	ATC TWR	1
vacating runway and taxiing	vacating runway protected area			3
vacating runway and taxiing	vacating runway protected area	aircraft violates runway area	pilot	2
vacating runway and taxiing	vacating runway protected area	not switching off landing lights	pilot	1
vacating runway and taxiing	ATC issuing clearance to cross runway	issuing clearance to cross runway on occupied runway	ATC TWR	2
vacating runway and taxiing	crossing service road	stopping the aircraft abruptly	pilot	1
vacating runway and taxiing	reaching intended position	reaching wrong position	pilot	1
hazard and risk management				41
hazard and risk management	identifying hazard			20
hazard and risk management	identifying hazard	not detecting design deficiencies	safety manager	13
hazard and risk management	identifying hazard	not detecting insufficient illumination of movement area at night	safety manager	5
hazard and risk management	identifying hazard	not detecting frequent infringement of operational procedure	safety manager	1
hazard and risk management	identifying hazard	not identifying wrong operational procedure	safety manager	1
hazard and risk management	safety study			9
hazard and risk management	safety study	not limiting particular aircraft on infrastructure	safety manager	2
hazard and risk management	safety study	approve infrastructure change that increases FOD risk	safety manager	2

hazard and risk management	safety study	safety study did not detect system malfunction	safety manager	2
hazard and risk management	safety study	approve new infrastructure design that is confusing for traffic	safety manager	1
hazard and risk management	safety study	approve new infrastructure that is confusing for systems	safety manager	1
hazard and risk management	safety study	approve new lights that blind the personnel	safety manager	1
hazard and risk management	establishing restrictions	not controlling risk	safety manager	4
hazard and risk management	analysing safety data	not monitoring safety	safety manager	4
hazard and risk management	issuing restrictions	not mitigating risk	safety manager	2
hazard and risk management	assessing risk	underestimation of risk	safety manager	2
infrastructure maintenance				32
infrastructure maintenance	delineation of intended area			8
infrastructure maintenance	delineation of intended area	not delineate workplace sufficiently	movement area inspector	7
infrastructure maintenance	delineation of intended area	workplace cannot be seen properly during poor visibility	movement area inspector	1
infrastructure maintenance	switching off systems			7
infrastructure maintenance	switching off systems	switching off not necessary systems	infrastructure maintenance personnel	3
infrastructure maintenance	switching off systems	not switching off required systems	infrastructure maintenance personnel	2
infrastructure maintenance	switching off systems	switching off systems without providing information	infrastructure maintenance personnel	2
infrastructure maintenance	establishing extraordinary operational procedures			7
infrastructure maintenance	establishing extraordinary operational procedures	not issuing information about restrictions	movement area inspector	4
infrastructure maintenance	establishing extraordinary operational procedures	not providing operational restrictions	movement area inspector	2
infrastructure maintenance	establishing extraordinary operational procedures	insufficient preparation of maintenance work	movement area inspector	1
infrastructure maintenance	project management	project is insufficiently managed	movement area inspector	5
infrastructure maintenance	infrastructure reparation			3
infrastructure maintenance	infrastructure reparation	infrastructure maintenance personnel violates traffic around construction site	infrastructure maintenance personnel	2

infrastructure maintenance	infrastructure reparation	producing FOD out of construction site	infrastructure maintenance personnel	1
infrastructure maintenance	putting infrastructure into operation			2
infrastructure maintenance	putting infrastructure into operation	reopening unserviceable area	movement area inspector	1
infrastructure maintenance	putting infrastructure into operation	leaving FOD at the construction site	movement area inspector	1
approaching the stand and stopping				23
approaching the stand and stopping	following marshall commands			6
approaching the stand and stopping	following marshall commands	guiding aircraft to wrong position	pilot	4
approaching the stand and stopping	following marshall commands	underestimation of aircraft separation from object	pilot	2
approaching the stand and stopping	turn initiation to stand			6
approaching the stand and stopping	turn initiation to stand	creating significant jet blast	pilot	2
approaching the stand and stopping	turn initiation to stand	turning too fast	pilot	1
approaching the stand and stopping	turn initiation to stand	initiating turning too early	pilot	1
approaching the stand and stopping	turn initiation to stand	affecting adjacent stand	pilot	1
approaching the stand and stopping	turn initiation to stand	initiating turning too late	pilot	1
approaching the stand and stopping	following VGDS commands			5
approaching the stand and stopping	following VGDS commands	providing wrong command	pilot	3
approaching the stand and stopping	following VGDS commands	VGDS response on moving obstacle in stand safety zone is slow	pilot	1
approaching the stand and stopping	following VGDS commands	VGDS is inoperative	pilot	1
approaching the stand and stopping	stopping at stop bar			4
approaching the stand and stopping	stopping at stop bar	stopping behind stop bar	pilot	3
approaching the stand and stopping	stopping at stop bar	not setting parking brake	pilot	1
approaching the stand and stopping	aligning the center line	using excessive thrust on stand	pilot	1
approaching the stand and stopping	visual check of assigned stand	not detecting that stand is too covered by snow	pilot	1
contamination removal				17
contamination removal	removing the contamination			11
contamination removal	removing the contamination	driving the vehicle at wrong place	movement area technician	6
contamination removal	removing the contamination	not sufficient contamination removal	movement area technician	5
contamination removal	movement area sanding and salting	not sufficient movement area curring	movement area technician	3

contamination removal	issuing operational restrictions			3
contamination removal	issuing operational restrictions	not providing information about plowed snow at taxiway edge	ATC TWR	2
contamination removal	issuing operational restrictions	not notifying pilots about poor taxiway condition	ATC TWR	1
ground handling				17
ground handling	driving on a service road			10
ground handling	driving on a service road	not giving way to aircraft	ground personnel	7
ground handling	driving on a service road	not seeing aircraft during low visibility	ground personnel	1
ground handling	driving on a service road	driving in stand safety zone when aircraft is not safely parked	ground personnel	1
ground handling	driving on a service road	crossing holding position without clearance	ground personnel	1
ground handling	finishing the flight documentation			2
ground handling	finishing the flight documentation	opening the cabin door from outside without receiving thumbs up signal	handling agent	1
ground handling	finishing the flight documentation	weather report handed over to pilot too late	handling agent	1
ground handling	preparation for ground handling	late preparation of handling equipment	ground personnel	1
ground handling	refueling	fuel leakage when fueling is performed	ground personnel	1
ground handling	finishing the handling and closing service doors	not moving handling machinery out of the stand safety envelope zone	ground personnel	1
ground handling	chocking the wheels after safe stop of the aircraft	not chocking the wheels sufficiently	ground personnel	1
ground handling	jet bridge connection	jet bridge cannot meet the aircraft door properly	jet bridge operator	1
taxiing and crossing holding position				17
taxiing and crossing holding position	keeping distance from other traffic			6
taxiing and crossing holding position	keeping distance from other traffic	continuing taxiing when taxiway is not cleared from other traffic	pilot	3
taxiing and crossing holding position	keeping distance from other traffic	braking aggressively	pilot	1
taxiing and crossing holding position	keeping distance from other traffic	wrongly assessed situation	pilot	1
taxiing and crossing holding position	keeping distance from other traffic	not adjusting speed to current situation	pilot	1
taxiing and crossing holding position	searching for appropriate holding position			3
taxiing and crossing holding position	searching for appropriate holding position	searching for holding position after crossing	pilot	1
taxiing and crossing holding position	searching for appropriate holding position	stopping behind holding position	pilot	1

taxiing and crossing holding position	searching for appropriate holding position	not seeing holding position	pilot	1
taxiing and crossing holding position	ATC assigning taxi route	assigning not appropriate taxi route for particular aircraft	ATC TWR	2
taxiing and crossing holding position	taxiing via assigned taxiway	using wrong taxiway to holding point	pilot	2
taxiing and crossing holding position	turning to another taxiway			2
taxiing and crossing holding position	turning to another taxiway	not adjusting speed to current conditions	pilot	1
taxiing and crossing holding position	turning to another taxiway	not performing oversteering	pilot	1
taxiing and crossing holding position	crossing runway	crossing holding position without clearance	pilot	1
taxiing and crossing holding position	crossing holding position	crossing runway without ATC clearance	pilot	1
landing				17
landing	ATC issuing landing clearance			6
landing	ATC issuing landing clearance	clearance is issued to occupied runway	ATC TWR	2
landing	ATC issuing landing clearance	insufficient separation is provided when another aircraft is crossing runway	ATC TWR	1
landing	ATC issuing landing clearance	clearance is issued while go around is safer option to keep separation	ATC TWR	1
landing	ATC issuing landing clearance	not providing sufficient separation between aircraft	ATC TWR	1
landing	ATC issuing landing clearance	holding pattern is issued for long time due to lack of capacity	ATC TWR	1
landing	setting landing configuration			5
landing	setting landing configuration	pilot has not got acquainted with NOTAM/ATIS	pilot	3
landing	setting landing configuration	landing when maximum landing weight is exceeded	pilot	1
landing	setting landing configuration	landing with thrust reversal inoperative when runway is contaminated	pilot	1
landing	ILS interception			3
landing	ILS interception	ILS guidance is not precise	pilot	1
landing	ILS interception	approaching wrong runway	pilot	1
landing	ILS interception	glide slope fails	pilot	1
landing	stabilizing approach	performing unstabilized approach	pilot	2
landing	visual contact with runway	landing with late visual contact with runway	pilot	1
pushback				15

pushback	pushing aircraft to assigned position via intended route			11
pushback	pushing aircraft to assigned position via intended route	not detecting obstacle during pushback	ground personnel	3
pushback	pushing aircraft to assigned position via intended route	pushing aircraft to position with poor surface conditions	ground personnel	2
pushback	pushing aircraft to assigned position via intended route	pushback stops suddenly	ground personnel	2
pushback	pushing aircraft to assigned position via intended route	pushing aircraft too close to other traffic	ground personnel	2
pushback	pushing aircraft to assigned position via intended route	pushing aircraft to wrong position	ground personnel	2
pushback	pushback disconnection			2
pushback	pushback disconnection	leaving aircraft that had not applied brakes	ground personnel	1
pushback	pushback disconnection	bypass pin is sheared	ground personnel	1
pushback	pushback connection with aircraft	tow bar is wrongly connected	ground personnel	1
pushback	preparation for exiting stand	enabling pushback when handling machinery is within stand safety envelope zone	handling agent	1
line-up and take-off				12
line-up and take-off	ATC issuing take-off clearance			8
line-up and take-off	ATC issuing take-off clearance	take-off clearance issued on occupied runway	ATC TWR	2
line-up and take-off	ATC issuing take-off clearance	not using standard phraseology	ATC TWR	1
line-up and take-off	ATC issuing take-off clearance	not providing sufficient separation between aircraft	ATC TWR	1
line-up and take-off	ATC issuing take-off clearance	ATC assigned runway for take-off with tailwind	ATC TWR	1
line-up and take-off	ATC issuing take-off clearance	take-off clearance issued when other landing aircraft is crossing the runway	ATC TWR	1
line-up and take-off	ATC issuing take-off clearance	take-off clearance issued when a vehicle is violating the runway	ATC TWR	1
line-up and take-off	ATC issuing take-off clearance	take-off clearance issued not in compliance with airport operational procedures	ATC TWR	1
line-up and take-off	initiating take-off roll			2
line-up and take-off	initiating take-off roll	initiating take-off when wind speed limit is exceeded	pilot	1
line-up and take-off	initiating take-off roll	not complying immediate take-off command in time	pilot	1
line-up and take-off	monitoring other traffic	not checking runway occupancy	pilot	1

line-up and take-off	aborting take-off	aborting take-off when not needed	pilot	1
wildlife control				4
wildlife control	long-term reduction of wildlife presence	fence does not serve as boundary	biological protection operator	2
wildlife control	wildlife check			2
wildlife control	wildlife check	not reporting wildlife occurrence	biological protection operator	1
wildlife control	wildlife check	not detecting wildlife	biological protection operator	1
aircraft maintenance				4
aircraft maintenance	manipulating the aircraft nearby hangar			3
aircraft maintenance	manipulating the aircraft nearby hangar	not following stated procedures when manipulating with aircraft	aircraft maintenance personnel	2
aircraft maintenance	manipulating the aircraft nearby hangar	not manipulate the aircraft carefully	aircraft maintenance personnel	1
aircraft maintenance	aircraft reparation	jacking aircraft wrongly	aircraft maintenance personnel	1
security assurance				3
security assurance	guarding the airport perimeter			2
security assurance	guarding the airport perimeter	not detecting unauthorized vehicle within airside	security personnel	1
security assurance	guarding the airport perimeter	not detecting unauthorized aircraft within airside	security personnel	1
security assurance	security check of airport personnel	not detecting prohibited item	security personnel	1
network administration	ensuring network accessibility	crew cannot access the internet	network administrator	1

Appendix 3

Four tables of "Top 10" elements which contain unsafe control actions most often

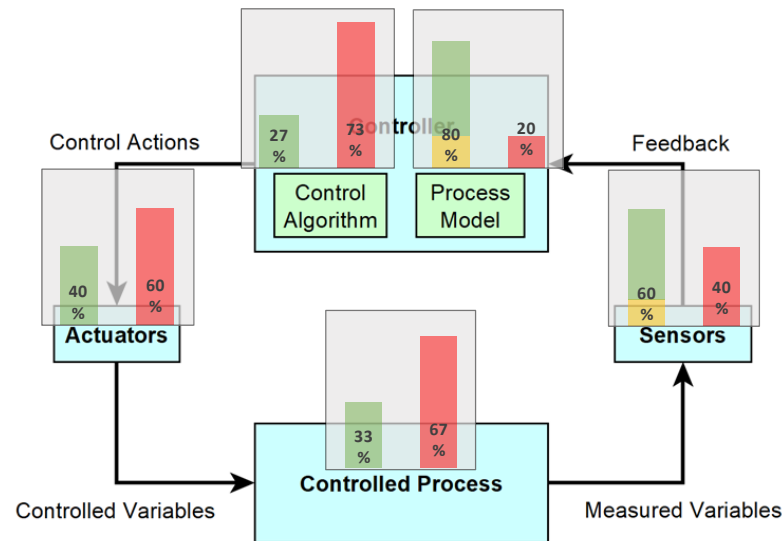
Event - Control Loop			
controlled process <input type="text" value="controlled process"/>	activity <input type="text" value="activity"/>	deviation <input type="text" value="deviation"/>	controller <input type="text" value="controller"/>
controlled process	activity	deviation	controller
count <input type="text" value="count"/>	count <input type="text" value="count"/>	count <input type="text" value="count"/>	count <input type="text" value="count"/>
[P] - movement area serviceability check	[A] - identifying hazard	[H] - not detecting design deficiencies	movement area inspector
77	20	13	99
[P] - ATC procedures	[A] - providing notification about operational procedures	[H] - wrong friction outputs	pilot
50	16	10	92
[P] - vacating runway and taxiing	[A] - creating ATC operational procedures	[H] - not detecting FOD	ATC TWR
44	15	9	56
[P] - hazard and risk management	[A] - pavement structure check	[H] - not establishing operational procedures where needed	safety manager
41	13	9	41
[P] - infrastructure maintenance	[A] - searching for FOD	[H] - crossing holding position without clearance	ground personnel
32	13	8	28
[P] - approaching the stand and stopping	[A] - marking correctness check	[H] - not performing contamination check	ATC management
23	13	7	18
[P] - contamination removal	[A] - keeping distance from other traffic	[H] - not giving way to aircraft	movement area technician
17	12	7	14
[P] - ground handling	[A] - removing the contamination	[H] - not delineate workplace sufficiently	infrastructure maintenance personnel
17	11	7	10
[P] - taxiing and crossing holding position	[A] - pushing aircraft to assigned position via intended route	[H] - driving the vehicle at wrong place	biological protection operator
17	11	6	4
[P] - landing	[A] - crossing runway	[H] - not detecting confusing marking	aircraft maintenance personnel
17	11	6	4

Appendix 4

Design of the fully-automated tool for performing analysis of control loop and interpreting results

formula:	A	B	C	D	E	$(A \wedge B \wedge C \wedge D \wedge E) \rightarrow 1$	$C \rightarrow 0 \wedge (D \wedge E) \rightarrow 1$	$D \rightarrow 0 \wedge E \rightarrow 1$	$A \rightarrow 1 \wedge B \rightarrow 0$	$B \rightarrow 1 \wedge C \rightarrow 0$	$C \rightarrow 1 \wedge D \rightarrow 0$	$D \rightarrow 1 \wedge E \rightarrow 0$	$A \rightarrow 0 \wedge B \rightarrow 0$	of which identified by effective feedback	$A \rightarrow 0 \wedge B \rightarrow 1$	of which identified by effective feedback	
ID	control algorithm	actuator	process	sensor	process model	loop works well but contains delay	process does not work but feedback is effective	resilience of controller	inappropriate command	technical problem	faulty sensor	incorrect interpretation	controller does not control process		controller controls process when should not		
1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	
2	0	1	1	0	1*	0	0	1	0	0	1	0	0	0	1	0	
3	0	1	1	1*	1	0	0	0	0	0	0	0	0	0	1	1	
4	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	
5	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
6	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	
7	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
8	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	
9	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	
10	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	
11	0	1	1	1*	1	0	0	0	0	0	0	0	0	0	1	1	
12	0	1	1	1	1*	0	0	0	0	0	0	0	0	0	1	1	
13	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	
14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
15	0	0	0	0	1*	0	0	1	0	0	0	0	1	0	0	0	
total 1+1*:	27%	40%	33%	60%	80%	0%	33%	20%	20%	7%	7%	0%	40%		33%		
total 0:	73%	60%	67%	40%	20%												
total delay:	0%	0%	0%	13%	20%												
total 1:	27%	40%	33%	47%	60%												
inadequate training, inappropriate procedures:																31%	
component failure, faulty transmission:																7%	
average delay per control loop:																7%	

identified: 67% identified: 80%



Appendix 5

Proposal of STAMP-based safety dashboard for monitoring trends of selected characteristics of the control loop

year	controller does not control process	of which identified by effective feedback	controller controls process when should not	of which identified by effective feedback
2017	10%	50%	20%	50%
2018	8%	0%	20%	40%
2019	8%	50%	16%	50%
2020	10%	100%	15%	33%

