

INVESTIGATING DIFFERENCES BETWEEN THE WORKLOAD FACTORS OF EXECUTIVE AND PLANNING AIR TRAFFIC CONTROLLERS

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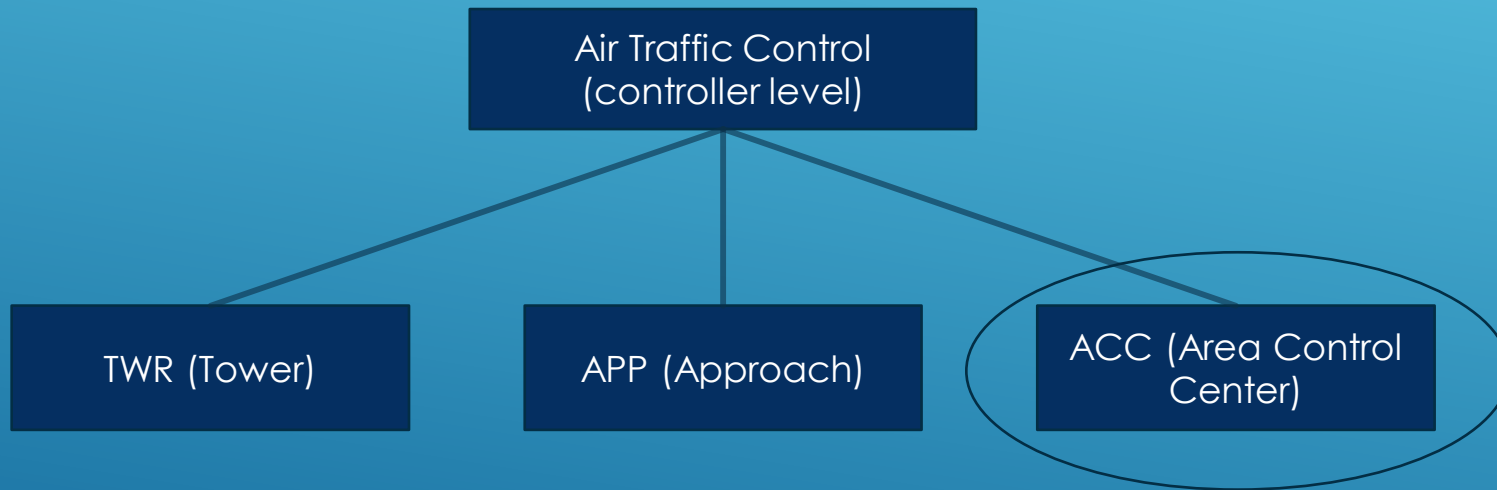
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WHO IS THE EXECUTIVE AND PLANNING CONTROLLER?

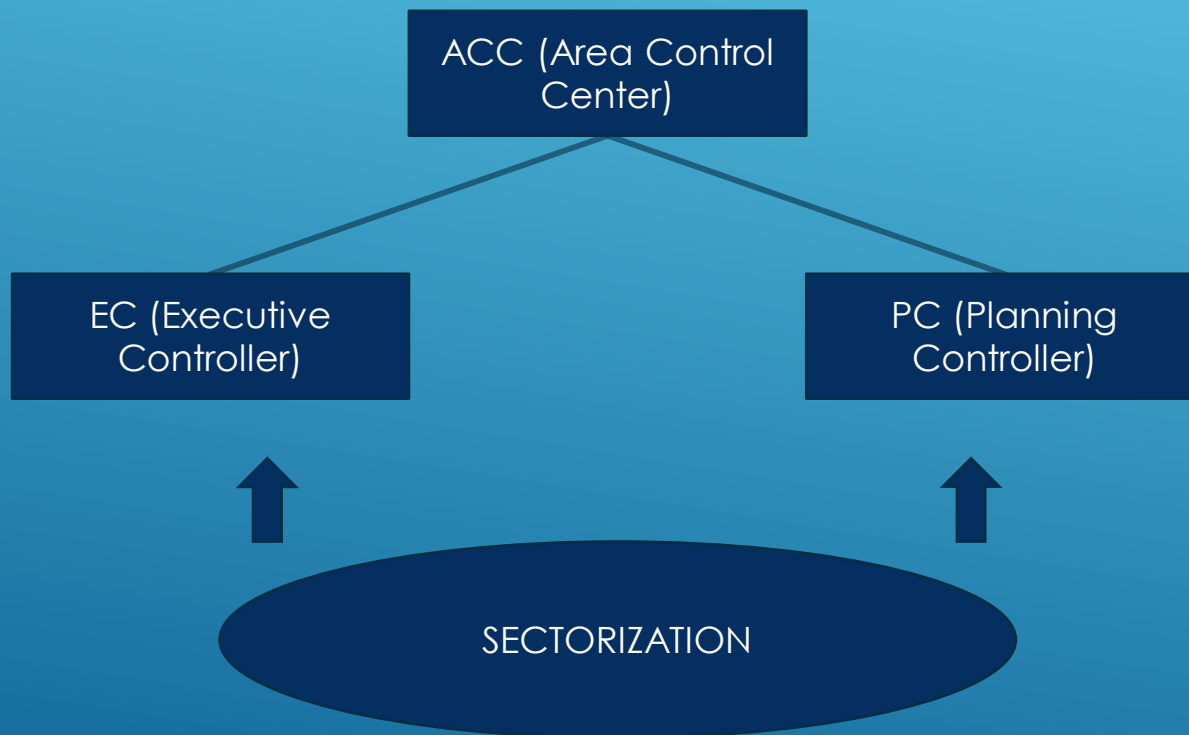


WHO IS THE EXECUTIVE AND PLANNING CONTROLLER? II.

Mean tasks:

EC – communication with a/c pilots

PC – doing plans for solving conflicts between a/c



WORKSTATION OF AN ATCO



Mal
Muir

irline
Reporter

SECTORIZATION

Main purpose of air traffic services: keeping the separation minima between a/c

- Based on ICAO Annexes
- Because of safety reasons (high speed, a/c characteristics, etc.)

ATCOs work in so-called sectors

- To keep their workload in an optimal interval (75-80%)
- Based on the number of a/c in the current sector
- An ATCO can handle max. ca. 18-20 a/c simultaneously
- The SV (Supervisor) opens/closes sectors depending on the volume of the traffic

BOTTLENECKS OF THE CURRENT SYSTEM

The traffic grows very fast

- Air traffic services are getting closer and closer to a traffic volume which cannot be handled anymore by the current structure
- Total automation isn't a solution according to current studies
 - Human-based activity
 - Human vs. Machine decisions (pros and cons)

We need to find a solution which helps the ATCOs reduce their workload

FIRST STEPS OF THE RESEARCH

Personal interview with the air traffic controllers

- Information about the processes, procedures, complexity

Survey for the ACC ATCOs

- General data
- Complexity factors
- Sector configuration change

THE SURVEY

International usability was important
Google Forms platform
Complexity-based approach
16 complexity factors defined

Number of climbing aircraft (EC)

	1	2	3	4	5	
Slight influence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Large influence

Number of descending aircraft (EC)

	1	2	3	4	5	
Slight influence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Large influence

Relative directions of aircraft (convergence/divergence of traffic) (EC)

	1	2	3	4	5	
Slight influence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Large influence

RESULTS

Average value and deviation for the complexity factors of both EC and PC

Correlation calculus for the relation of the ATCO's age and the complexity factors

<i>Komplexitási tényezők:</i>	<i>EC</i>	<i>EC</i>	<i>PC</i>	<i>PC</i>
	<i>átlag</i>	<i>szórás</i>	<i>átlag</i>	<i>szórás</i>
<i>Emelkedő légi járművek száma</i>	4,54	0,50	3,54	0,91
<i>Süllyedő légi járművek száma</i>	4,54	0,58	3,58	0,91
<i>Légi járművek egymáshoz képesti helyzete (forgalom diverzitása, konverzitása)</i>	3,04	0,98	3,29	0,89
<i>Szektorok közötti koordináció</i>	2,17	1,03	4,38	0,70
<i>Légi járművek sebességének különbözősége</i>	2,75	0,83	3,00	0,91

<i>Komplexitási tényezők:</i>	<i>EC-re</i>	<i>PC-re</i>
	<i>vonatkozó</i>	<i>vonatkozó</i>
	<i>korrelációs</i>	<i>korrelációs</i>
	<i>együttható</i>	<i>együttható</i>
<i>Emelkedő légi járművek száma</i>	-0,09	0,08
<i>Süllyedő légi járművek száma</i>	-0,01	0,15
<i>Légi járművek egymáshoz képesti helyzete (forgalom diverzitása, konverzitása)</i>	0,22	0,12
<i>Szektorok közötti koordináció</i>	0,42	-0,57
<i>Légi járművek sebességének különbözősége</i>	0,41	0,25

RESULTS II.

- Provided opportunity to give free text remarks
- The main bottleneck is the coordination between the sectors according to the given answers
- Meteorology and the different a/c movements are also significant factors



POSSIBILITIES FOR DEVELOPMENT

- For helping ATCOs coordinate with the adjacent sectors
- Decision support tool
- Suggestion for the optimal Flight Level at the sector boundaries when hand-off/takeover
 - Decision-making model
 - Artificial Intelligence-based tool structure
 - Based on the hungarian practice

THANK YOU FOR YOUR ATTENTION!