AUN2014 : Airports in Urban Networks
15-16 Apr 2014 CNIT - Paris la Défense (France)

Passenger Management by Prioritization

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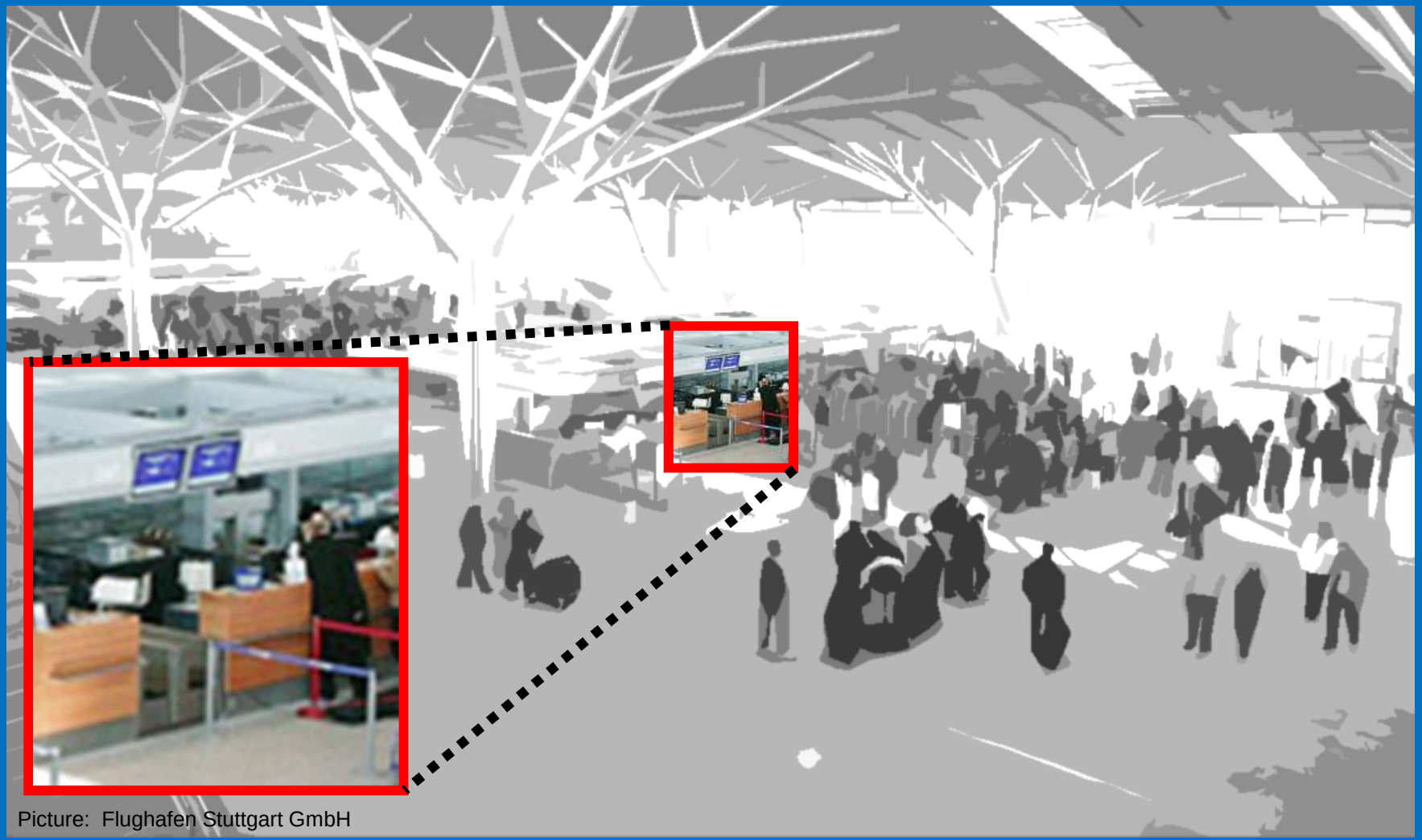
Topics

- Fast lane usage concepts
  - Prioritizing status group members
  - Prioritizing for passenger steering
- Operational scenarios and simulation
  - Reference scenario
  - Priority scenarios

Terminal queuing

Picture: Flughafen Stuttgart GmbH

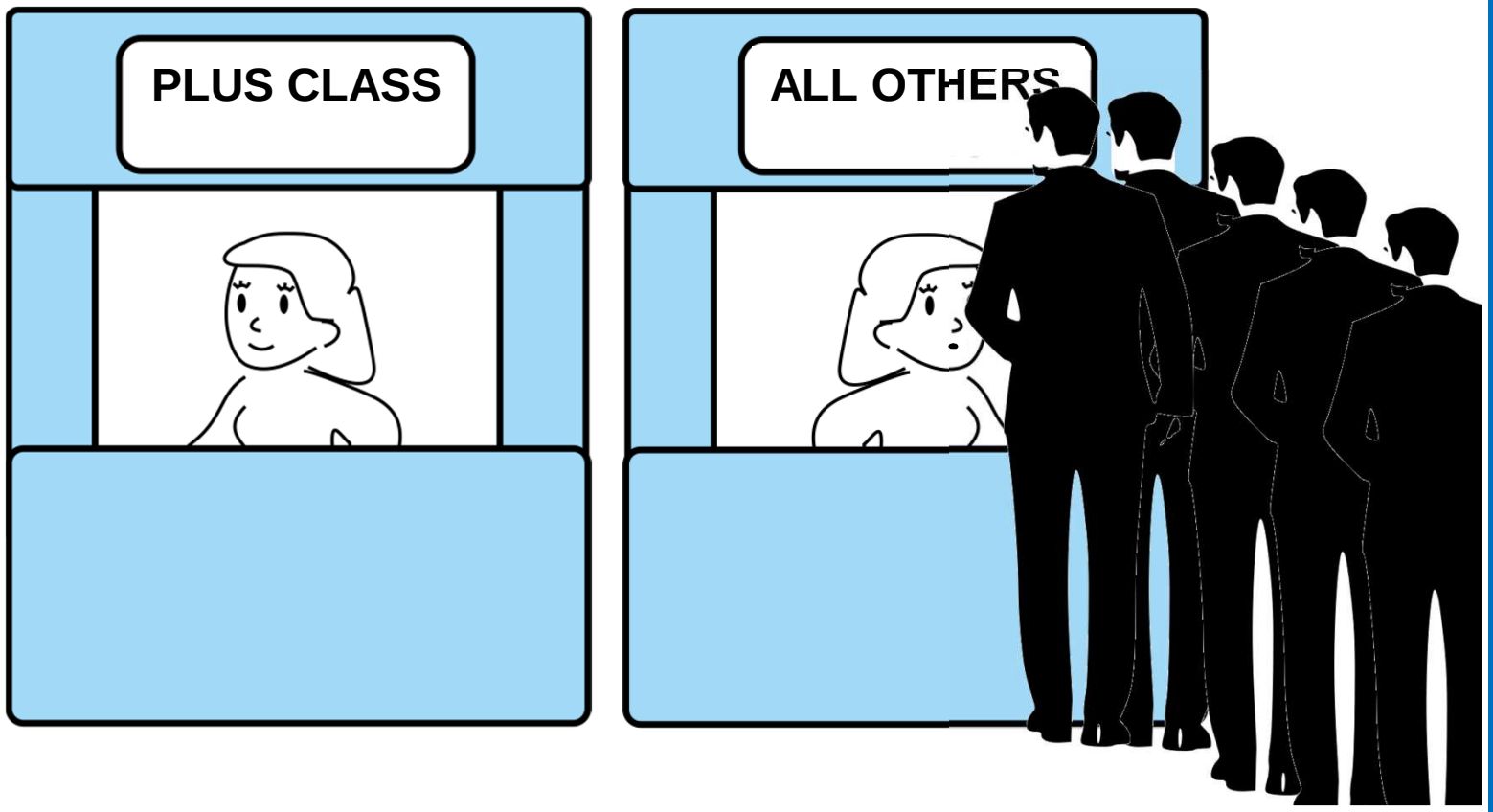
Terminal queuing



Picture: Flughafen Stuttgart GmbH

Fast lane usage concepts

- Status group depending priorities



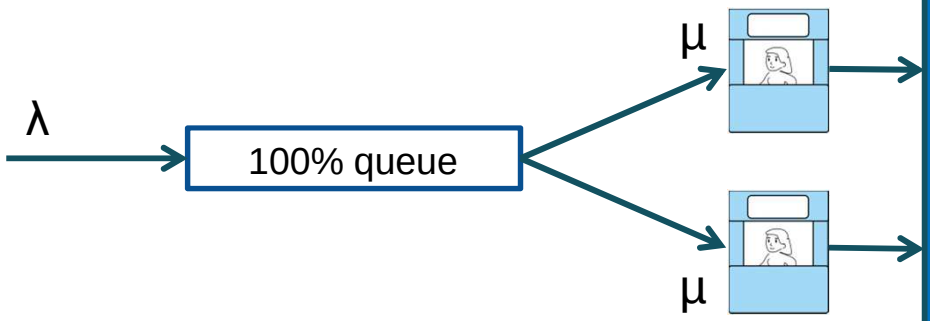
Fast lane usage concepts

- Status group depending priorities

Avg. number of persons in the system *Expl.: λ=1.2; μ=1.0; c_I=1.0; c_S=0*	
Single queue	**1.55**

G/G/n approximation by Allen/Cunneen

$$E(N) \approx \frac{\rho}{1-\rho} \times \sqrt{\rho^{c+1}} \times \left(\frac{c_I^2 + c_S^2}{2} \right) + \rho \times c$$



Fast lane usage concepts

- Status group depending priorities

Avg. number of persons in the system *Expl.: λ=1.2; μ=1.0; c_I=1.0; c_S=0*	
Single queue	**1.55**
Parallel queue	**2.10**

G/G/n approximation by Allen/Cunneen

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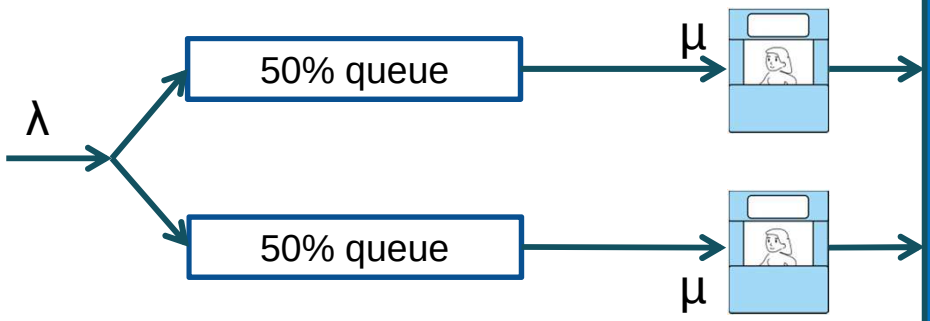


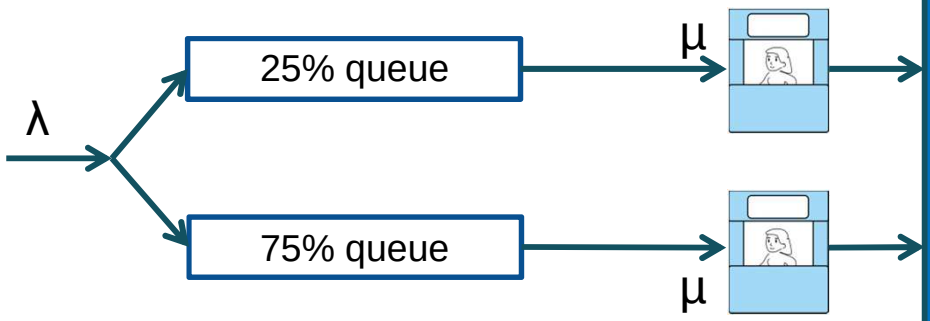
Fast lane usage concepts

- Status group depending priorities

Avg. number of persons in the system *Expl.: λ=1.2; μ=1.0; c_I=1.0; c_S=0*	
Single queue	**1.55**
Parallel queue	**2.10**
Asymmetric queue (25% + 75%)	**5.30**

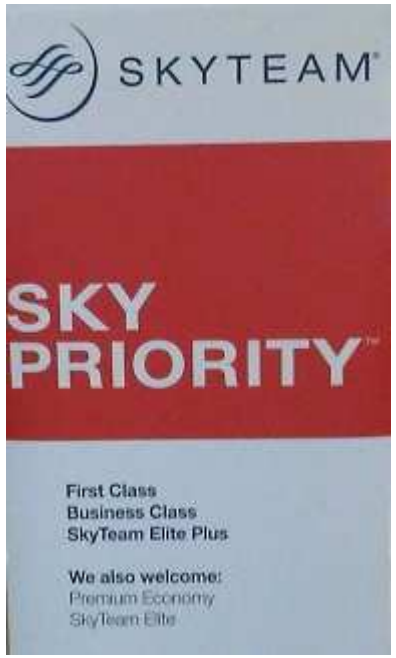
G/G/n approximation by Allen/Cunneen

$$E(N) \approx \frac{\rho}{1-\rho} \times \sqrt{\rho^{c+1}} \times \left(\frac{c_I^2 + c_S^2}{2} \right) + \rho \times c$$



Fast lane usage concepts

- Status group depending priorities
  - allocation of priority as part of the product class
  - paid priority
  - fast tracking *to be the first at gate*
  - may cause reduced infrastructure capacity efficiency due to idle running especially for prioritized requests



Fast lane usage concepts

- Prioritizing for passenger steering
  - allocation of priority as part of the AOP Airport Operations Plan stabilization process
  - Level of service driven priority
  - Fast tracking to maximise connectivity

Simulation

- The object of this study was to investigate the possibilities of influencing achievable boarding quotas through **targeted prioritisation** of flight passengers in order to limit the number of flights missed due to long queues **at security control**.
- *Local solutions only – "Intermodal Augmented Scheduling" with regional focus*

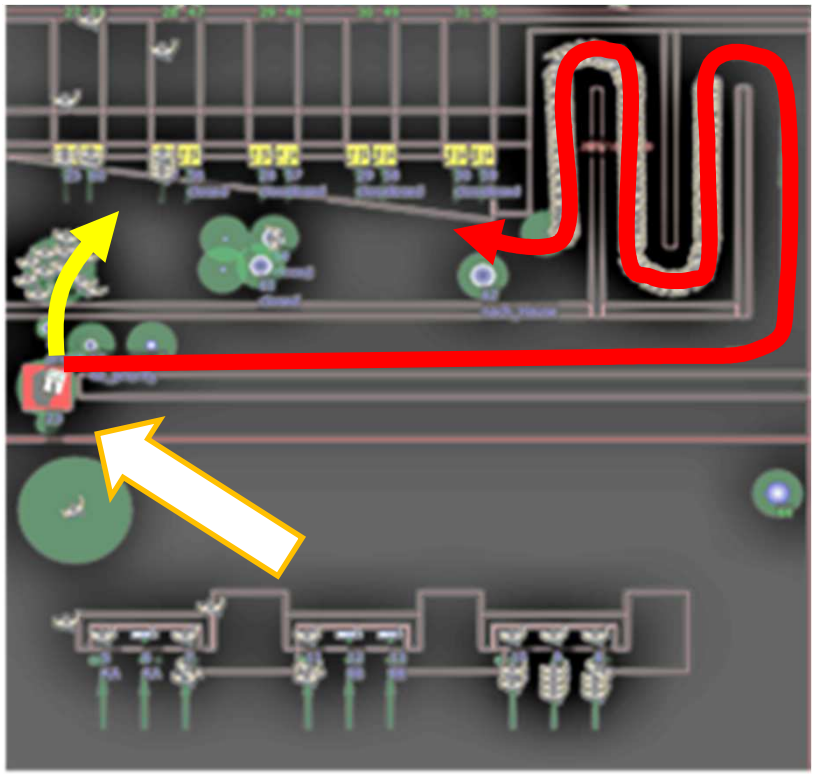
Simulation

1…10 security lines

priority security queue

boardingpass control

checkin counter blocks 1, 2, 3

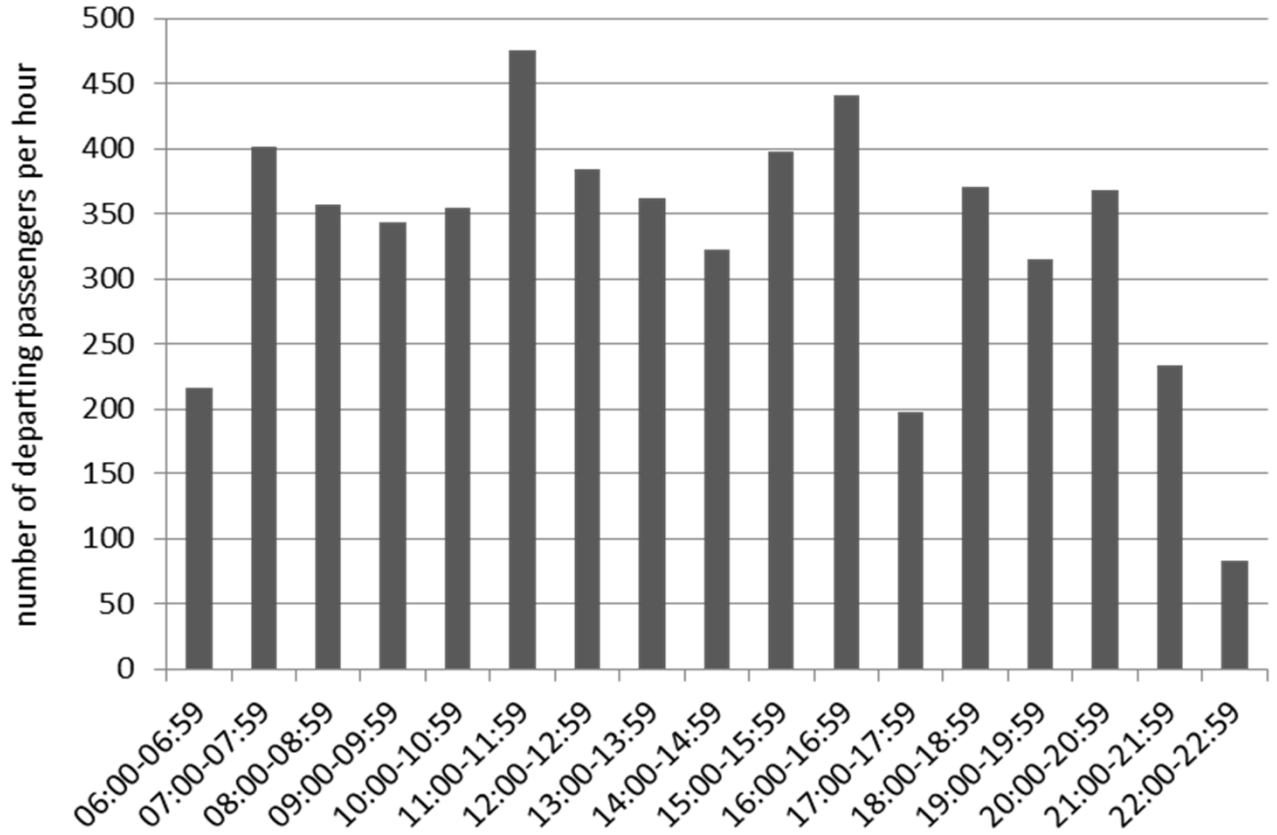


main security queue

ext. pax source

Simulation

- Passenger demand profile (sum per hour)

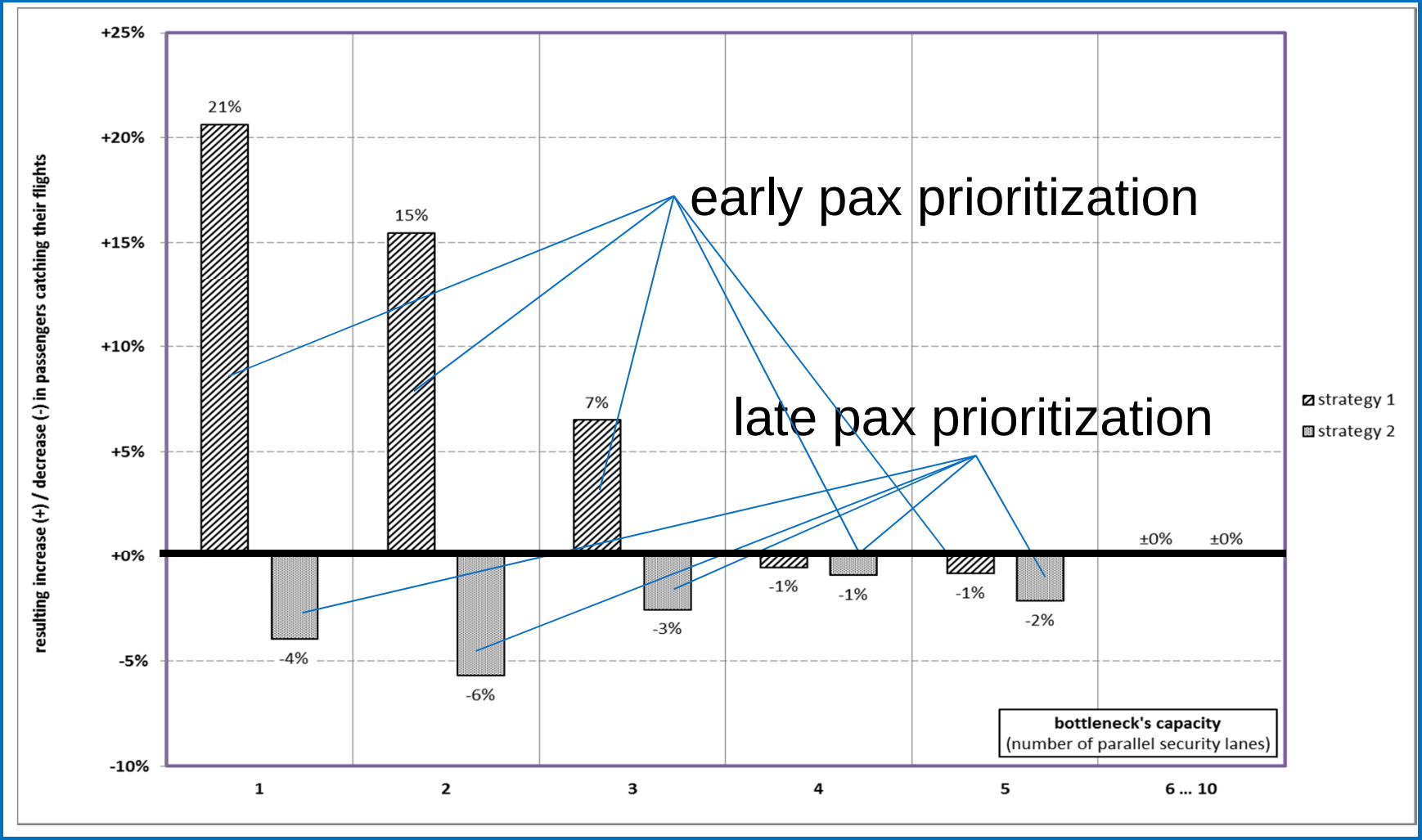


Simulation

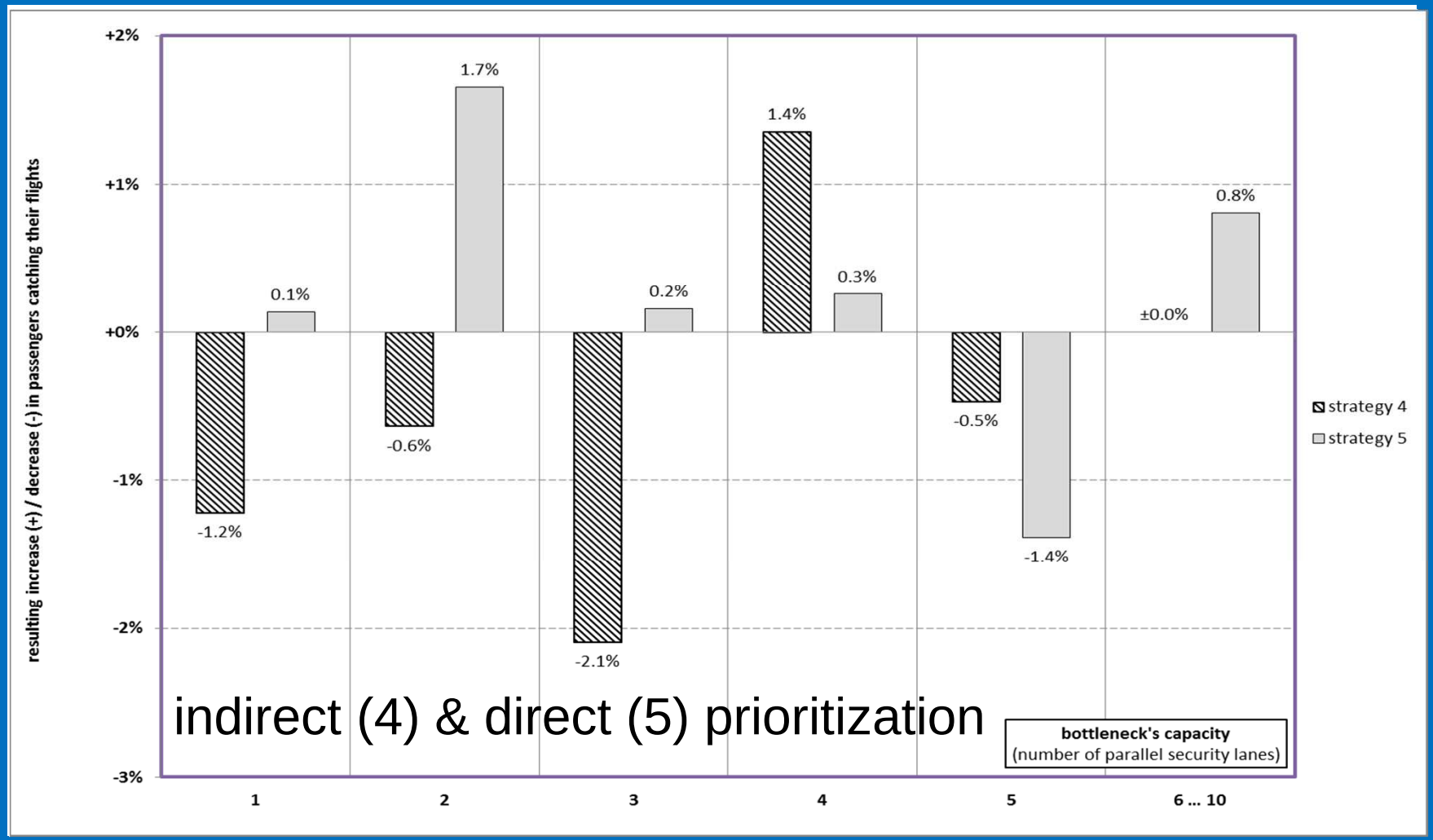
- Scenarios
  - #1: Reference
  - #2: Priority for early passengers
  - #3: Priority for late passengers

  - #4: bunch access reference
  - #5: Indirect priority for bunch
  - #6: direct priority for bunch

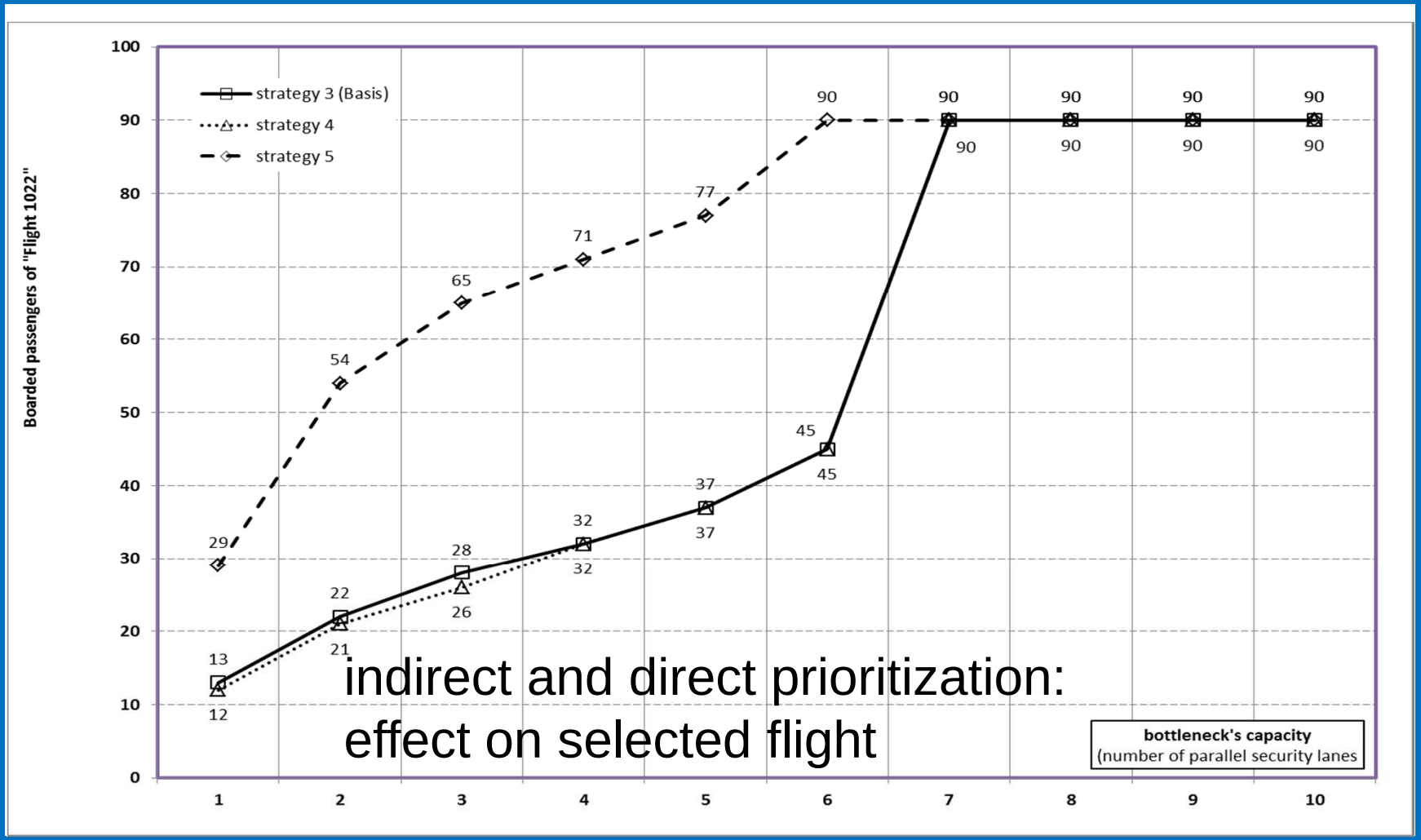
Simulation


+25%
+20%
+15%
+10%
+5%
+0%
-5%
-10%
resulting increase (+) / decrease (-) in passengers catching their flights
21%
-4%
15%
-6%
7%
-3%
-1%
-1%
-1%
-2%
±0%
±0%
early pax prioritization
late pax prioritization
strategy 1
strategy 2
bottleneck's capacity
(number of parallel security lanes)
1
2
3
4
5
6 ... 10

Simulation


+2%
+1%
+0%
-1%
-2%
-3%
resulting increase (+) / decrease (-) in passengers catching their flights
1.7%
1.4%
0.8%
0.1%
0.2%
0.3%
±0.0%
-0.6%
-0.5%
-1.2%
-2.1%
-1.4%
strategy 4
strategy 5
indirect (4) & direct (5) prioritization
bottleneck's capacity
(number of parallel security lanes)
1
2
3
4
5
6 … 10

Simulation


Boarded passengers of "Flight 1022"
strategy 3 (Basis)
strategy 4
strategy 5
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
29
54
65
71
77
90
90
90
90
90
13
22
28
32
37
45
90
12
21
26
32
37
45
90
90
90
indirect and direct prioritization:
effect on selected flight
bottleneck's capacity
(number of parallel security lanes

Conclusions

- Pax prioritization for terminal process optimization is very limited in effects
- Prioritization may lead to disadvantages for third parties – what-if simulation as decision support
- Prioritization causes costs (by dedicated capacities and/or due to reduced efficiency) and requires therefore additional benefits
- Prioritization should always be allocated in accordance with affected stakeholders → Rudolph et al.:“Intermodal Augmented Scheduling”