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IMPACT ASSESSMENT OF COVID-19 MEASURES ON AIRPORT OPERATIONS & CAPACITY

WEBINAR

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INTRODUCTION

COVID-19 IMPACT ANALYSIS ON AIRPORT CAPACITY

OVERVIEW | **MOTIVATION FOR STUDY**

COVID-19 MEANS SEVERAL NEW CHALLENGES

- One major aspect: **possibility to keep physical distance**
- Therefore airports need to know the **passenger volumes and capacities** of each area in order to:

Expand Queuing Areas

Realign Staffing / Allocation

Elaborate Concept for local Health Authorities

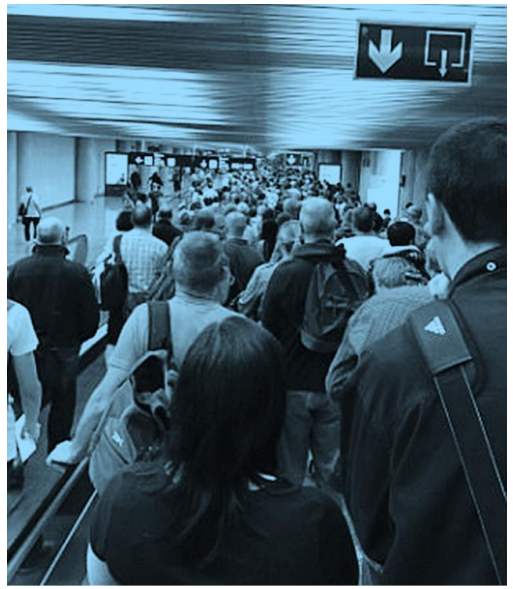
Know about Saturation Capacity

Prepare for Ad-hoc changes

CHALLENGES

- Uncertainty and very dynamic changes
- But **laissez-faire** / **trial and error** in real life can **jeopardy health**
- → Worst case: uncontrolled congestion → bad reputation

Systematic Assessment required → Use Simulation for "What-if"



OVERVIEW | **OBJECTIVE OF STUDY**

CHARACTERISTICS OF STUDY

- Quantify **capacity impact of Covid-19 measures** on airport operations and capacity
- Consider a **wide spectrum of situations**

METHODOLOGY FOR OPTIMIZATION

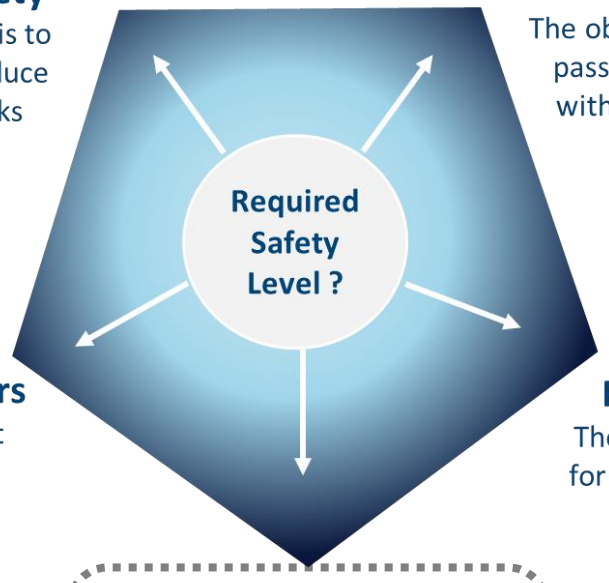
- Understand **influencing parameters**
- "What-if" to develop **‚best practices'** → **smooth recovery** and guidelines

This Webinar:
Share general findings and approach

→

Applied by Airports:
Specific saturation capacity

Area of Conflicts for Covid-19 Measures



Effectiveness for Health Safety
The objective is to effectively reduce infection risks

Passenger Confidence in Safety
The objective is to increase the passengers' wellbeing even with non-proven measures

High amount of permitted Travelers
The objective is to not limit the number of travelers

Reduction of Financial Impact
The objective is to decide for cost-efficient solutions

Ensuring Handling Capacity
The objective is to minimize impact on throughput capacity

OVERVIEW | **CATEGORIES OF IMPACT / MEASURES**

Reduction of Health Risk by…

… more stringent Processes	**Additional Processes** Temperature Check, Covid-19 Test ?, Health Certificate Check ? …	**Increased Processing Time** Additional Questions at Check-In / Immigration, …	**Changed Passenger Flow** Suspension of simplified Transfer Flows, Other Allocation…
… keeping Distance	**Social Distancing in Queues and Holding Areas** Enlargement of Queuing and/or faster Throughput	**Limited Availability of Processors** Use of every 2nd Counter/ Lane / Reclaim Belt / Gate Holdroom only…	**Delayed Boarding / Deboarding** Boarding by Zones, Delayed Deboarding, Head Start for Luggage…

Question: What is the impact on airport capacity?

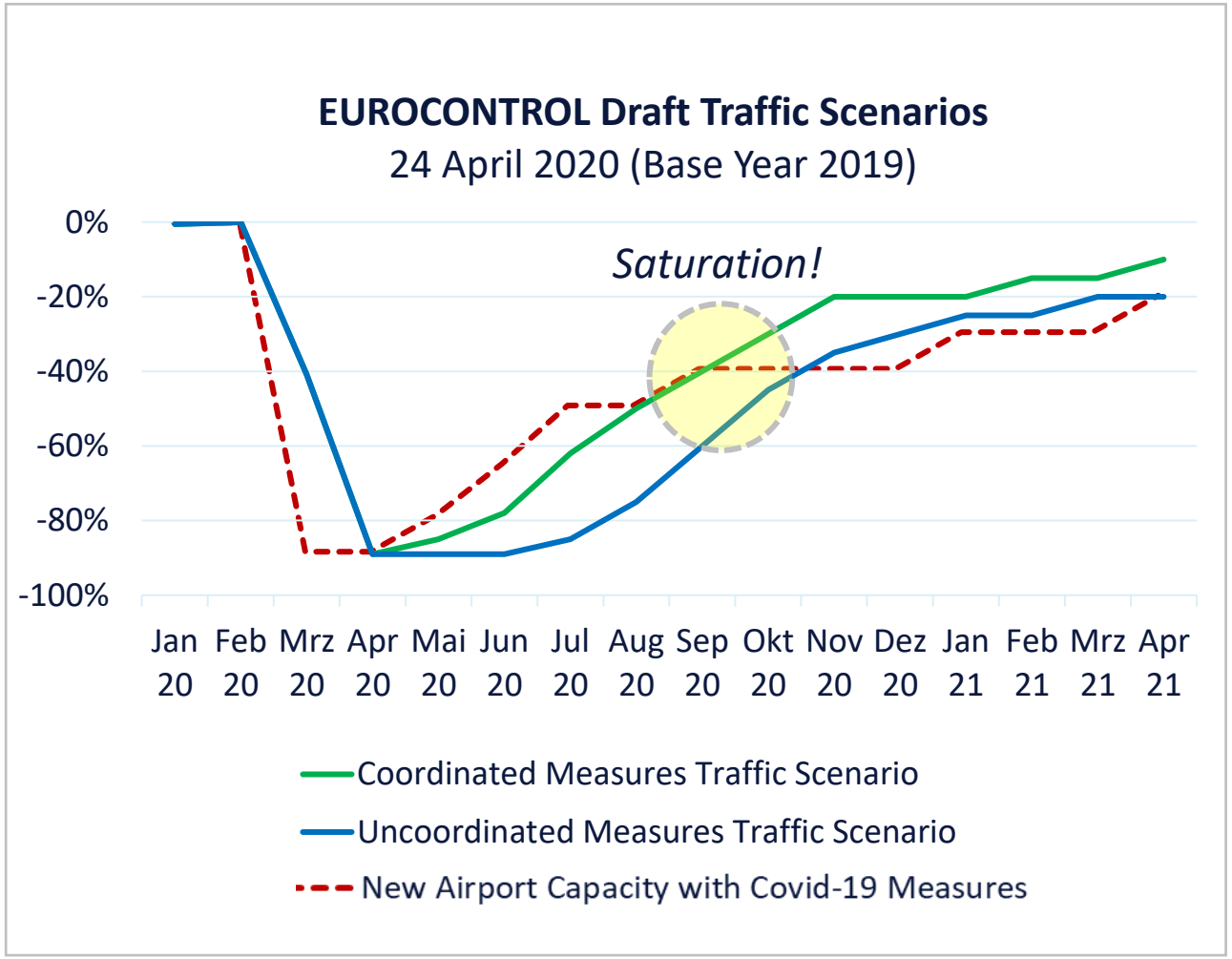
OVERVIEW | **NEW SATURATION CAPACITY**

TWO TRENDS

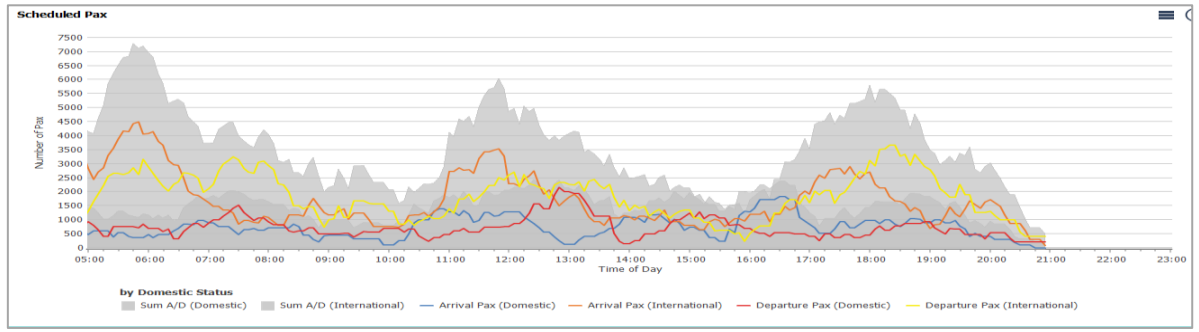
- Recovering traffic numbers
- Alleviating health safety measures
  - stepwise
  - but likely certain measures will stay

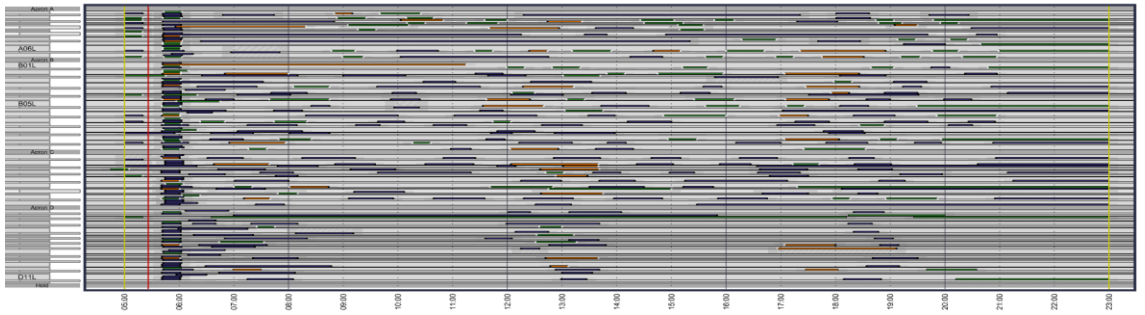
WHAT DOES THIS MEAN FOR CAPACITY?

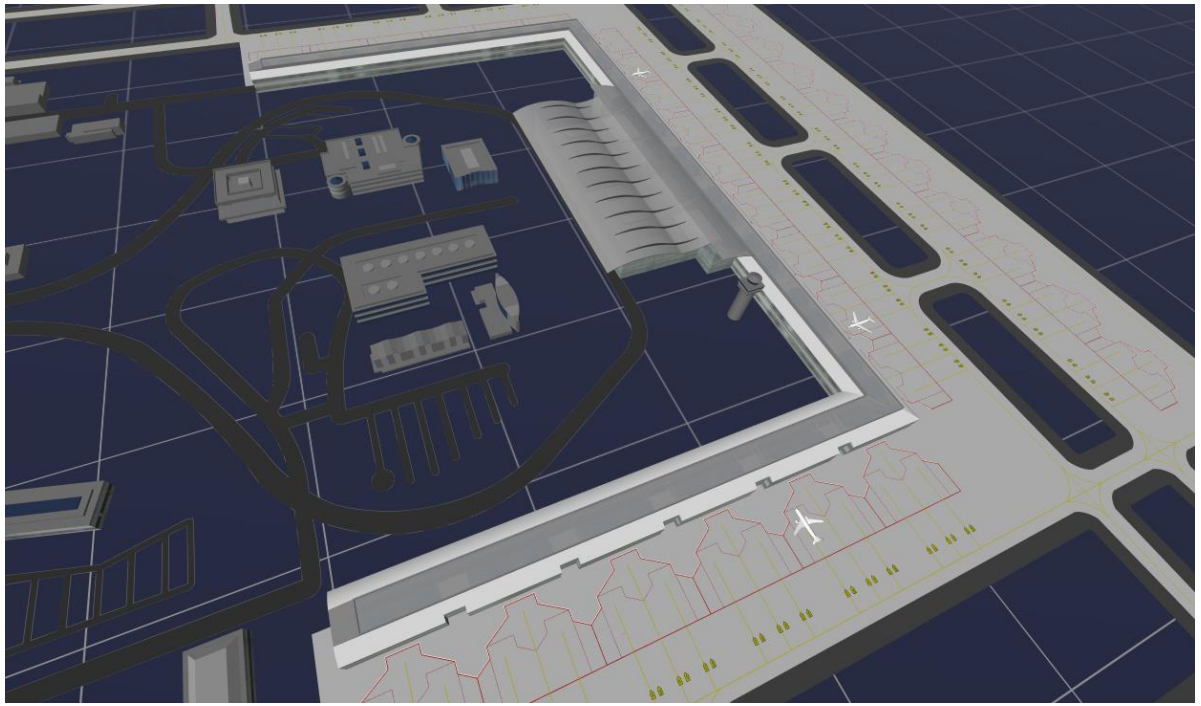
- Will health safety measures end soon enough when traffic gets closer to Pre-Covid volumes?
- If not, airport will face a **New Saturation Capacity.**

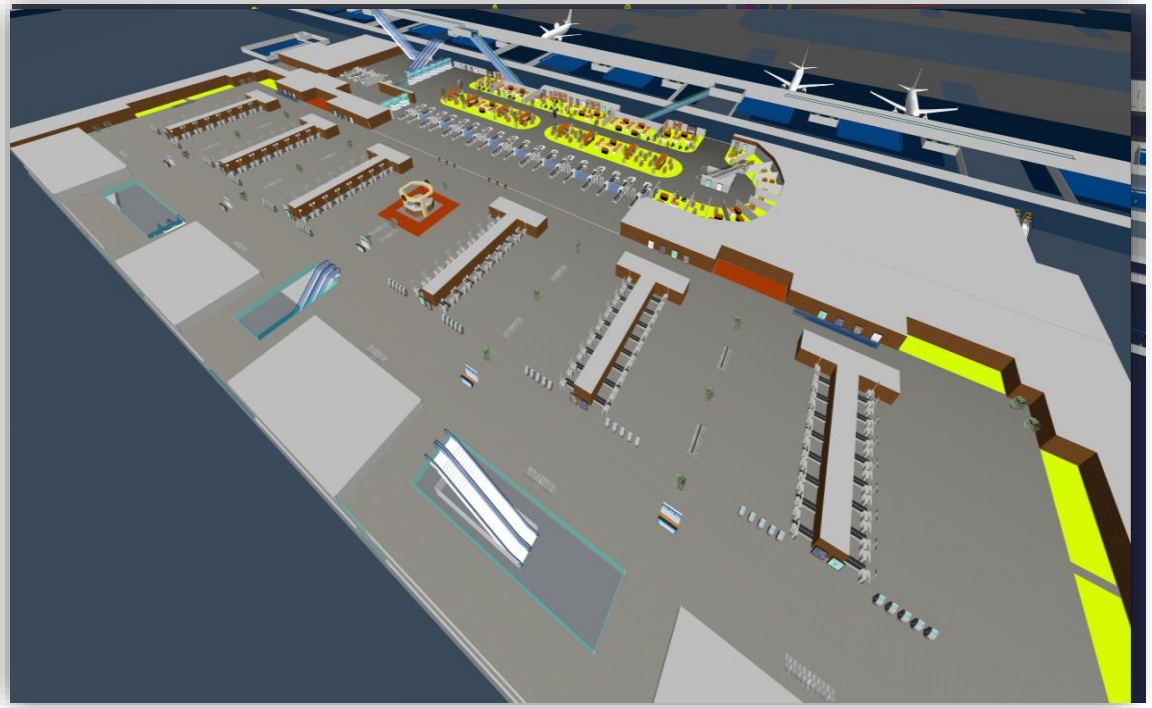


TEST ENVIRONMENT | **GENERIC AIRPORT**



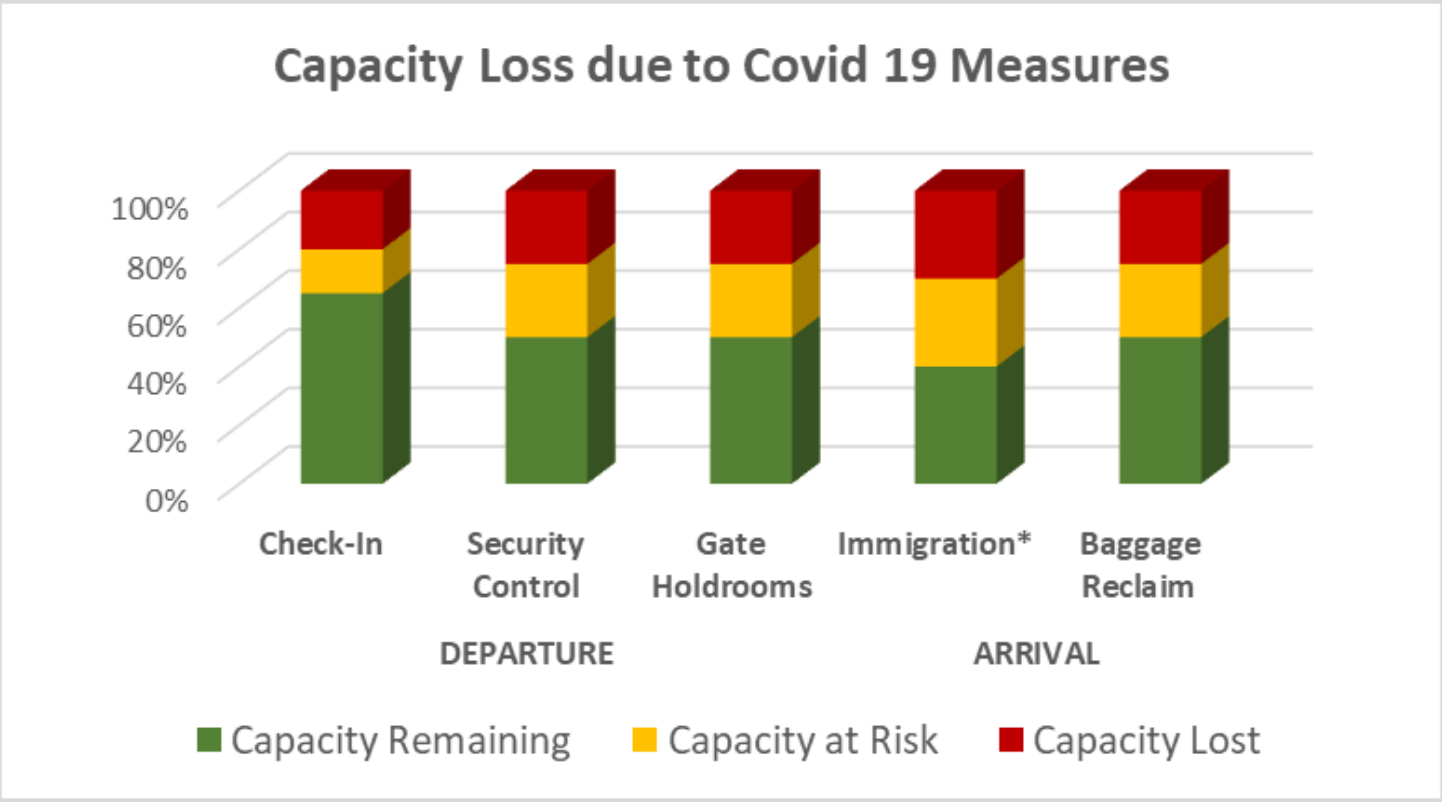






OVERVIEW | **NEW SATURATION CAPACITY**

- **General findings:** saturation capacity: 60-75%
- Actual saturation capacity is airport specific | Consideration of layout and local situation



* Relates to NonSchengen Traffic only

Fix - Capacity Lost:
Very likely that Covid-19 measures reduce capacity with hardly any chance for solving with reasonable time /effort

Flexible - Capacity at Risk:
Reduction very much depending on layout / process specifics;
Solving generally possible but costly

Capacity Remaining:
Either with ‚do-nothing' or easy measures sustainable capacity

DETAILED RESULTS PER TERMINAL AREA

COVID-19 ANALYSIS ON AIRPORT CAPACITY

HEALTH CHECK

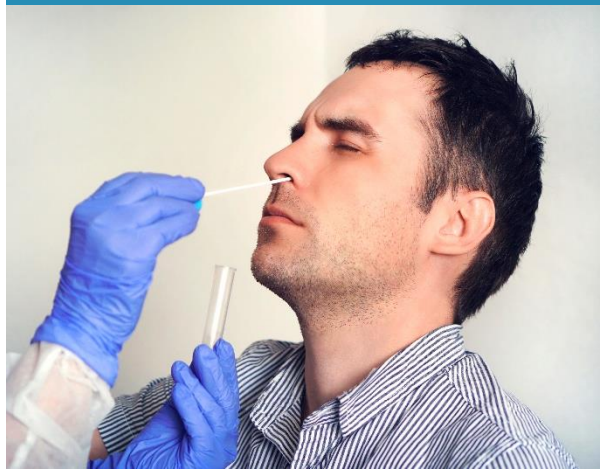
COVID-19 IMPACT ANALYSIS

HEALTH CHECK| **PROBLEMS OF HEALTH CHECK**

TESTING IS GETTING MORE IMPORTANT – HEALTH CHECKS AT AIRPORT – BUT…

Reliable PCR Test ?

→ takes too long, costly



Temperature screening?

→ Does not detect persons

Fast antibody tests?

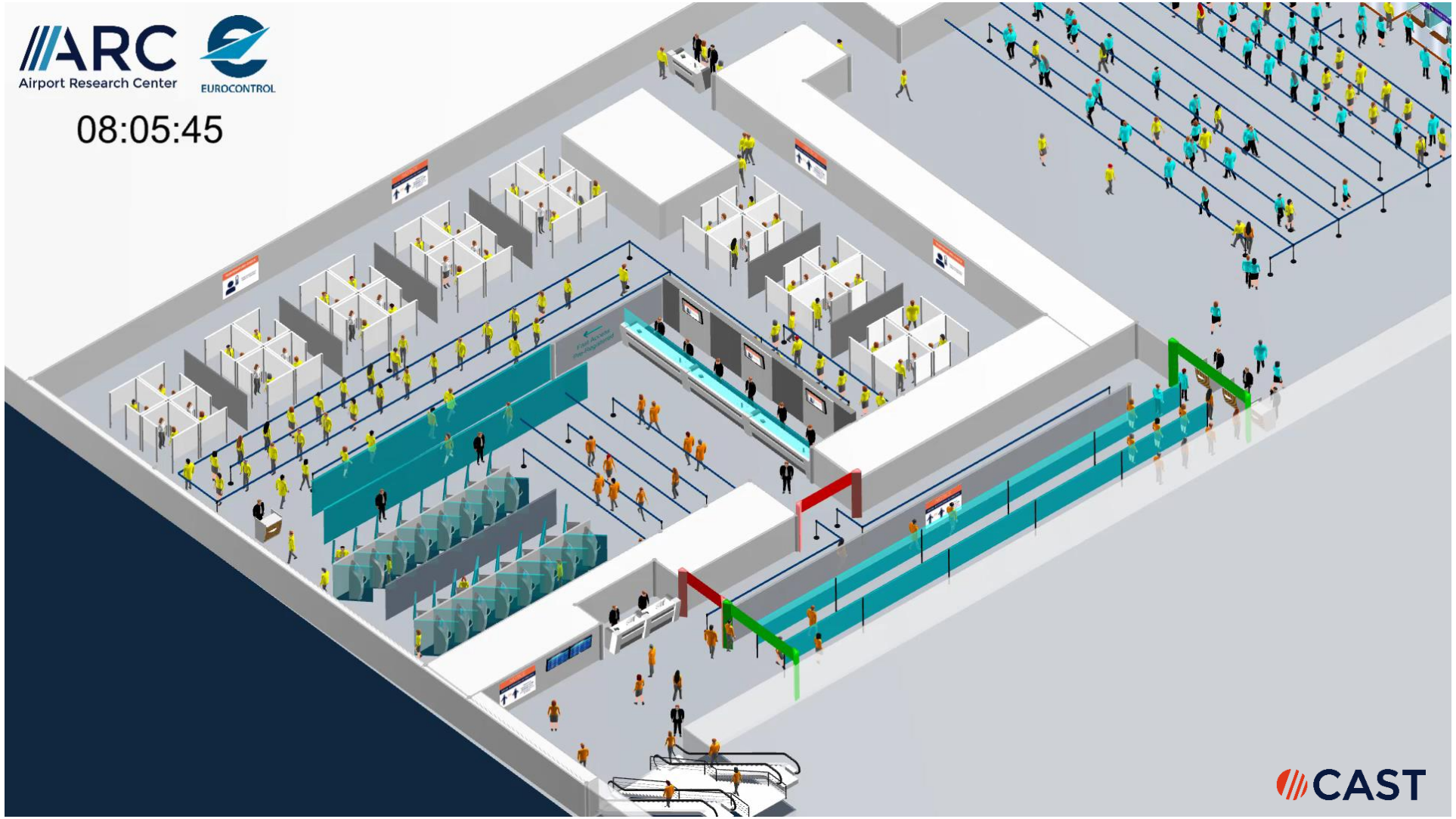
→ not accurate

Health Certificate / Health Passport?

→ no standard yet

→ VERY DYNAMIC SITUATION

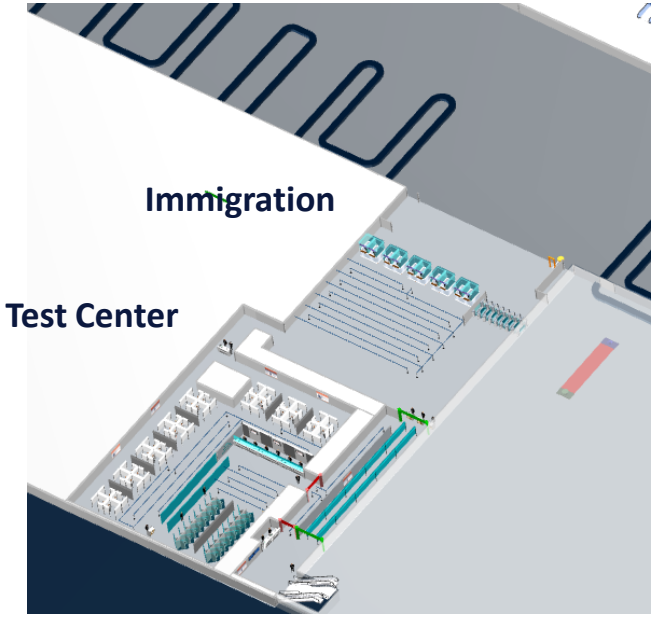
HEALTH CHECK | **SCENARIO: COVID TEST ON ARRIVAL**



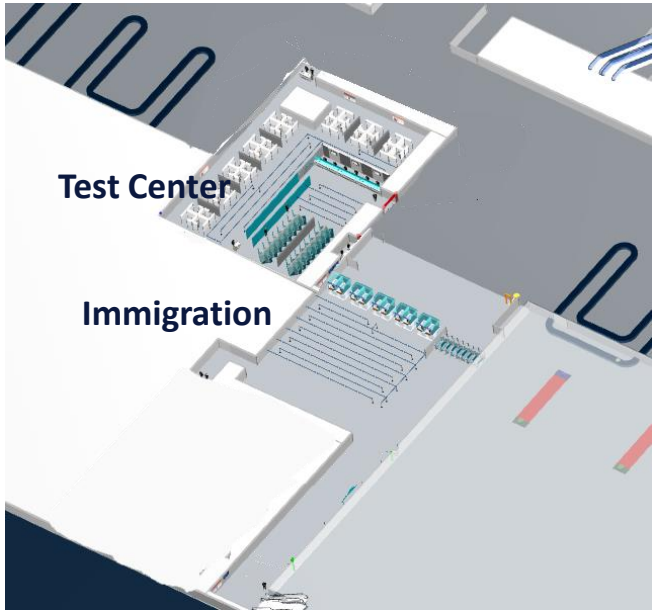
Video Link: https://youtu.be/O9a-bScTnoE

HEALTH CHECK | **TEST PRE- OR POST IMMIGRATION**

LOCATION OF TEST UNIT - PRE- OR POST IMMIGRATION?



Test Center **Pre-Immigration**



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Test Center **Post-Immigration**

Scenario	desired Waiting Time	Number of Test Booths
Test Pre-Immigration	15 min	32
Test Post-Immigration		23

- Immigration control “flattens” the demand → in example: **30% less test units**
- No unnecessary immigration for Schengen from Risk Areas

CHECK-IN

COVID-19 IMPACT ANALYSIS

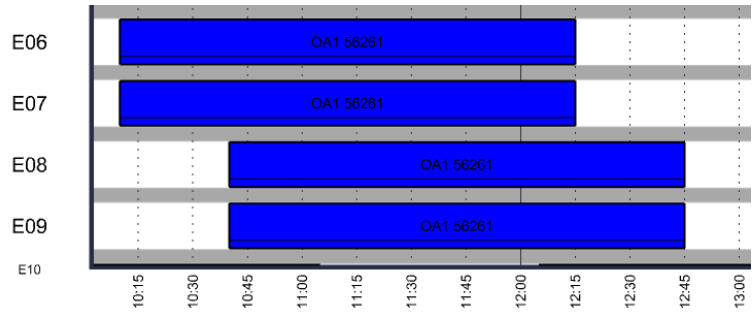
CHECK-IN | **CHECK-IN ASSESSMENT**

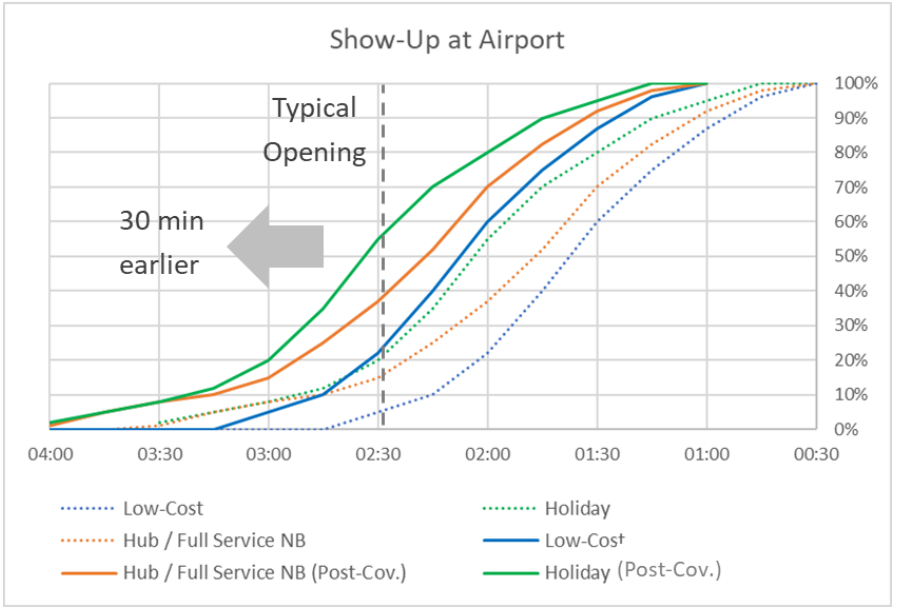
COVID 19 IMPACT

- Social Distance in queues
- Mandatory health questions at check-in
- More passengers check-in bags
- Earlier show-up

MITIGATION MEASURES

- Include health questions in online check-in
- Adjust opening times for 2 of 4 counters





CHECK-IN | **EXAMPLE FULL SERVICE CARRIER**

VISUALIZATION

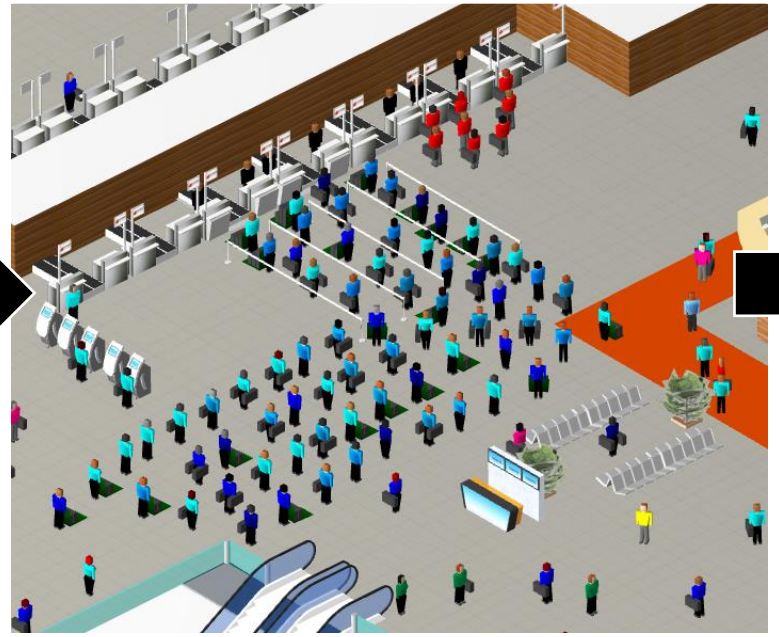
Pre-Covid	20 Pax | 30m²

Scenario Pre-Covid:

Capacity adequate to demand

Short queues

Worst Case	75 Pax | 150m²



Worst Case / Do Nothing:

Social distance

Early arrival of pax

More bags checked-in

Health questions to all pax

After Optimization	25 Pax | 50m²

Optimization Potential:

allowing online check-in again

asking health questions online

adapt check-in opening

CHECK-IN | **EXAMPLE HOLIDAY CARRIER**

VISUALIZATION

Pre-Covid	40 Pax | 60m²

Worst Case	100 Pax | 200m²

After Optimization	60 Pax | 120m²

Scenario Pre-Covid:

Longer waiting time already in baseline

Queue space used to full extent

Worst Case / Do Nothing:

Social distance

More early arrival of pax

More bags checked-in

Health questions to all pax

Optimization Potential:

Earlier opening

Queues still problematic

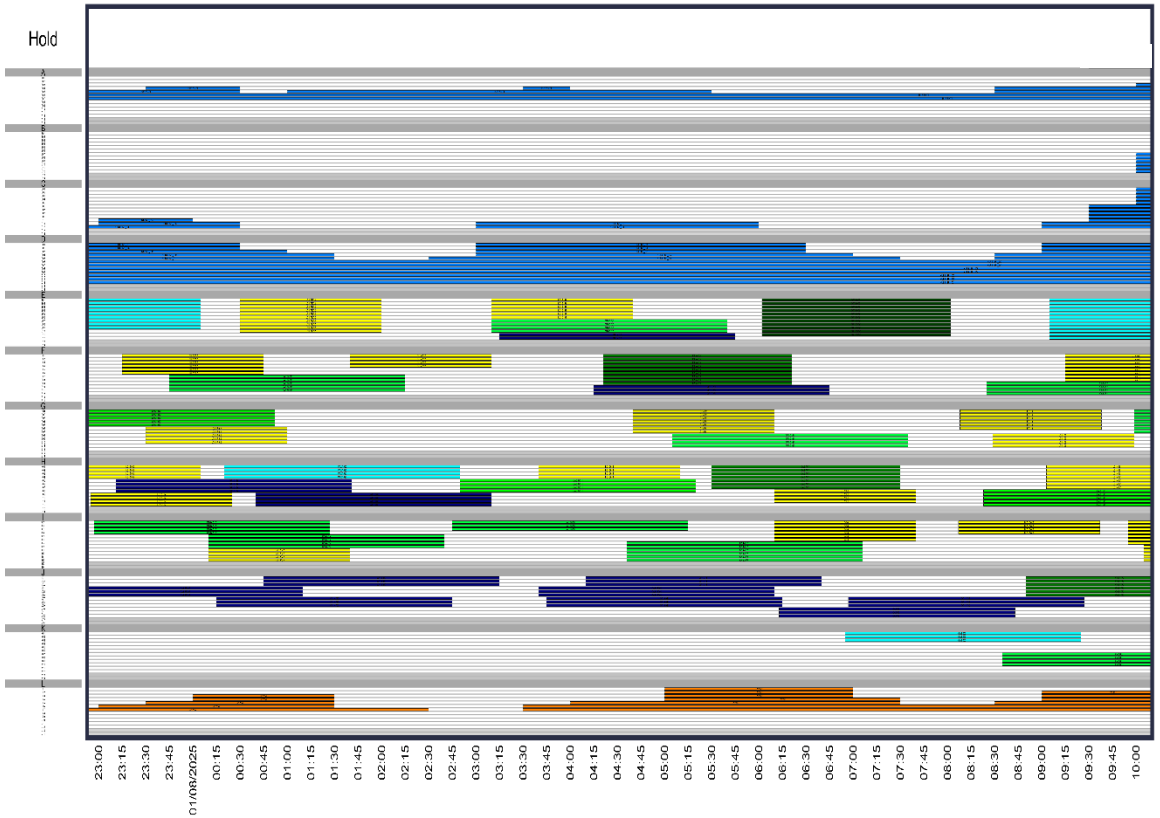
Overflow area needed

CHECK-IN | **SPACE PROVISION FOR LONG QUEUES**

KEEPING COUNTERS FREE TO ASSIGN MORE SPACE

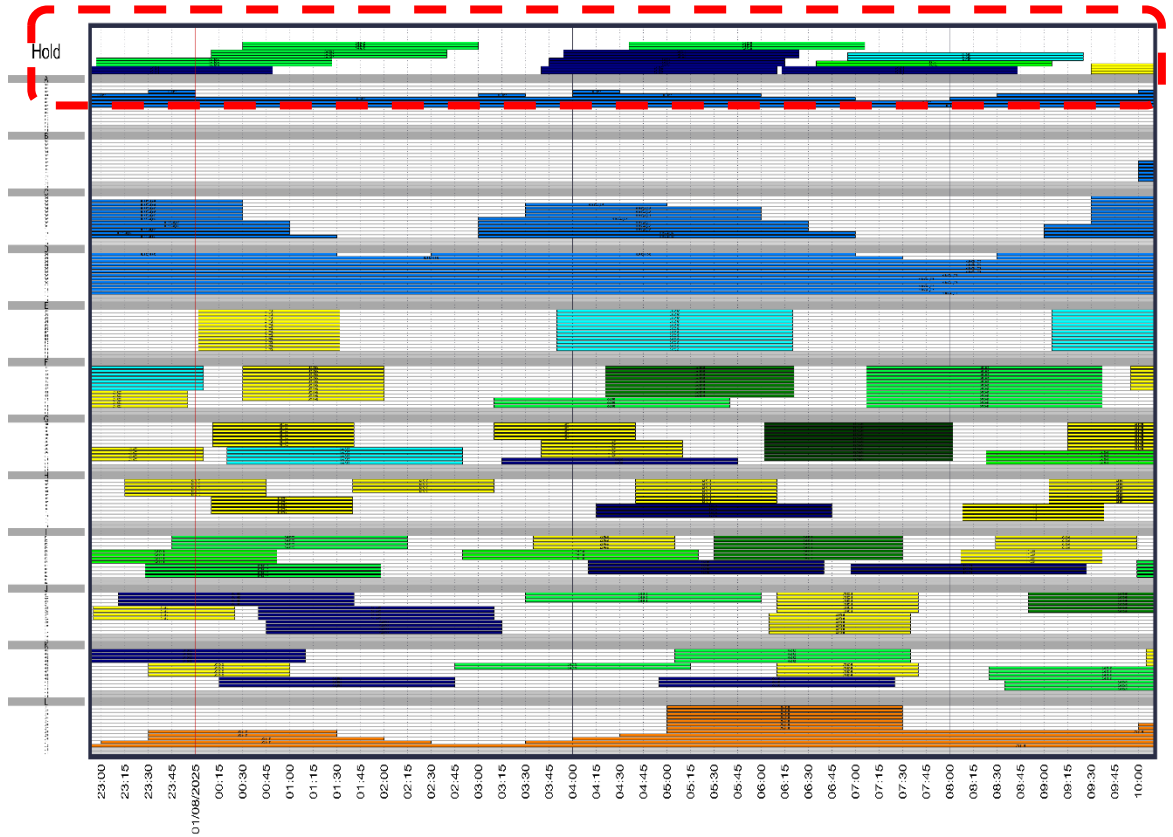
CHECK-IN | IMPACT OF QUEUE SPACE ON ALLOCATION

ALLOCATION OF REDUCED FLIGHT SCHEDULE



50% Reduction:

Allocation possible without using main carriers‘ rows



75% Reduction:

Allocation not possible without using main carriers‘ rows

Could be done when breaking with historic allocation rules

CHECK-IN | **IMPACT AND MITIGATION**

Physical distance impact

Space | Time | Throughput

QUEUE SPACE
- 25% Queue capacity drop

Mitigation

1. Enlarge queue space
2. Leave gaps in allocation
3. Increase staff level to reduce queues

Earlier passenger show-up

Space | Time | Throughput

SHIFTED DEMAND TIME
Up to 2-3x queue and wait time, if no adjustment

Mitigation

1. Adjust opening time
2. Do not encourage pax to show up early
3. Motivate pax for self-check-in

Additional health question/self declaration

Space | Time | Throughput

CHECK-IN PROCESS
up to 50% reduced throughput (incl. mandatory agent check-in for everybody)

Mitigation

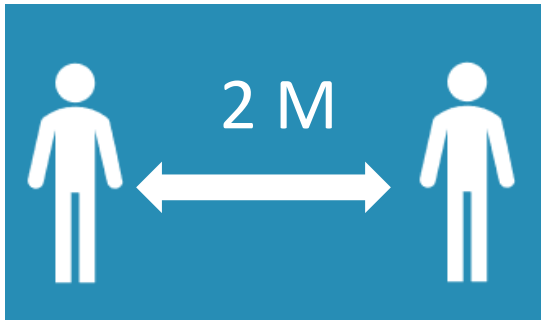
1. Pre-flight declaration online
2. Health declaration as separate process (e.g. via kiosk)

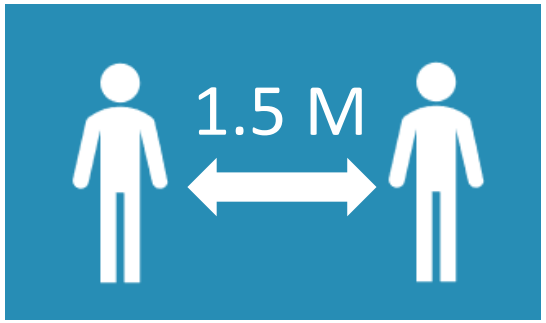
SECURITY CONTROL

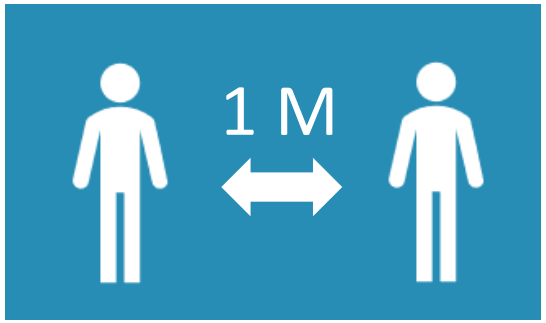
COVID-19 SCENARIO SIMULATIONS

STATUS | **HEALTH MEASURE ON PHYSICAL DISTANCING**

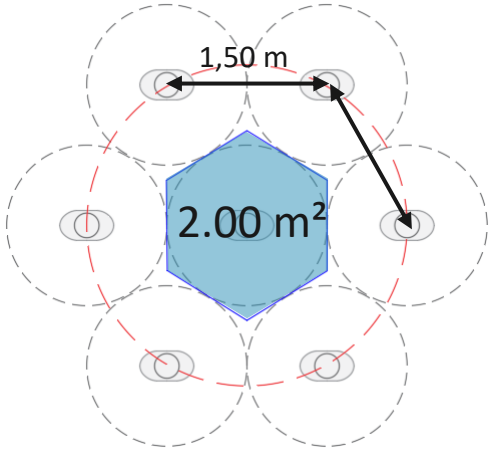
DIFFERENT RECOMMENDATIONS AND GUIDELINES



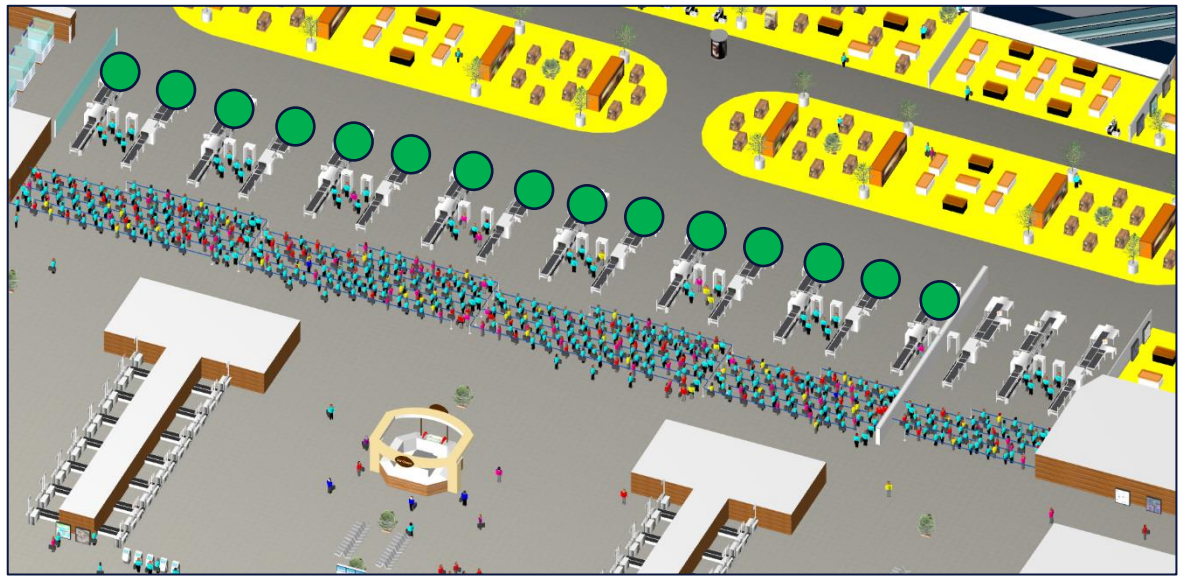
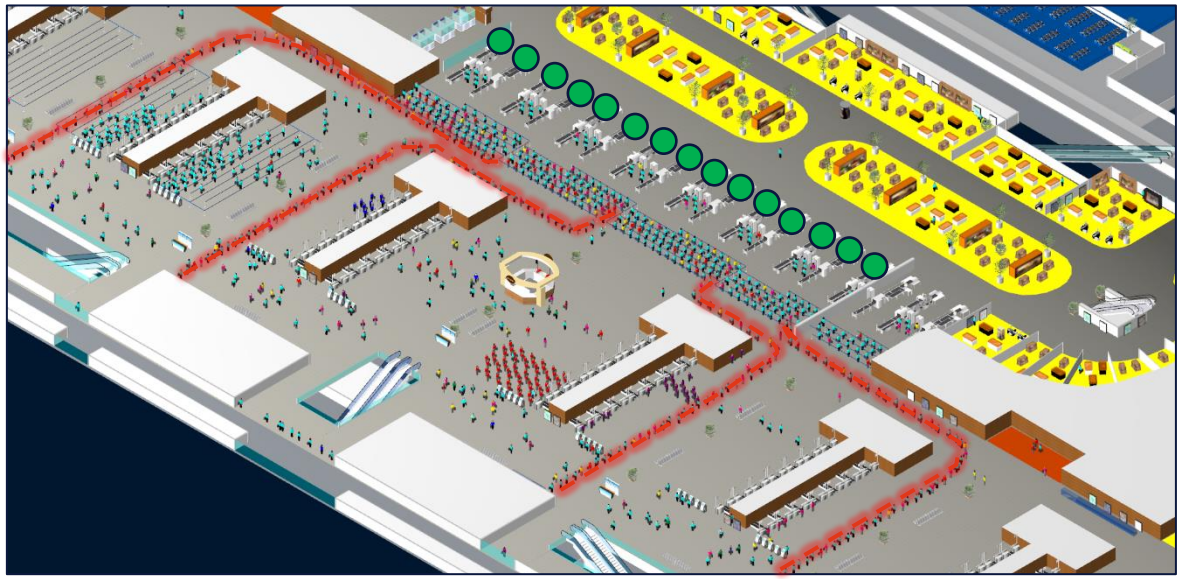




Physical Distance 1.5m
→ Space-Demand 2.00 m²



SECURITY CHECKPOINT | **ANALYSIS OF LAYOUT (SPACE)**

Pre Covid-19	**Post Covid-19** (1.5m social distance)
	
450 PAX in Queue | Waiting Time: 10 min → **Queue systems sufficient**	**450 PAX in Queue | Waiting Time: 10 min** → **Queue systems not sufficient**

SECURITY CONTROL| **IMPACT ON THROUGHPUT**

Impact on Space | **Impact on Demand** | **Impact on Processing Time**

Less drop off positions due to physical distancing

More pax drop additional items after alarm at WTDM

Requirement to take off shoes (esp. if body scanner is in use)

More instructions from staff for self-packing trays

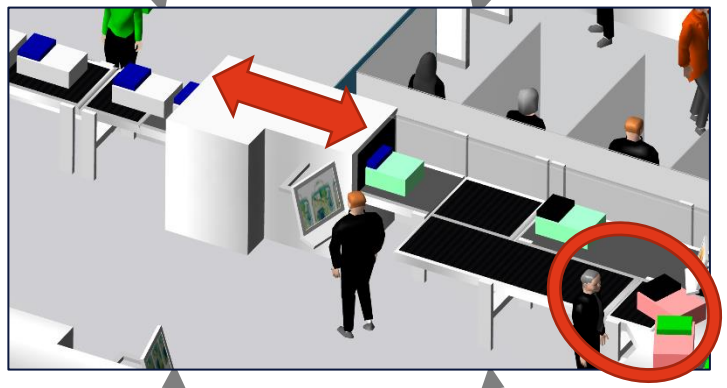
Reduced waiting space at WTMD / Body Scanner

Repeated scans of pax preferred to manual search

Pat search takes longer due to more instructions and hygiene rules

More repeated X-ray scans to avoid manual inspection

More trays to be checked (e.g. shoes are checked as Covid-19 measure)

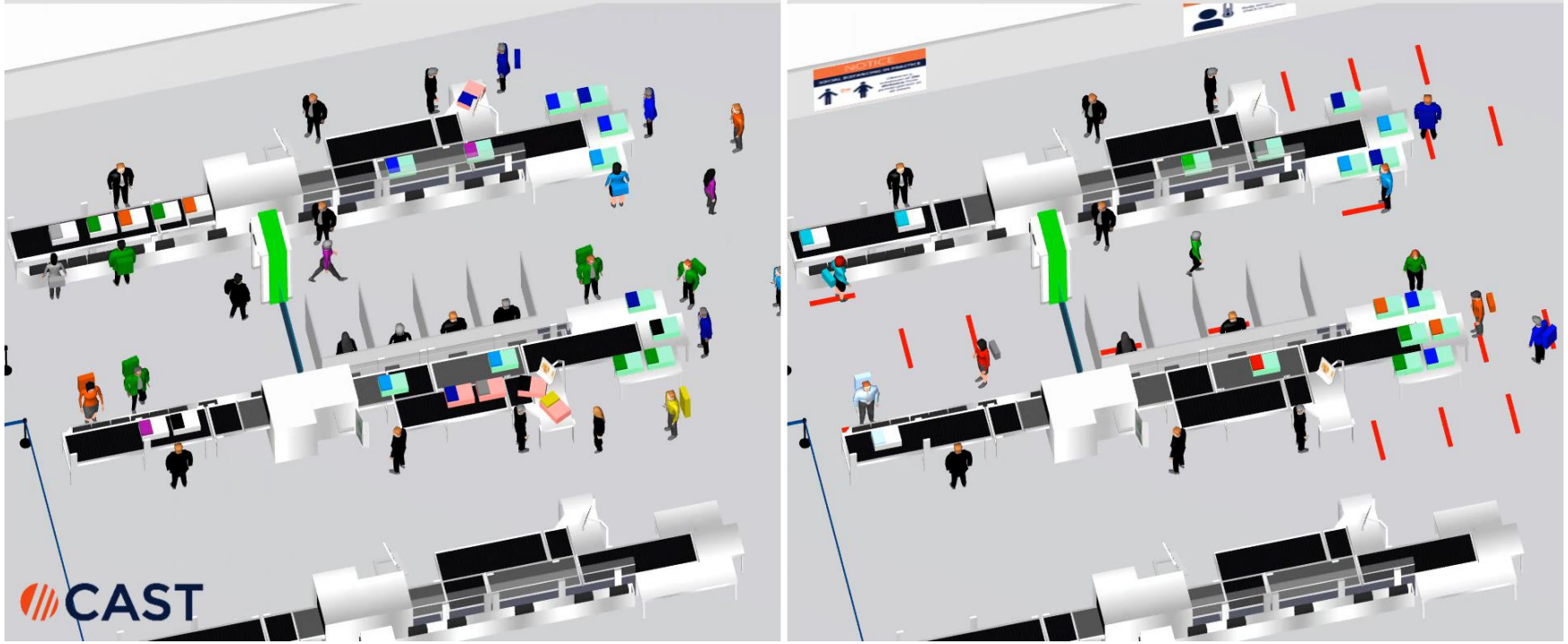


More liquids in bags due to hand sanitizers/sprays

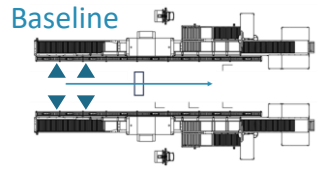
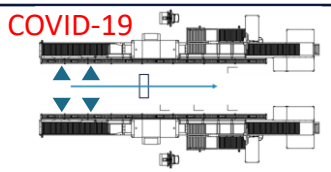
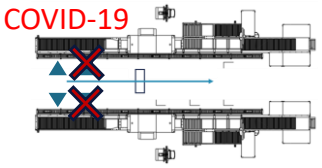
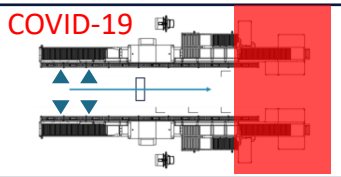
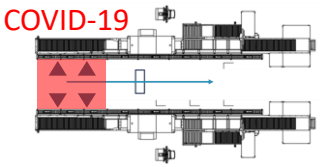
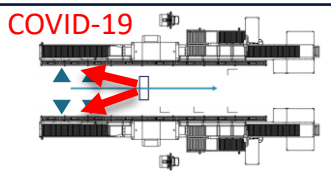
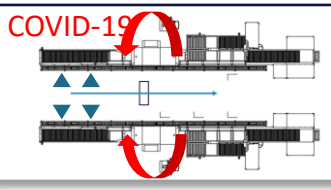
Manual Bag search takes longer due to more instructions and hygiene rules

SECURITY CONTROL| **VIDEO**

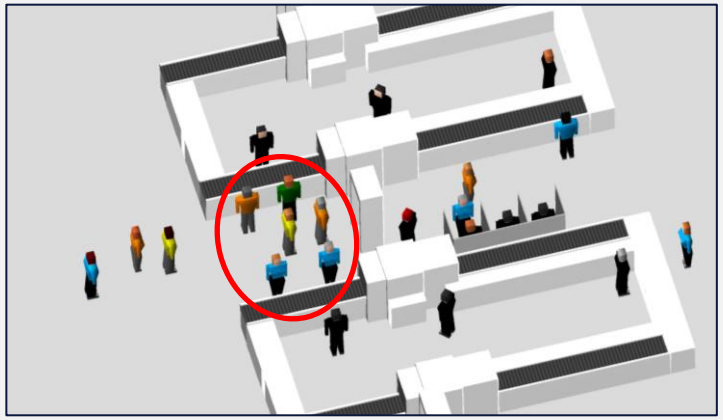
Before COVID-19	During COVID-19
Throughput (1 Lane): 170 Pax/h - Front Section: 5 Pax - Rear Section: 13 Pax	Throughput (1 Lane): 88 Pax/h - Front Section: 3 Pax - Rear Section: 6 Pax



Video-Link: *https://youtu.be/KXLt5ys0r3A*

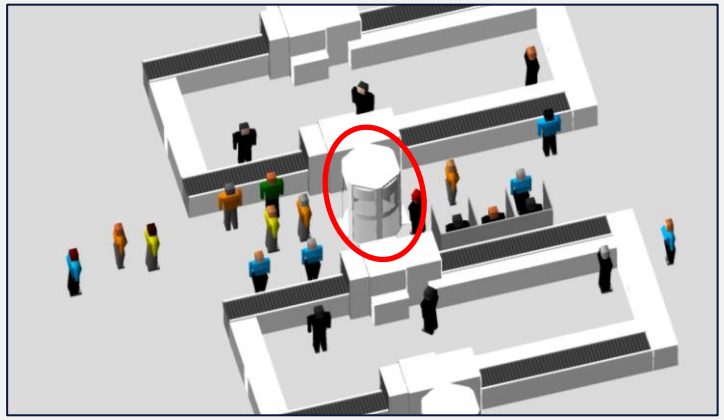
Scenario			Throughput	Throughput Reduction	Comment
Baseline			185 PAX/h	-0%	-
Increased Divesting Time			160 PAX/h	-15%	More instructions, stowage of loose items lead to increase
Increased Divesting Time	1 Drop off position		90 PAX/h	-50%	Major capacity drop
	Limited Number of Pax in pickup zone		155 PAX/h	-15%	Higher impact expected with more performant lanes
	Drop more items beforehand		125 PAX/h	-30%	Reduction strongly depends on trays and divesting time increase
	Repeated pax scans with dropping additional items		150 PAX/h	-20%	Impact assumed to be higher if body scanners in use
	Repeated X-Ray scans of trays		155 PAX/h	-15%	Low impact on sample security setup

2 Divest Positions, shared WTMD



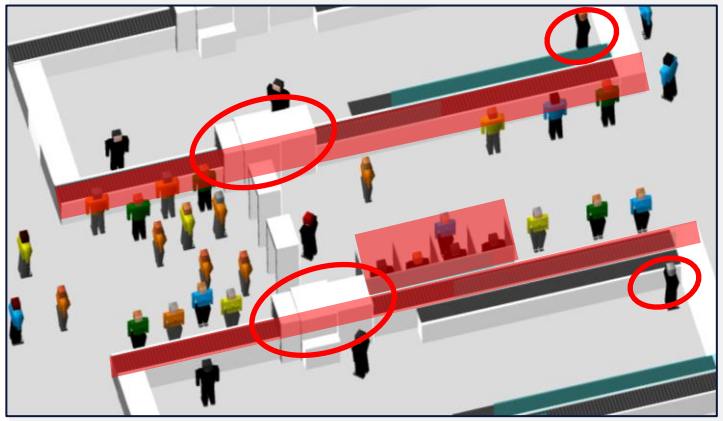
- **Reducing drop off positions (2 → 1)**
- **Dropping more items (belt, shoes) to reduce pat down search**

2 Divest positions, shared Body Scanner



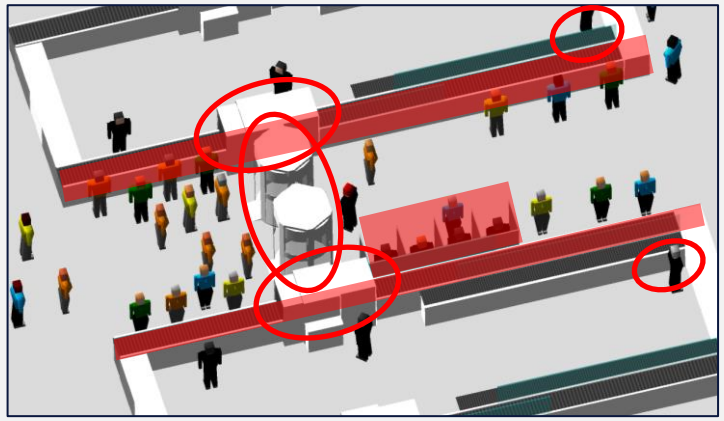
- Reducing drop off positions (2 → 1)
- **Repeated pax scans at body scanner to avoid pat down search**

3 Divest Positions, dedicated WTMD



- **Reducing Drop off positions**
- **Repeated X-Ray tray scans**
- **Dropping more items to reduce pat down search**
- Longer manual checks

3 Divest Positions, dedicated Body Scanners



- **Reducing Drop off positions**
- **Repeated X-Ray tray scans**
- Longer manual checks

SECURITY CHECKPOINT | **BASELINE 'PRE-COVID'**

Baseline Situation (Pre-COVID)

Open Lanes - 15

Closed Lanes

Traffic Volume: **100**%	Open Lanes: **100**%
Security Throughput: **180 PAX/h (100%)**	Regular Social Distance: 1m² / PAX

Waiting Time: 10 min

Queue Space: sufficient

SECURITY CHECKPOINT | **COVID-19 IMPACT 'DO NOTHING'**

COVID Situation „Do Nothing“ with 50% Traffic

Open Lanes – 8

Closed Lanes

Traffic Volume: **50%**

Open Lanes: **50%**

Security Throughput: **135 PAX/h (75%)**

Increased Social Distance: 2m² / PAX

Waiting Time: 45 min

Pax in Queue: 750 Pax

SECURITY CHECKPOINT | **COVID-19 IMPACT 'OPTIMIZATION'**

COVID Situation „Optimized" with 50% Traffic

Open Lanes - 10

Closed Lanes

Traffic Volume: **50%**

x 1.4

Open Lanes: **70%**

Reduced Throughput: **135 PAX/h (75%)**

Increased Social Distance: **2m² / PAX**

→ **Update of Staffing factor required**

Additional Staff Requirement (compared to Pre-Covid)		**Traffic Volume compared to Pre-Covid**		
Security Throughput Compared to Pre-Covid	Traffic	50%	75%	100%
	35% 60 Pax/h	x3	x3	-
	50% 90 Pax/h	x2	x2	-
	65% 117 Pax/h	x1.6	x1.5	-
	75% 135 Pax/h	x1.4	x1.5	-
	100% 180 PAX/h	x1	x0.9	x1

SECURITY | **IMPACT AND MITIGATION**

Physical distance in queue

Space | Time | Throughput

→ **QUEUE SPACE**
- 50% capacity drop

→ Mitigation

1. **Enlarge queue space**
2. **Increase staffing level to reduce queues**
3. **Active crowd management**

Physical distance in process

Space | Time | Throughput

→ **THROUGHPUT REDUCTION**
- 25 to 50%

→ Mitigation

1. **Apply other measures with same health safety** (e.g. masks, plexiglass)
2. **Optimize staffing rules** (more staff per given pax volume)

Changed passenger show-up

Space | Time | Throughput

→ **SHIFTED DEMAND TIME / NUMBERS**
→ Unpredictability

→ Mitigation

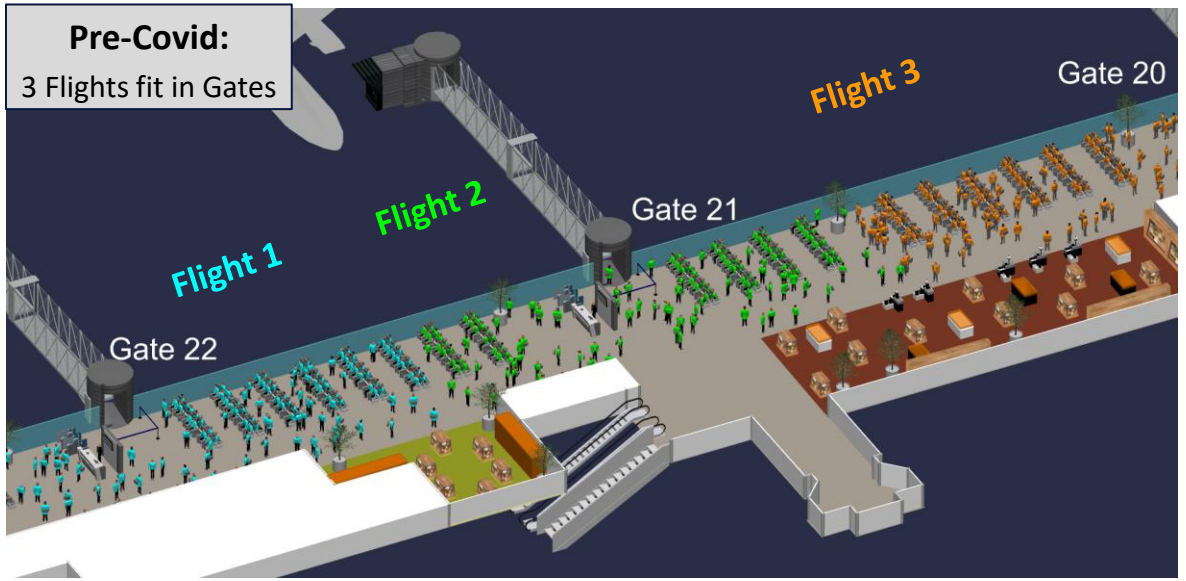
1. **Demand driven staffing (ad-hoc adjustments)**
2. **Contingency factor**

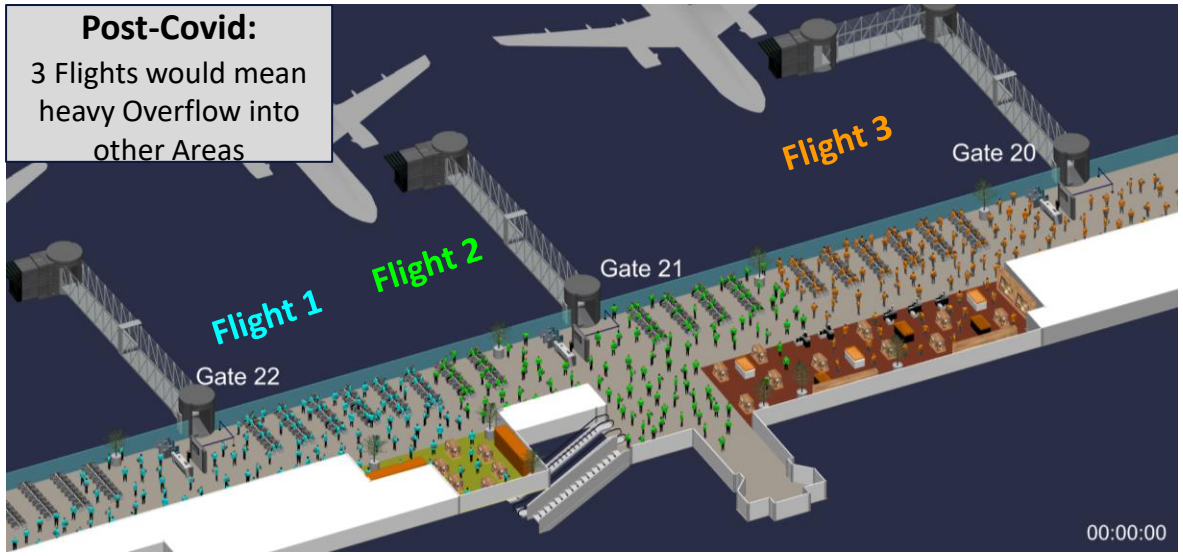
BOARDING GATE ROOMS

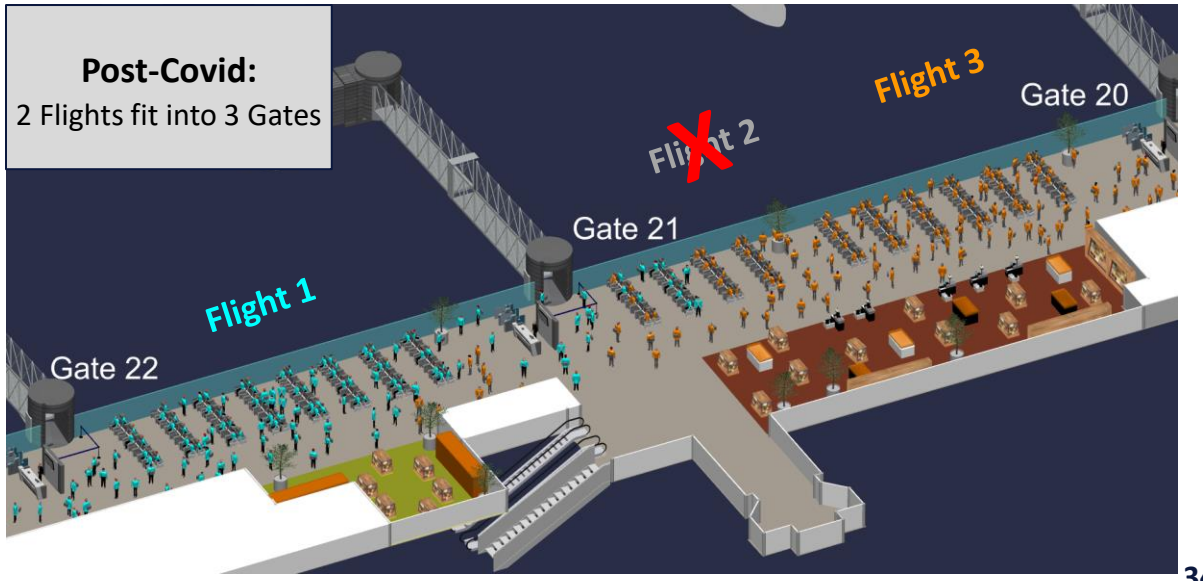
COVID-19 IMPACT ANALYSIS

BOARDING GATES | **PHYSICAL DISTANCE**

- Pre-Covid: suitable space provision
- Post-Covid: Physical distancing:
  - → Gate **capacity reduced to 50-75%**
  - →**Heavy overflow** into other areas
- Optimization: Allocation should leave gaps



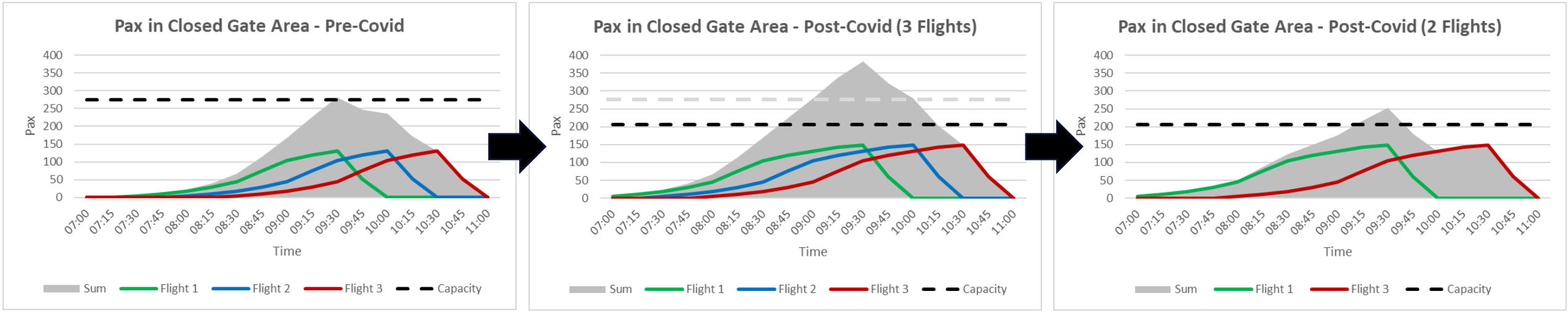




BOARDING GATES | **ALLOCATION**

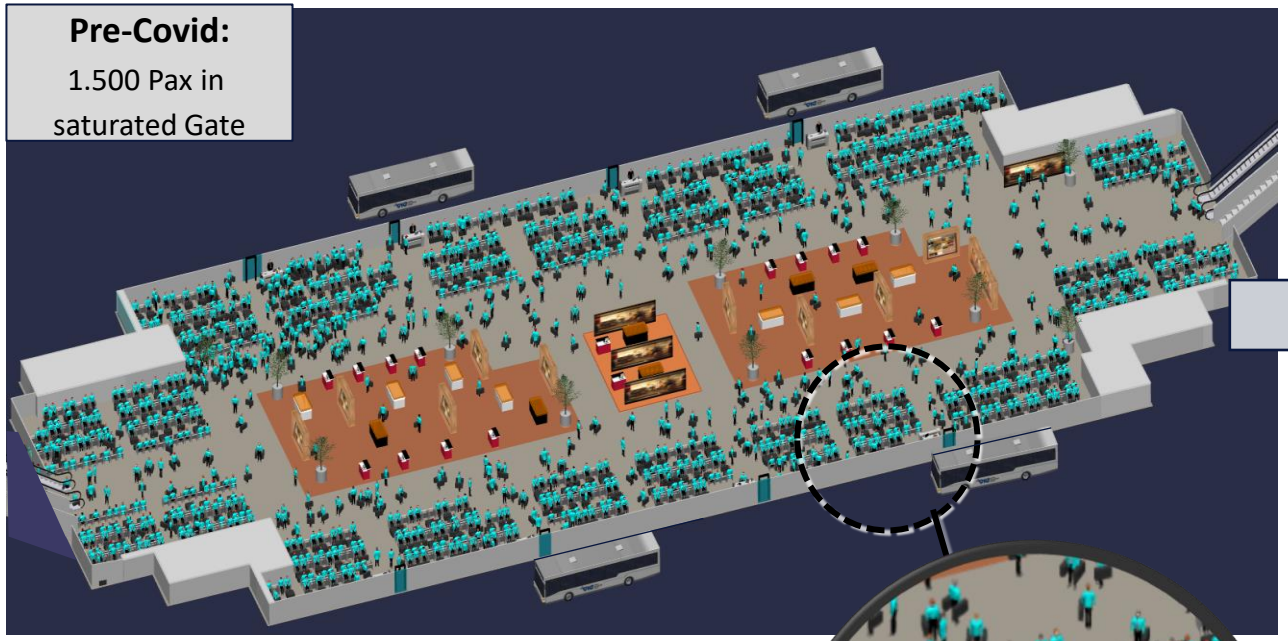
ALLOCATION

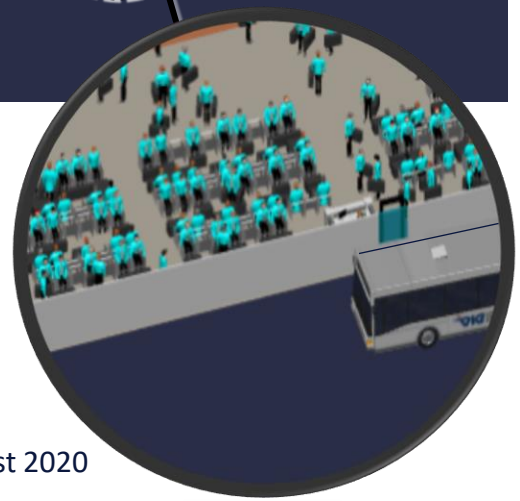
- Pre-Covid, 3 flights allocated to gate area without constraints
- Post-Covid, 2 factors accumulate and cause problems:
  - **Reduced capacity** due to physical distancing
  - **Earlier show-up**, e.g. because of anticipated longer waiting times, which actually do not occur
- Mitigation: Move one flight (to other gate or changed STD)



BOARDING GATE | **SATURATION CAPACITY (BUS GATE)**

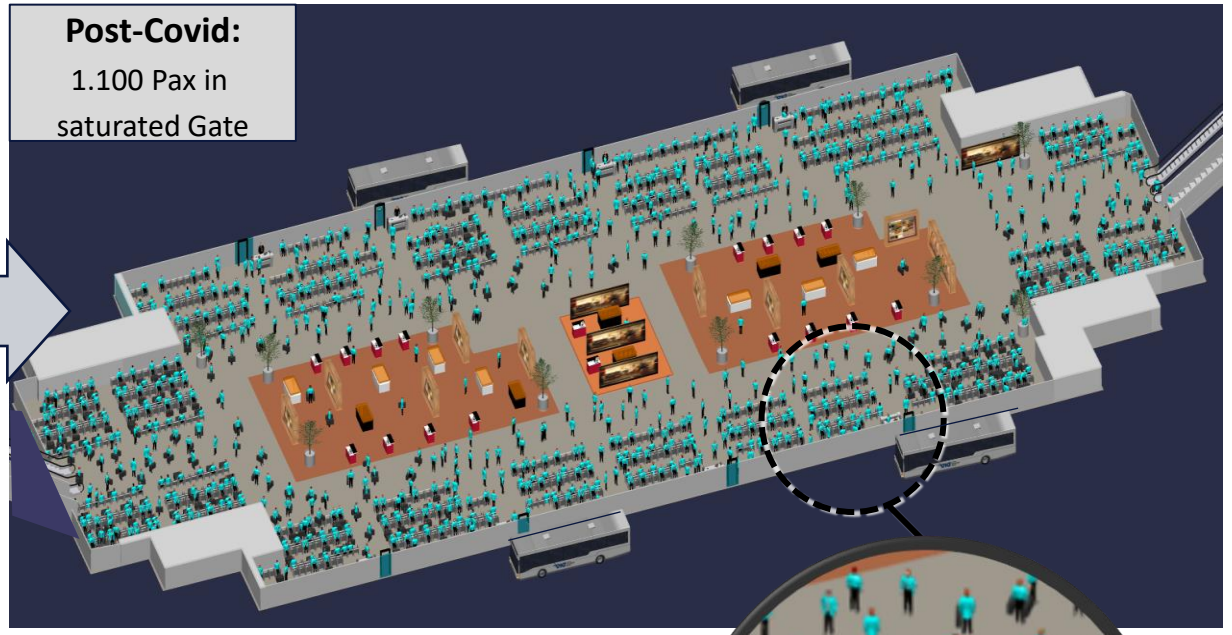
EXAMPLE: PHYSICAL DISTANCING IN BUS GATE

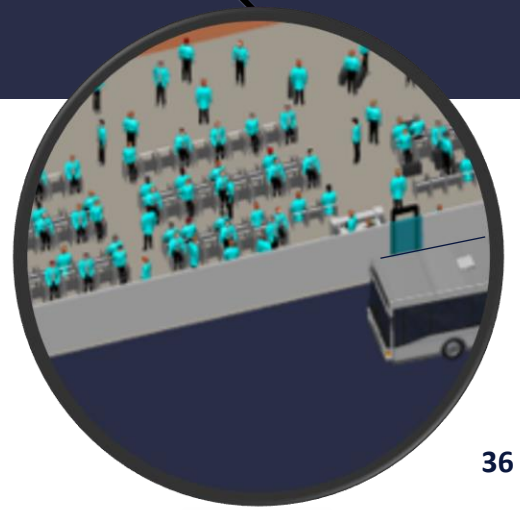




Pre-Covid

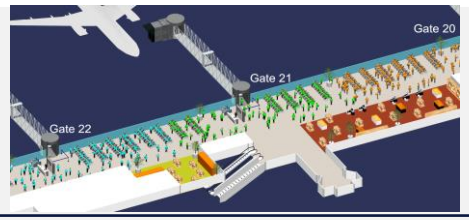
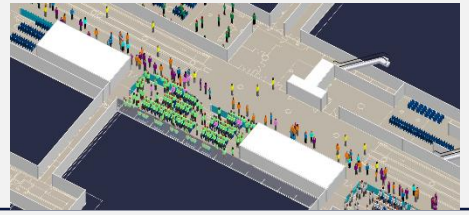
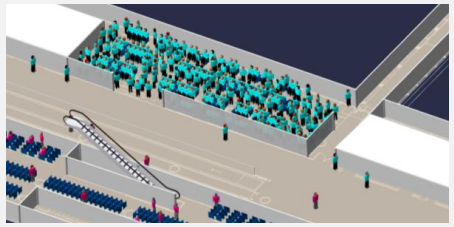
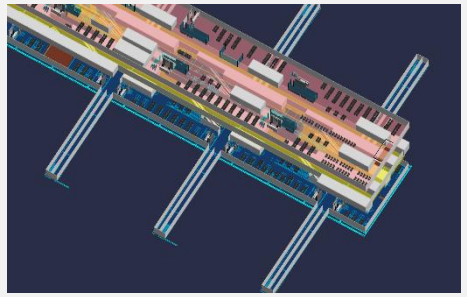
- „100%“ traffic
- Regular IATA level of service





Post-Covid

- **75% traffic (Saturation)**
- Physical Distance

Gate Layout		Covid-19 Impact	Recommendation
Open gate concept adjacent gates in line of sight		**Low** Pax intuitively spread to nearby gates (occupy 1.3-1.5 times the previous area)	Allocation of every other gate, as long as possible.
Generally open gate concept but gates not in line of sight		**Medium** Pax cannot simply use other areas, as they don't see when boarding starts	Avoidance of simultaneous allocation in same zone as long as possible. Improved passenger information.
Closed gate concept access for allocated flight only		**High** After entering, no overflow into other area possible anymore	Avoid closed gates when not necessary.
Dual gate concept with Schengen and Non-Schengen gates at different levels serving one stand		**Low – Medium** With 'equal' Schengen and NonSchengen flights, every second gate would not be in use automatically. Problem occurs, when mainly Schengen flights remain.	Alternating allocation of Schengen and NonSchengen flights.
Main central dwell area late announcement of actual gate		**Low – Medium** Central area may get overcrowded, in particular with closed/limited restaurants.	Early announcement of actual gate to distribute passengers.

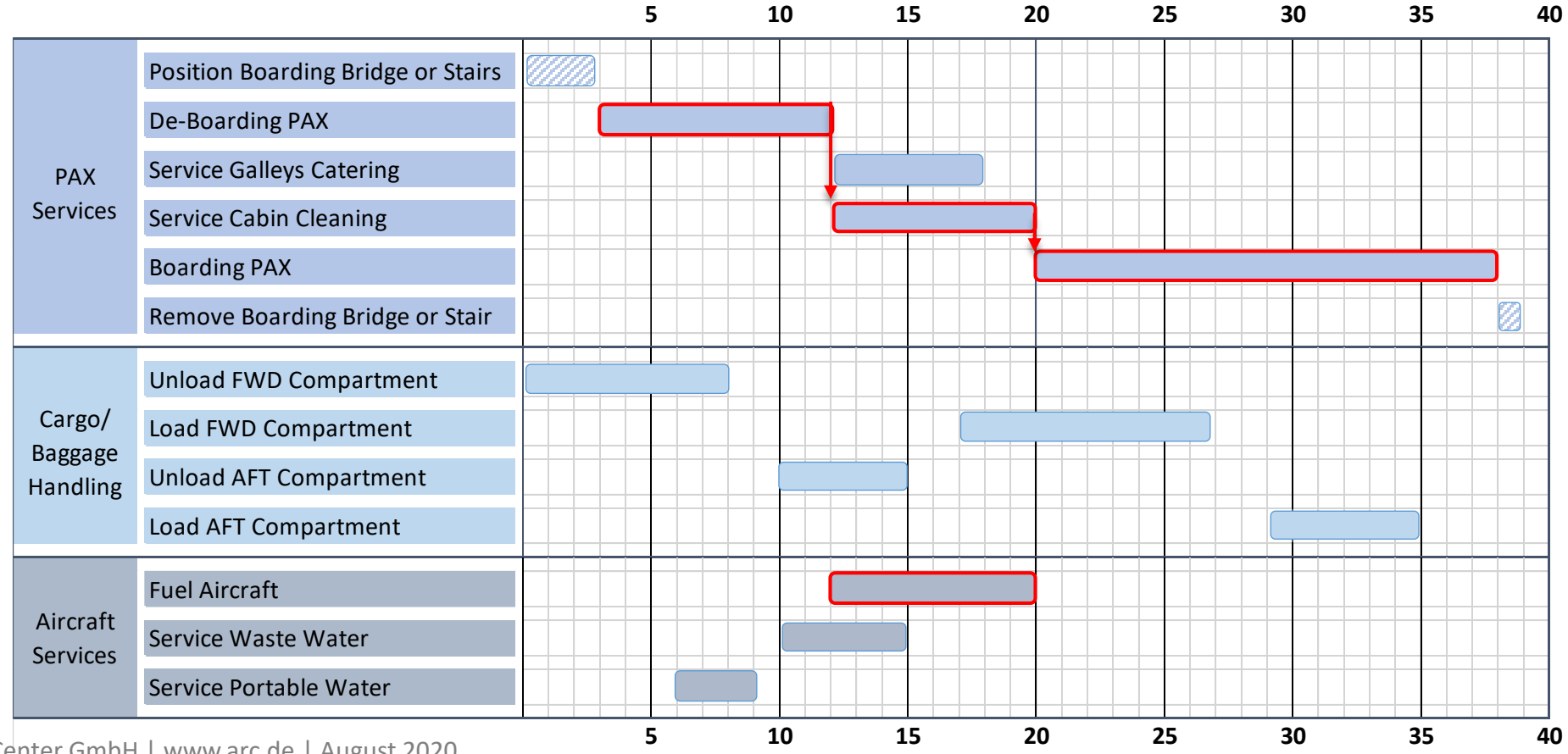
AIRCRAFT TURNAROUND AND DE/BOARDING

COVID-19 IMPACT ANALYSIS

AIRCRAFT TURNAROUND | **GROUND HANDLING SCHEME**

BASELINE – PRE-COVID

- Example: Typical European flight, hybrid carrier, narrow body aircraft
- Main focus of **critical path is within aircraft cabin**



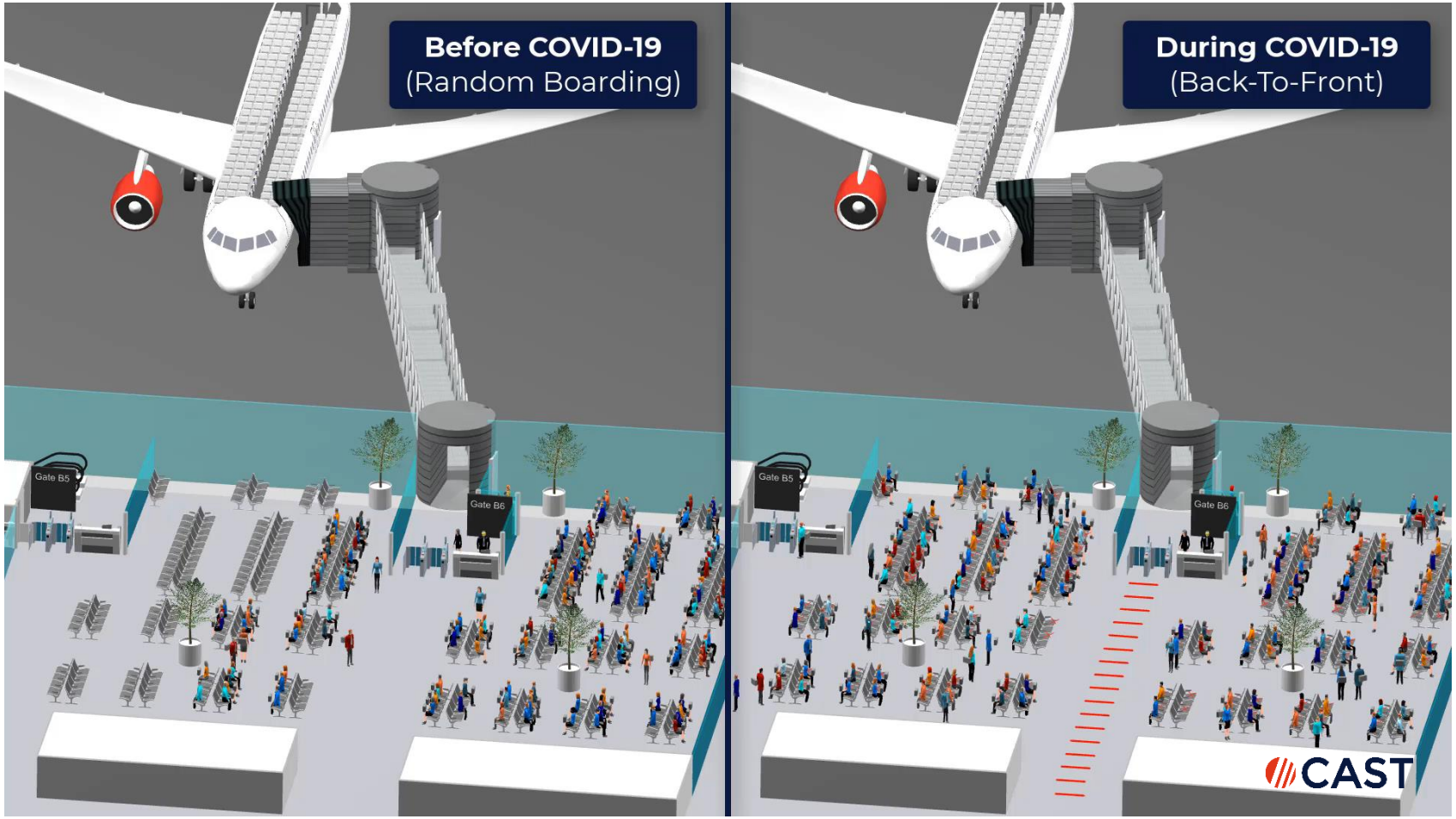
AIRCRAFT TURNAROUND | **BOARDING VIDEO**

POTENTIAL BOARDING ISSUES

- **Health check**, additional travel document check
- → lower throughput rate

- **Back-to-front** boarding
  → less person contacts
- → less chances of taking a seat simultaneously

- **Social distance** in cabin
  → increased time for storing hand luggage



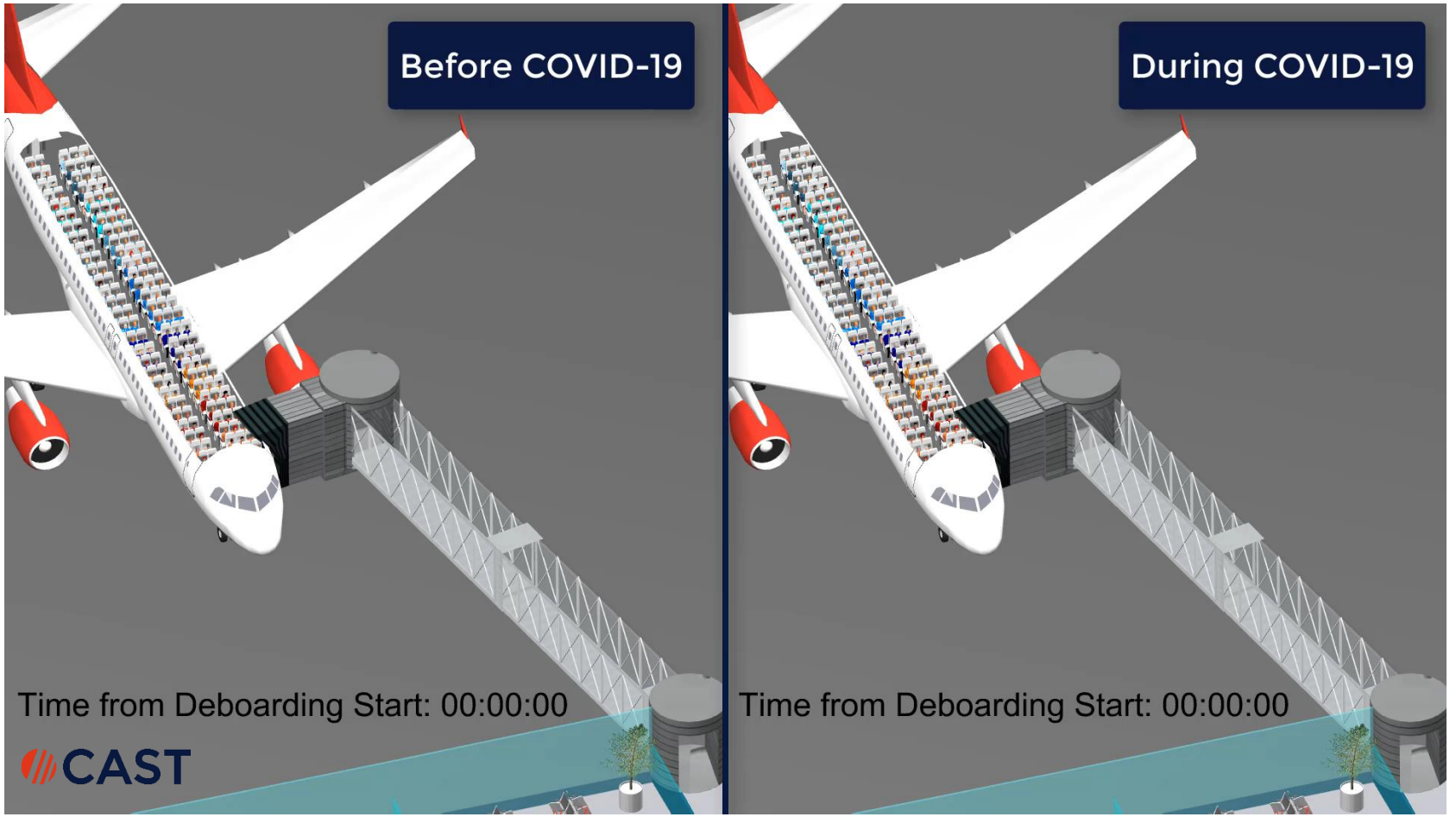
Video-Link: https://youtu.be/V1sGkoymmj4

Based on LF, luggage boarding principle the increase differs.
As a conservative approach 10 min increase could happen.

AIRCRAFT TURNAROUND | **DEBOARDING**

POTENTIAL DEBOARDING DELAY

- Passengers **stay seated longer** to keep social distance.
- But **no general change** in deboarding principle

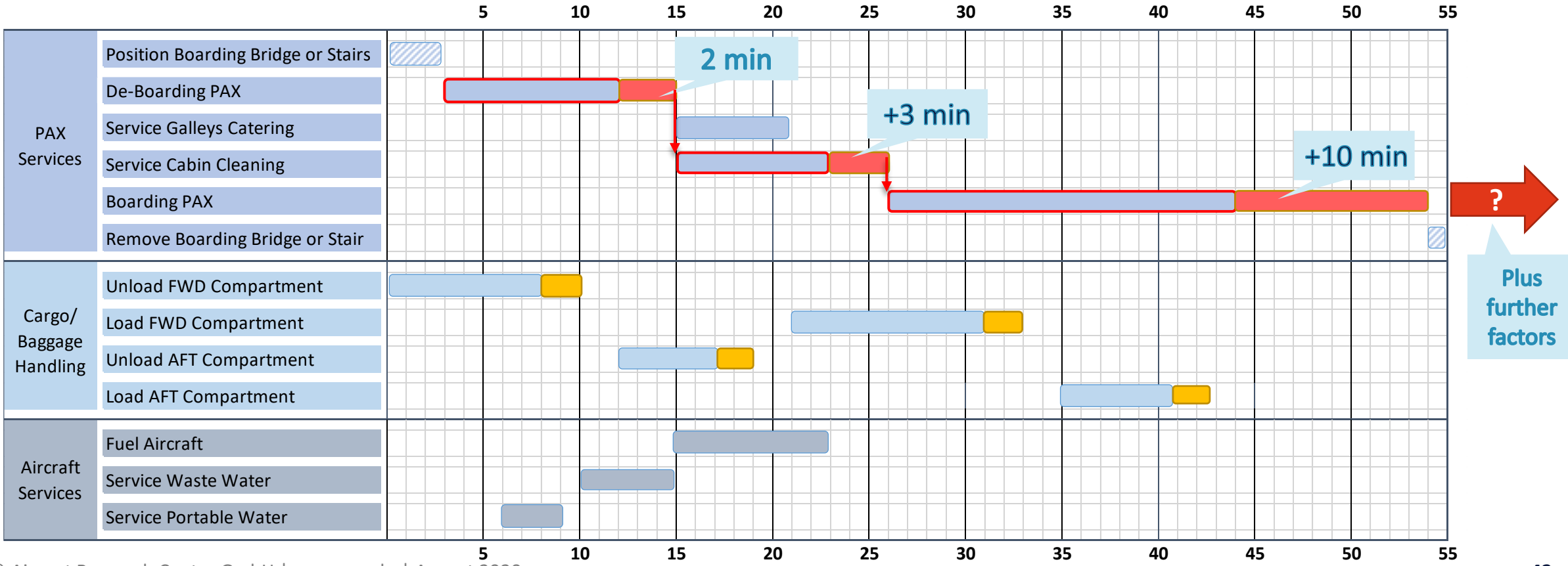


Video-Link: https://youtu.be/-yJs0Y_SltA

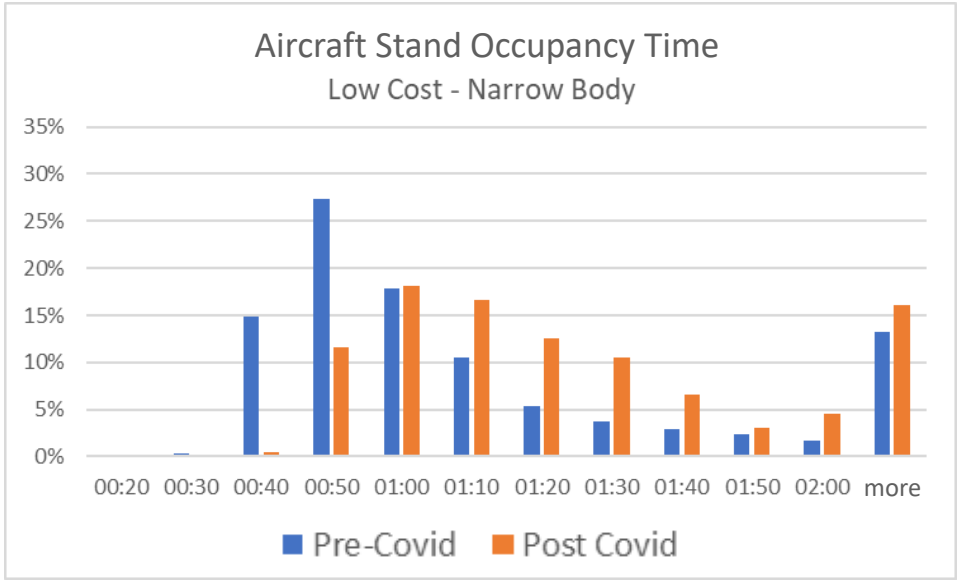
Deboarding process might be prolonged around 0 to 3 minutes.

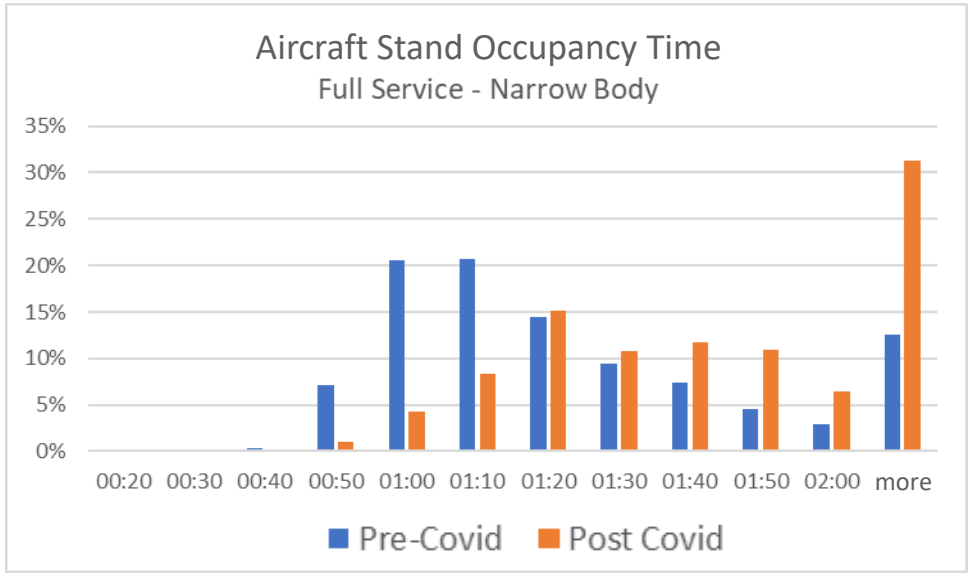
AIRCRAFT TURNAROUND | **IMPACT OF COVID-19**

- Typical European flight, hybrid carrier, narrow body aircraft
- Example: aircraft turnaround **increases by around 15 minutes** (**from 40 to 55 minutes**)
- Baggage loading/unloading can be longer as long as hand luggage is restricted.



STAND OCCUPANCY TIME ANALYSIS FOR NARROW BODY





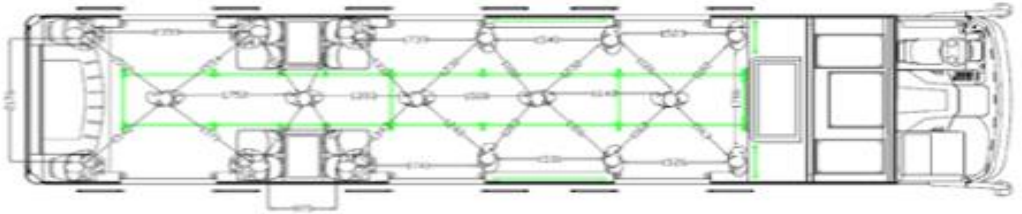
- Only a limited number affected by increased turn around (e.g. 50-75% of turnarounds > 50 min anyway)
- Longer stand occupancy time observed in reality has **other additional reasons**, e.g.
  - Less flights per aircraft per day
  - Early arrival due to empty airspace

Data Source: Analysis of past schedules of a major European hub

AIRCRAFT TURNAROUND | **BUS HANDLING**

CAPCITY OF BUS

- Strict physical distancing: just **25** pax/bus
  150 pax: 6 busses instead of 2 !
- Operationally unfeasible - trade-off: e.g. 50 pax/bus



cobus-industries.de

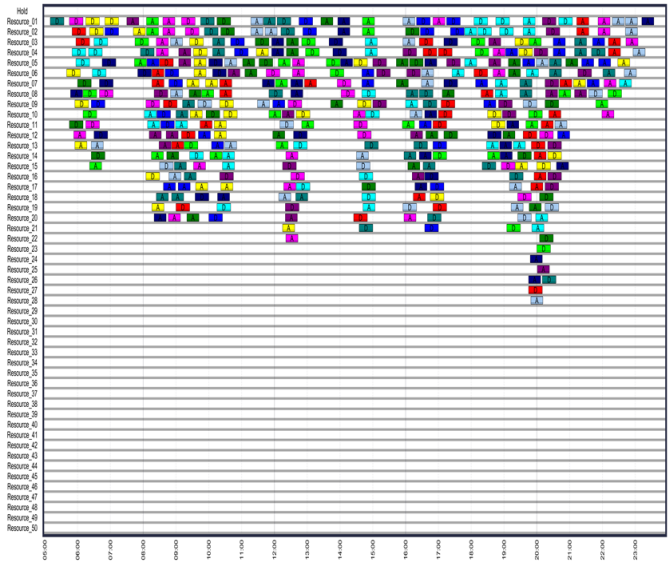
BUS REQUIREMENTS

- + 50% more buses for same traffic
- → unlikely that airports invest now

SATURATION CAPACITY

- 70% of bus gate flights still manageable with existing buses

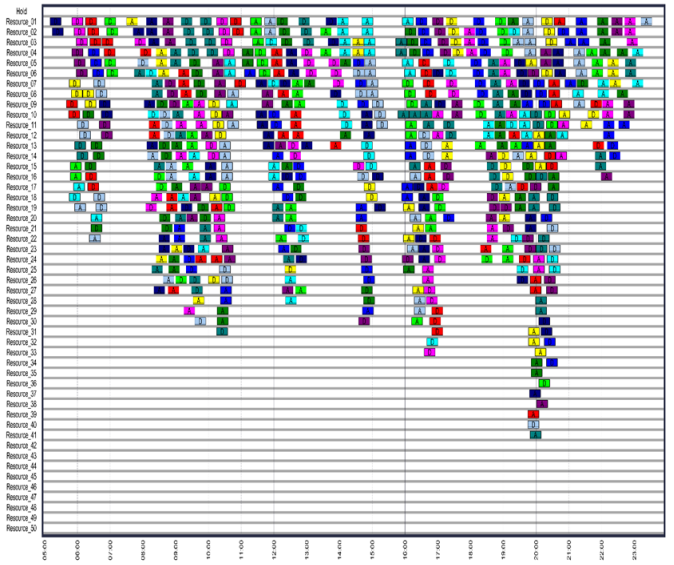
PRE-COVID



- Maximum of 28 buses needed

Physical Distance partly applied (50 Pax per bus)

POST-COVID



- Maximum of 41 buses needed → +47%

BOARDING GATES | **IMPACT AND MITIGATION**

Physical distance in holdroom

Space | Time | Throughput

→ **HOLDING CAPACITY**
- 25 to 50% drop

→ Mitigation

1. **Optimize allocation**
2. **Actively assign dwell area** (time of gate announcement, limited inflow etc.)
3. **Change / reject flights**

Changed boarding process to keep physical distance

Space | Time | Throughput

→ **BOARDING TIME**
+ up to 50% increase
(for back-to-front boarding)

→ Mitigation

1. **Avoid short turnarounds**
2. **Prefer contact stands**
3. **Limit cabin luggage**
4. **Inform passengers about boarding principle**

Additional health / travel restrictions check

Space | **Time | Throughput**

→ **BOARDING TIME**
depending on complexity of flight / process

→ Mitigation

1. **Do checks at check-in already / while pax wait in the gate**
2. **Increase manpower**

IMMIGRATION

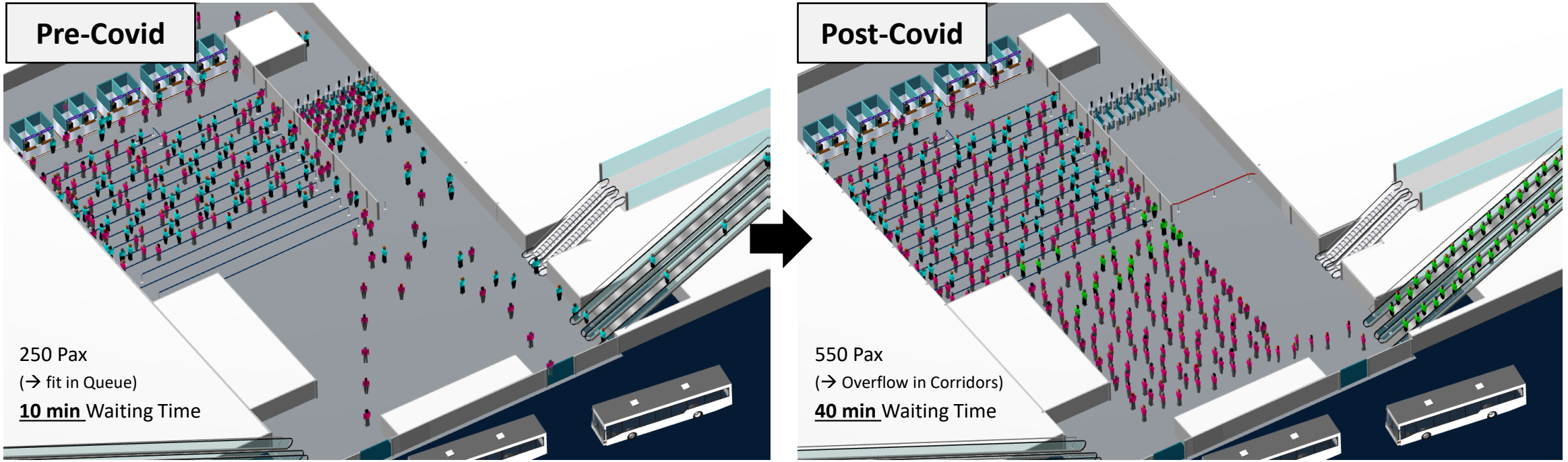
COVID-19 IMPACT ANALYSIS

IMMIGRATION | **MANDATORY AGENT IMMIGRATION**

MANDATORY IMMIGRATION AT AGENT - NO SELF-SERVICE

- Physical distance in queues requires more space
- Any manual checks (health certificate / questions) not possible e-gates.
- Thus, **all passengers** need to use **manned counters**.

→ Saturation capacity of **50-75%** of NonSchengen flights



IMMIGRATION | **IMPACT AND MITIGATION**

Physical Distance Impact

Space | Time | Throughput

QUEUE SPACE
- 50% Queue capacity drop

Mitigation

1. Enlarge Queue Space

2. Increase Staffing Level to reduce queues

3. Control inflow of pax (e.g. delayed deboarding)

Additional Health Question/Self Declaration

Space | Time | Throughput

IMMIGRATION PROCESS
- 10-30% capacity drop, (even more if no use of e-gates anymore)

Mitigation

1. Pre-flight registration online organized by government (e.g. QR code)

2. Check before Immigration as separate process

New Process Mandatory Covid-Test

Space | Time | Throughput

NEW PROCESS
Need for additional space, equipment, staff

Delayed bag pick-up

Mitigation

1. Pre-flight registration online

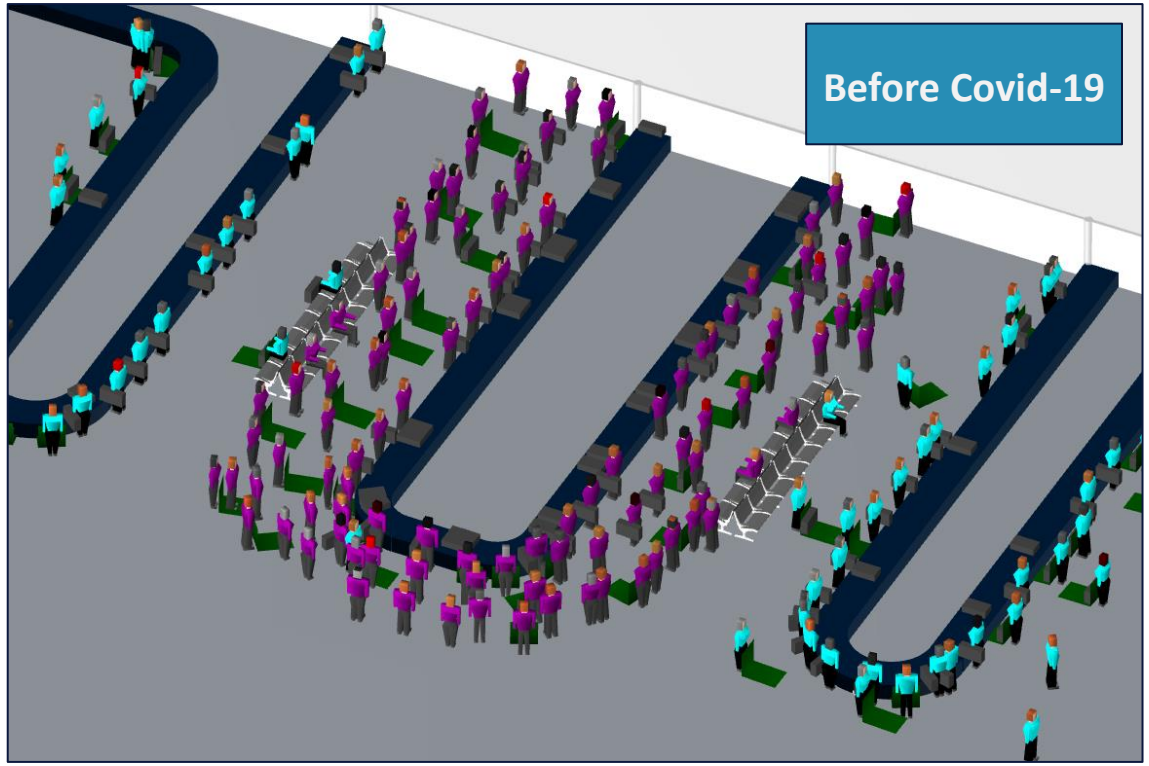
2. Covid-test before travel for fast track

BAGGAGE RECLAIM

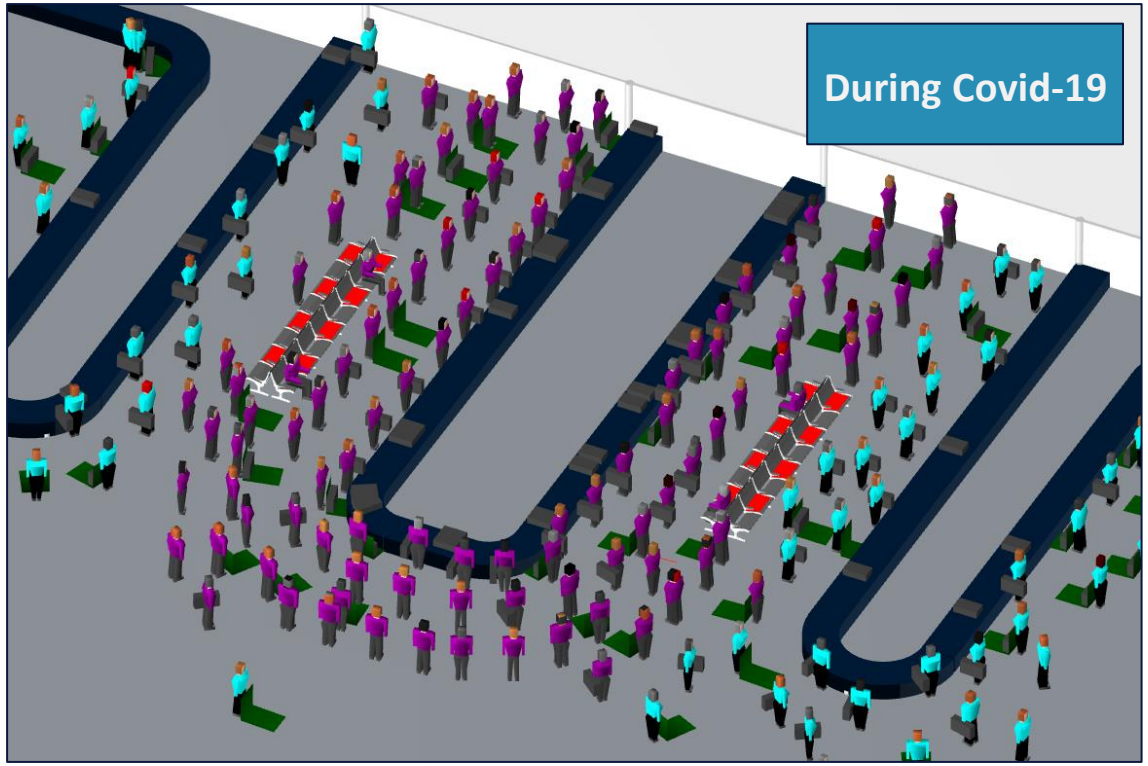
COVID-19 IMPACT ANALYSIS

BAGGAGE RECLAIM | **BELT WAITING SPACE (II)**

- Enlargement of required waiting space around belts for the same passenger number.
- **Waiting areas overlap** for simultaneous allocations at neighboring belts.



100 PAX wait in area ~3.5 m around belt

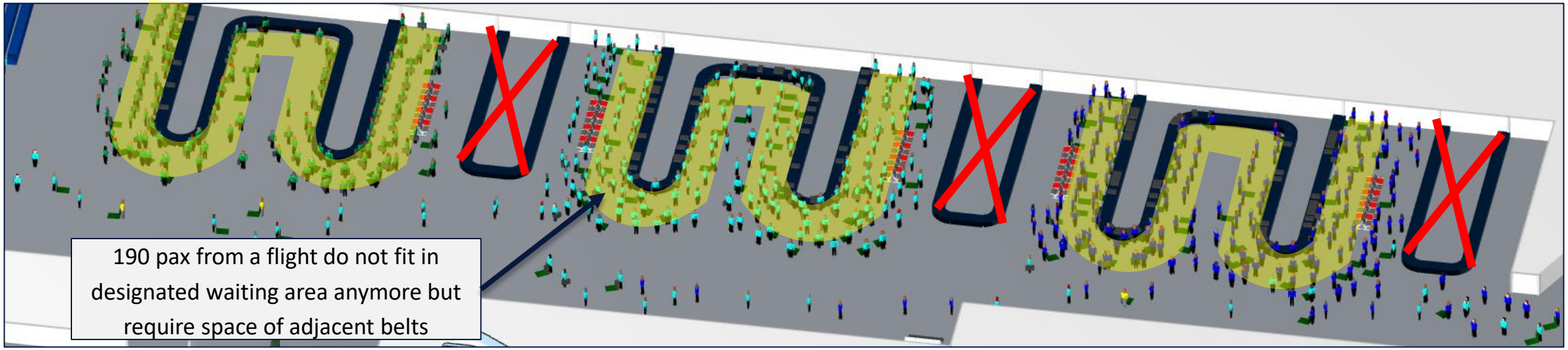


100 PAX waiting in area ~5 m around belt

BAGGAGE RECLAIM | **BEST USE OF AVAILABLE SPACE**

GOOD PRACTICE

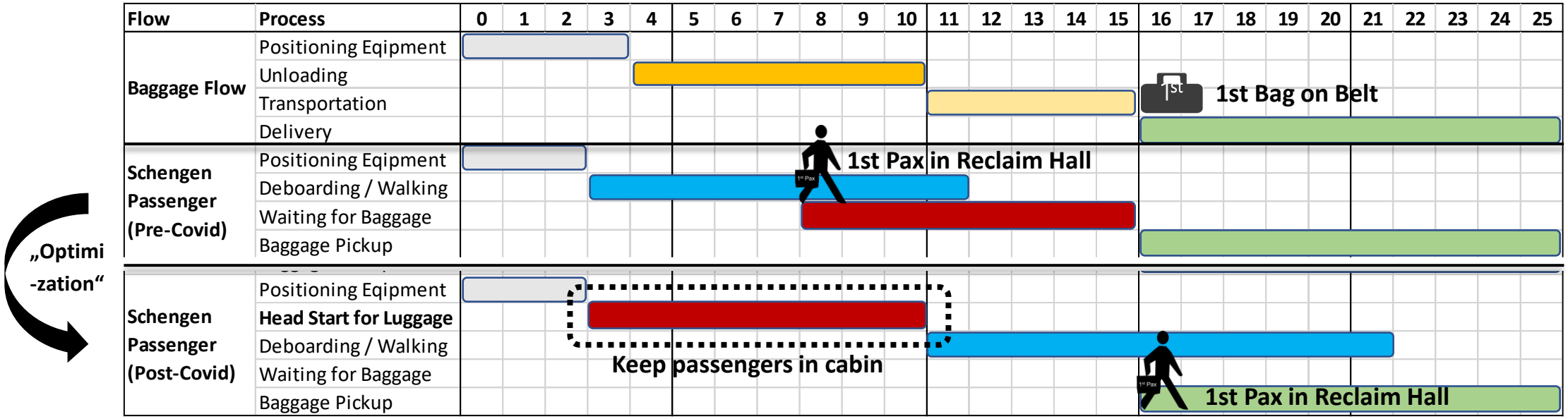
- If traffic allows, allocate **large belts to narrow body** flights.
- **Leave gaps** between simultaneous arrivals.
- Let **groups** use overflow areas; **only one selected person** shall pick-up **at the belt**.



BAGGAGE RECLAIM | **HEAD START FOR LUGGAGE**

PASSENGER SHOW-UP VS BAGGAGE DELIVERY

- Inside the baggage hall, pickup shall be ‚come and go‘
- → **Flights might be delayed**, if baggage hall gets overcrowded.



Post-Covid: Optimized Arrival Flow of Passengers and Bags

BAGGAGE RECLAIM | **IMPACT AND MITIGATION**

Physical distance

Space | Time | Throughput

→ **QUEUE CAPACITY**
-25% drop

→ Mitigation

1. **Leave gaps in allocation**
2. **Assign secondary waiting areas**
3. **Delay deboarding for head start for luggage**

More checked luggage

Space | Time | Throughput

→ **HIGHER DEMAND IN RECLAIM CAPACITY**
(more passengers at belt and longer belt occupancy)

→ Mitigation

1. **Consider in belt allocation**
2. **Speed-up baggage delivery**

Delayed passenger show-up due to upstream processes

Space | Time | Throughput

→ **IMBALANCED PAX AND BAGGAGE FLOW**
(exceeded belt capacity, longer belt occupancy)

→ Mitigation

1. **Consider in belt allocation**
2. **Let floorwalkers pick-up and organize luggage**

TRANSFER

COVID-19 IMPACT ANALYSIS

TRANSFER | **CHANGED PASSENGER FLOW („WHAT-IF“)**

SCHENGEN → SCHENGEN

› **Pre-Covid**

› **Post Covid:** Potential Health Check (separate checkpoint)

› **Post Covid:** Potential Health Check at Immigration (→ mixing with other passengers)

* Not desired but may be necessary because of mixing with unclean passengers and layout

TRANSFER | **AFFECTED CONNECTIONS**

INCREASED CONNECTION TIME REQUIREMENTS

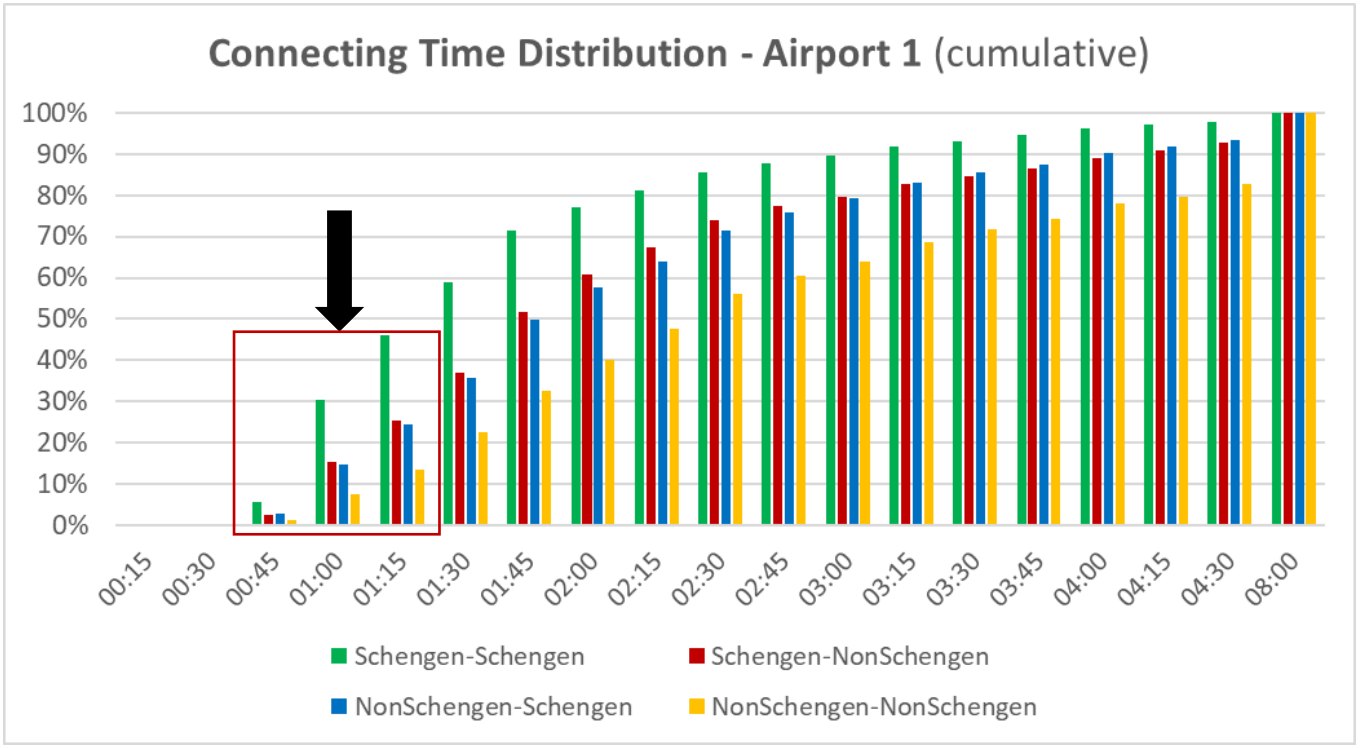
› IF additional transfer processes are necessary → **MCT of 45 min** could turn into **60-75 min.**

ANALYSIS OF EXAMPLE HUB AIRPORT

› **30-45%** transfer pax affected
(< 1h15 connection time)

MITIGATION OPTIONS

› Avoidance of unnecessary mixing with unclean passengers.
› Efficient transfer checkpoints/fast track
› Allocation to reduce walking time
› Check at final destination ?



Example: Actual data from major European airport pre-covid

SUMMARY

TIME AND SPACE IMPACT ON ENTIRE PASSENGER JOURNEY

OVERALL IMPACT ON PASSENGERS' JOURNEY | **TIME**

WHERE DOES COVID 19 ADD TIME?

→ **+ ∑ 0 to 10 min** …and more

Mandatory delay

Risk factor for delay

Health Check

- Not mandatory yet
- Test before travel **off- airport** or close to airport before travel currently seems more likely

→ **+ 0 -15 min** (if implemented)

Check-In

- **Health questions** at counter make agent check-in mandatory, if not online
- Check-in former **carry-on** luggage
- **Timatic** travel restrictions

→ **+ < 3 min** (transaction)

→ **+ 0 – 30 min** (additional waiting, if airlines do not adjust staffing to higher demand / cannot react on changes of volatile schedule (STD,LF)

Security Control

- No additional process required
- But **throughput reduction** requires higher staffing ratio

→ **+ 0 – 30 min** additional waiting (if security does not adjust staffing to reduced throughput)

Gate Holdroom

- **Late originating pax** at gate as described by upstream processes
- **Late transfer pax**, if more extensive transfer process
- **Add. processes** (e.g. health checks, Timatic checks, bags)

→ **+ x min**

Boarding / Turnaround

- **Social distance**
- Changed boarding procedure
- Intense cleaning / **disinfection** cabin

→ **+ < 3 min** (‚self organized' by keeping distance)

→ **+ 10 min** (with changed boarding procedure)

→ **+ 3 min** (if disinfection is done after turnaround)

OVERALL IMPACT ON PASSENGERS' JOURNEY | **SPACE**

WHERE DOES COVID-19 REQUIRE MORE SPACE?

Mandatory space requirement

Risk factor for additional space requirement

Health Check

Space req. depends on:

- Kind of check
- **# flights or pax** to check
- **Process time**
- Desired LoS

→ **‚size" tbd** (if implemented)

Check-In

- **Physical distance** in queues
- **Earlier show-up** of pax
- Higher demand at counters
- Adjustment of staffing or higher efficiency?

→ **+50% queuing space** (with 1.5m SD)

→ **+ 50%** if staffing does not react adequately

→ **+ XX** Extra hold space early pax

Security Control

- **Physical distance** in queues
- Lowered throughput
- Adjustment of staffing?

→ **+100% queuing space** (with 1.5m SD and throughput reduction)

→ **+ 100-200%** queuing space if staffing does not react adequately

Gate Holdroom

- **No use of every other seat**
- **Social distance** when standing / walking
- Space loss due to allocation constraints

→ **+ 35 -50% dwell area**

Boarding Counter

- **Social distance** in boarding queue

→ **+ 0-100%** (depending how passengers are called to counter)

OVERALL IMPACT ON PASSENGERS' JOURNEY | **TIME**

WHERE DOES COVID 19 ADD TIME?

→ **+ ∑ 5 to 20 min** …and more
Excluding health check

Mandatory delay
Risk factor for delay

Deboarding

- **Physical distancing** (inside cabin, passenger buses etc.)
- Head start for **luggage**

→ **Around 5 min**

Health Check (if implemented)

- **Not** generally **regulated** mandatory yet
- Different regulations in EU countries
- Performing full test currently seems more likely **not airside**

→ **+ 0 -15 min**
(if implemented)

Immigration

- In case of no separate health check, immigration might ask more detailed questions, check self-declaration etc.
- More **critical** when **e-gates** for EU Passports **not used** anymore
- Process itself is short but might lead to longer waiting time

→ **+ 10 – 30 min**

Baggage Reclaim

- No general change to baggage delivery process
- BUT – if airport has space constraints in reclaim area and pax arrive before bags, pax might need to hold somewhere else (aircraft, bus, or other holding area)

→ **+ 0 - 15 min**

OVERALL IMPACT ON PASSENGERS' JOURNEY | **SPACE**

WHERE DOES COVID 19 ADD SPACE?

Mandatory space requirement

Risk factor for additional space requirement

Deboarding

- **No additional space requirements** regarding terminal building
- **More buses** per flight needed for remote handling

→ **No additional space**

Health Check

- **Not** generally **regulated** / mandatory yet
- Different regulations in EU countries
- **Extra processes** require **extra space** (from simple QR-code check towards complex PCR test)

→ **Depends on operational principle**

→ Example: C19 test of 500 pax/h → 1,000 m²

Immigration

- **Physical distancing** in queues
- Longer queues if additional flights from **Schengen risk areas** need to be re-directed and checked here

→ **+100% queuing space** (with 1.5m PD)

→ **+ XX if staffing does not react adequately**

Baggage Reclaim

- **Physical distancing** around belts requires more space
- If **pax arrive before bags** (critical):
  - No allocation of every other belt
  - Waiting zones for group members
- If **bags arrive before pax**
  - Extra space to store bags and arrange 1-directional pick-up trail

→ **+30-50% space** (with 1.5m PD)

THANK YOU!

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