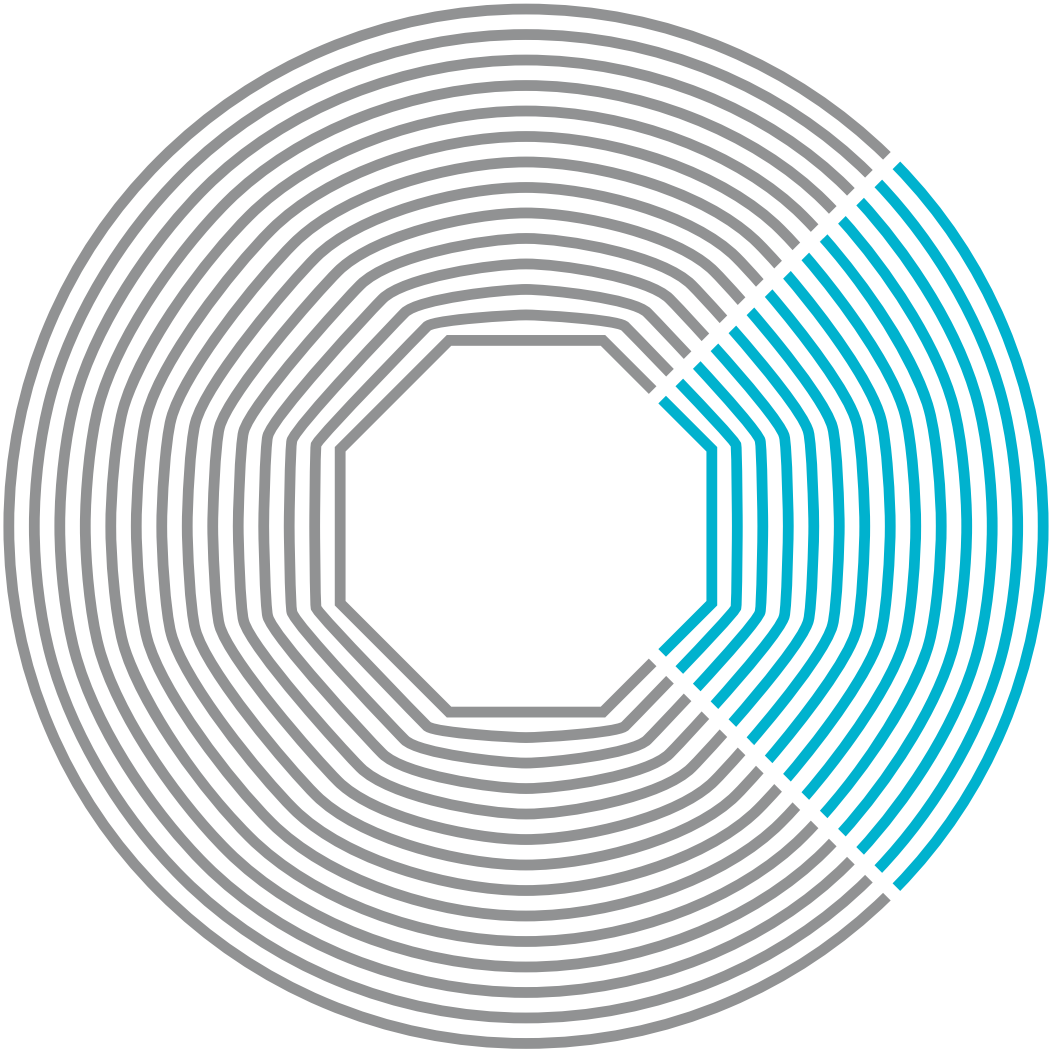
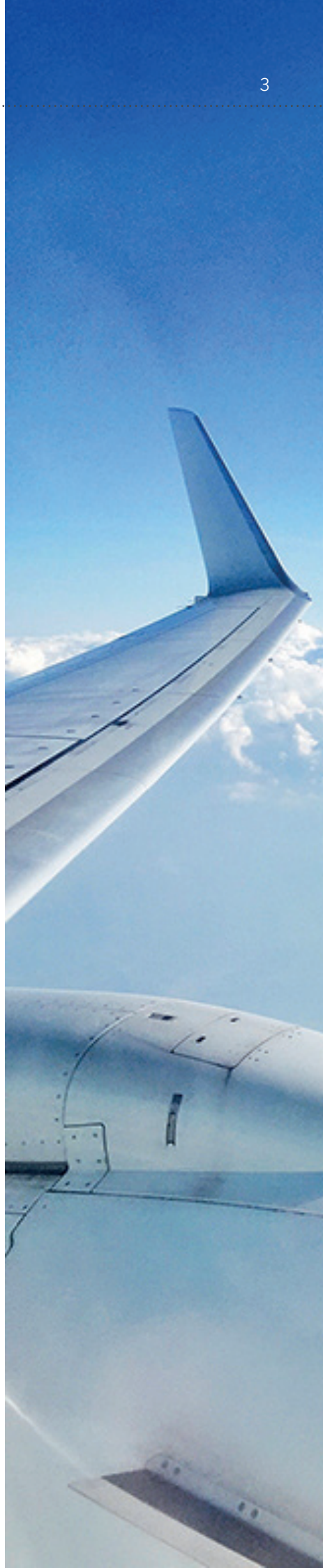


Zero-Based Planning enabling optimized Covid-19 resumption

COPENHAGEN OPTIMIZATION

Contents



This article is aimed at readers who are looking for:

— A new paradigm for operations planning, defined to stand out in the Covid-19 resumption

— Self-assessment of maturity within key planning elements

One-minute summary

Covid-19 has severely affected commercial aviation. These days airports, as a key player in the industry, are in the process of tackling the financial and operational consequences of the health crisis to resume operations safely and sustainably.

Covid-19 consequences on airports

- New traffic patterns
- Massive pressure on OPEX
- Low CAPEX budget
- New health and safety measures
- Need to regain passenger trust

To excel in this complex and essential task, we advise airports to question status-quo and define new, optimized operations through Zero-Based Planning, an objective data-driven approach to operational planning that starts from a "blank canvas" to assess resource needs across all operational areas.

DIY guide to zero-based planning	
1.	Assess current methodology
2.	Map available data and assess input parameter maturity
3.	Outline responsibilities for each operational area
4.	Verify current planning frequency

Timid but positive signals of traffic resumption

According to ICAO, passengers in May 2020 were down ~70% compared to the same period the previous year, whereas in June the same figure decreased to ~55% (and a monthly increase of ~63%). Despite timid positive signals, the consequences of COVID-19 are many and long lasting:

— New and evolving traffic patterns: as of August 10 ~70 million seats were offered for international flights and ~200 million for domestic in August 2020; one month earlier, those figures were ~135 and ~235 millions, indicating a drastic short-term cut (source: OAG and ICAO)

— Massive pressure on OPEX: airport revenues globally are expected to be between 55% and 60% lower than expected for 2020, as a consequence of a reduction to ~2,600 million passengers flown from the 4,600 million of 2019, with immediate (and already witnessed) cost-cutting needs (source: ICAO and ACI)

— Low CAPEX budget: with missing revenues and capital costs making up on average 35% of an airport total costs (source: IFC), it is likely that capital projects are delayed if not canceled altogether

— New health and safety measures: measures introduced to protect passengers and staff (e.g. on-site testing, personal protective equipment, increased document controls, physical distancing) affect the way operations are normally carried out

— Need to regain passenger trust: the industry recovery is also tied to the ability of its players, including airports, to convey a sense of safety to passengers so that they return to travel

To survive and emerge stronger, airports are to look at their operations in new ways, unleashing creativity where financial pressure limits expenses.

How would you plan your airport if you didn't know anything about past operations?

Zero-Based Planning: Rethink operations planning in four steps

To navigate uncertainty and plan operations that are safe and sustainable, we borrow from finance and accounting's "Zero-Based Budgeting" (ZBB) concept to introduce the concept of "Zero-Based Planning".

ZBB is about building all expenses bottom-up in each new period by asking "what is essential to run the business?" or "how would I run the business if I had no previous knowledge of it?". All costs and needs in each period should be "justified", avoiding arbitrary increases/decreases to a prior period's budget.

As for budgeting, Zero-Based Planning (ZBP) is about designing operations bottom-up, as if starting from a blank canvas, identifying the minimum yet optimal requirements to run processes in order to meet top-down strategic goals (e.g. passenger experience, cost optimization). It implies questioning legacy operational choices and leads to redefining optimal operational processes that satisfy demand and passenger experience while minimizing costs.

More of... (quantify real needs)	Less of... (challenge legacy operations)
What are the essential steps in the security process?	I want check-in counters 110, 111, 112, and 113 as they are close to my office
What is the minimum staff I would need to cover demand at security at a specific time?	We have always used a throughput of 150 passengers per hour
Which tools are necessary? Which ones are redundant?	We are using 8 different Excel documents with so many details it cannot be replicated
How many check-in desks would I allocate to each airline if no commercial agreement or rule were in place?	I am the largest airline at this airport and I need this area – no matter your analysis

We break ZBP down into 4 elements and indicate what constitutes low, medium, high maturity within each to provide guidance specific to the airport operations planning department on their next improvement opportunities. Each element represents a step in a Do-It-Yourself ZBP.

LOW	Excel	Experience based, multiple gaps	Unclear	Seasonal
MEDIUM	Legacy system	Some data, some automation	Split, sub-optimal	Weekly
HIGH	Modern solution	Frequently updated data	Unambiguous, optimal	Real time

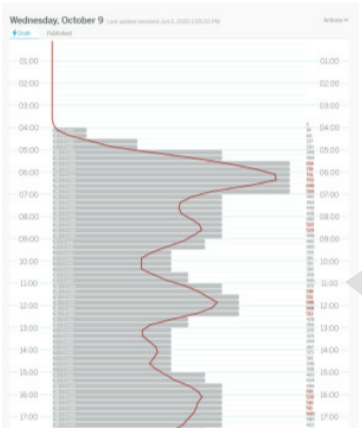
Step 1: Assess current methodology / Solution

Several airport operations planning departments are bound to Excel spreadsheets that lack robustness, scalability, and shareability and/or legacy software that does not satisfactorily match reality.

To get the most out of ZBP, adopt best practice planning methodologies (or software solutions equipped with them). Such solutions secure optimized resource allocations (e.g. staff, lanes, counters) with respect to demand and SLAs (e.g. waiting time).

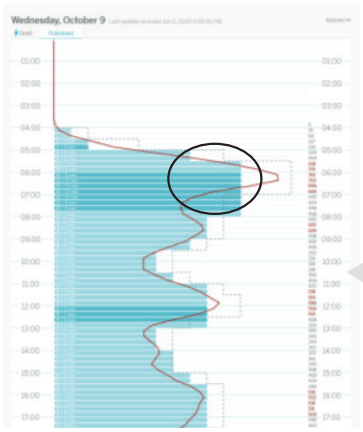
An example of this is shown in the chart below. To the left, we show a typical Excel-based security lane opening. For each interval, the number of passengers arriving are divided by the throughput and the resulting number is typically rounded up. In comparison, the figure to the right shows a security lane opening plan generated by a mathematical algorithm considering flow across the full day, wait time targets, and passenger throughput. The effect is clear – the peak demand for lanes is reduced by increasing the wait time to levels inside the service level agreement in place.

Traditional generation of lane opening plan for security



Lanes to open are calculated by rounding up demand in an interval (typical Excel based model) leading to overcapacity and inefficiencies, particularly around peak times

Best practice generation of lane opening plan for security



Lanes to open are calculated by a mathematical algorithm that optimizes in line with wait time targets, e.g. around peak time some queue is built

Step 2: Map your data and assess maturity of input parameters

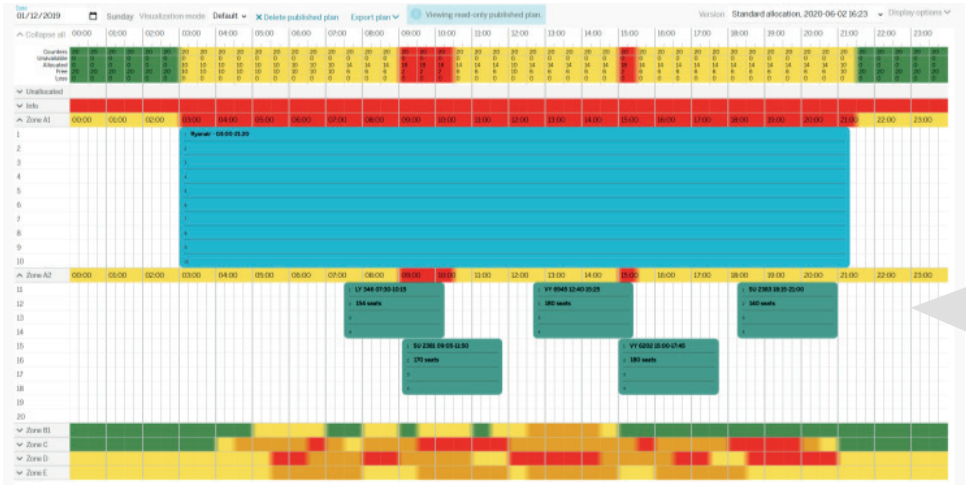
Data should drive decision-making. Depending on data maturity and available technology, the quality and granularity of available data (and, with it, planning accuracy) may vary, but generally planners and analysts should aim to answer the following:

- Passenger/Bag load factor forecast: how many passengers / bags are expected on each flight?
- Passenger/Bag show-up at operational area: when will the expected passengers / bags show-up at each relevant operational area?
- Passenger/Bag processing time: how long does it take to process a passenger / bag at an operational area? (e.g. time to check-in a passenger, time to check a passenger at security, time to take-away a bag from a make-up position)
- Service level target: how long waiting times / queues are accepted?

As traffic resumes, the uncertainty around these parameters will be high, hence we recommend analyzing sensitivity of key parameters and the production of multiple scenarios.

The combination of the answers should provide a picture of "true demand", and not one based on legacy requests from airlines and handlers. Provided that contractual agreements might pose a constraint to the full implementation of demand-driven planning, this "true demand" is what we advise planners to base their work on. Even when data is scarce, our experience across airports worldwide is that such an approach can yield significant improvements in infrastructure and staff utilization (with obvious cost benefits). This is shown in the following example for the check-in area.

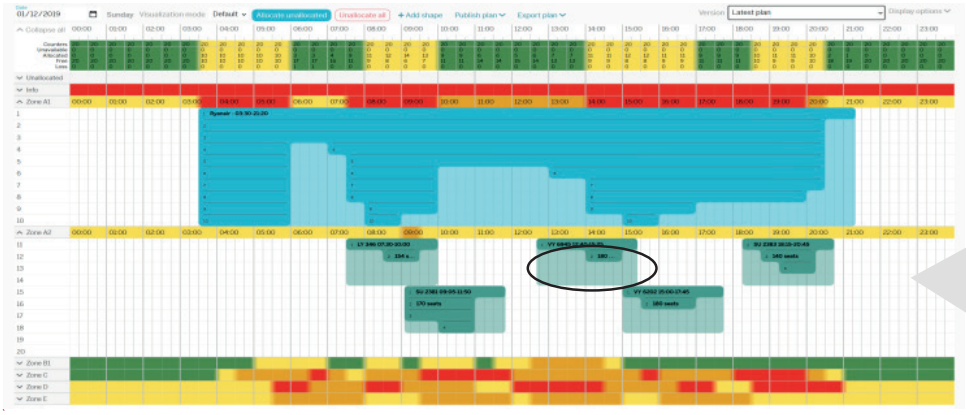
Simple rule of thumb check-in counter allocation



Check-in counter opening profiles based on:

- Rule of thumb
- Legacy
- Airline preferences

Input parameters-based check-in counter allocation



Check-in counter opening profiles based on:

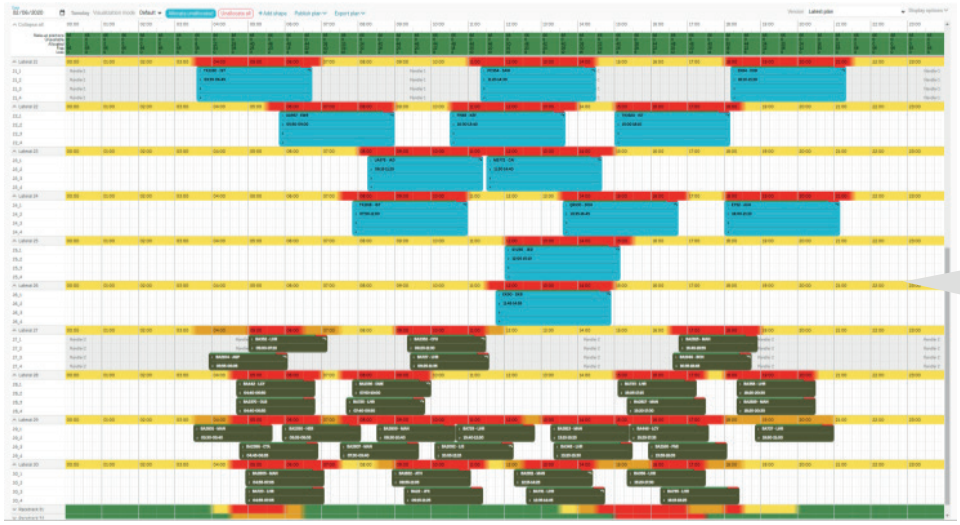
- Transaction time per passenger
- Passenger presentation profile
- Mathematical algorithm

The first method ("simple rule of thumb") leads to inefficient utilization of check-in counters: allocations are based on rough approximations or arbitrary preferences, which lead to simple "squared" shapes. Using the expected passenger show-up profile as input parameter for the allocation of counters to flights and airlines generates savings in terms of infrastructure and staff: as shown in the second half of the example, the maximum number of counters (e.g. 3 for green shapes and 10 for the blue shape) is only needed for a fraction of the counter opening time window, whereas fewer counters are needed the rest of the time (highlighted by the transparency in the shapes).

Step 3: Outline responsibility for each operational area

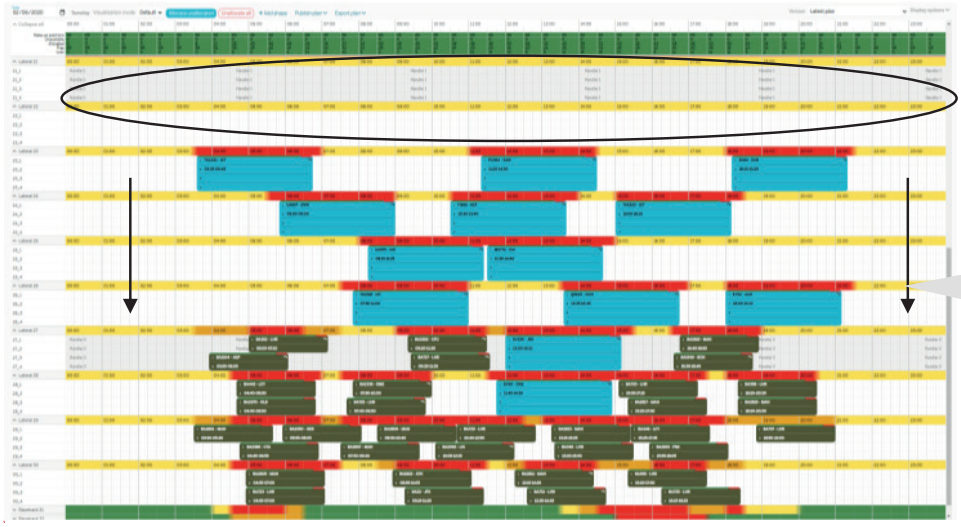
Optimal planning should provide a clear and unambiguous responsibility split that allows maximized resources utilization (e.g. infrastructure, staff). When responsibilities are not unclear, they are often still sub-optimal as purely based on a distribution of resources, e.g. allocating a portion of the operational area to a third-party operator. Within ZBP, airports have a chance to redefine responsibilities that maximize clarity and utilization, as we exemplify for an outbound baggage allocation.

Dedicated areas per handler



- Clear responsibility
- Sub-optimal use of infrastructure

Common areas shared between handlers



- Clear responsibility
- Optimal use of infrastructure

In the first half of the example, responsibility is clear (i.e. different handlers are allocated to different resources), but the use of infrastructure is suboptimal. Using common areas (second screenshot) by allocating the same lateral to several handlers throughout the day leads to an optimal use of infrastructure (i.e. in the example the two top laterals can be freed up across the full day) without sacrificing clarity

of responsibility, as different handlers (identifiable by the different color of the shapes) are never overlapping on the same piece of infrastructure.

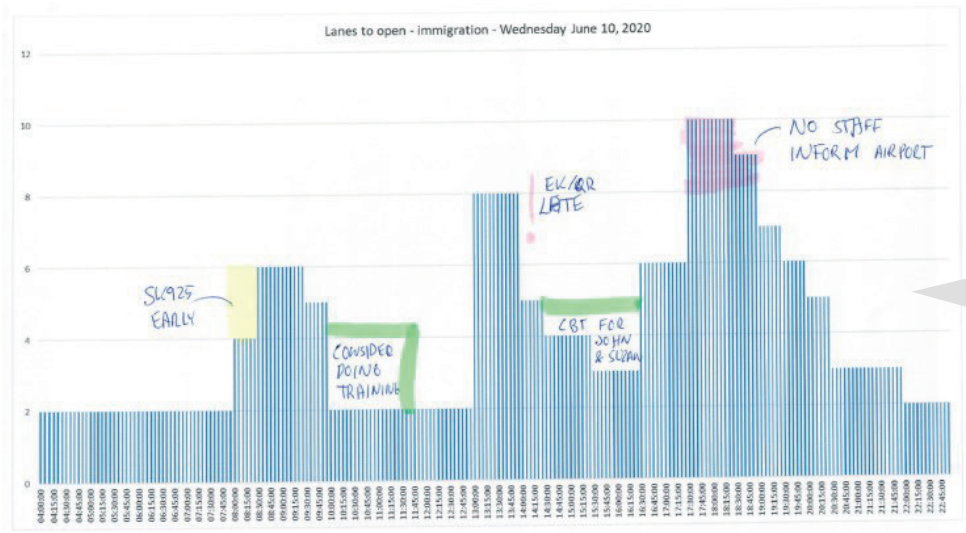
Step 4: Review current planning frequency

Increasing the planning frequency enables airport planners to capture changes in demand (e.g. schedules, passengers), ever so frequent after the start of the COVID-19 pandemic, and supply (e.g. staff, infrastructure), and thereby plan accordingly.

To successfully increase planning frequency and fully reap the benefits, consider implementing new processes and solutions which ease and/or automate the planning (update) process.

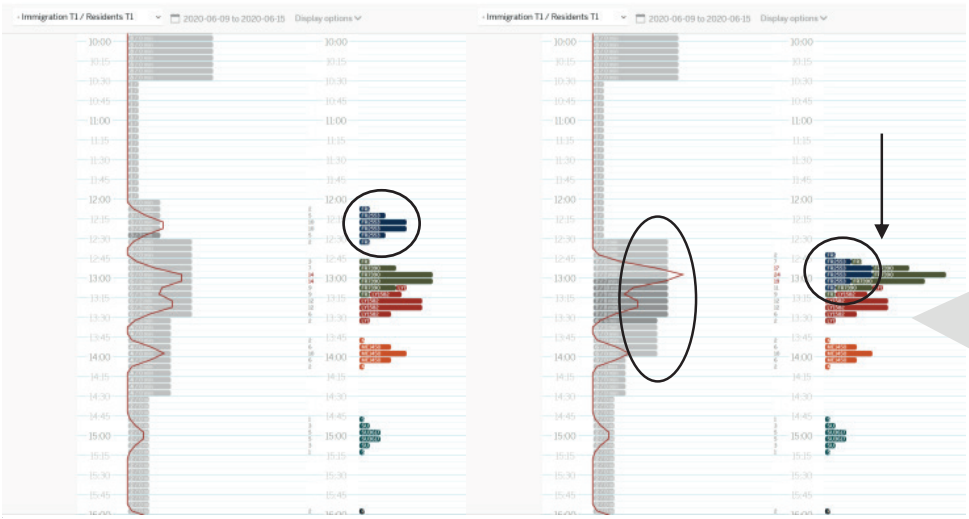
The example below compares a paper-based plan for lane opening at immigration with one updated real-time based on changes to the schedule: in the former, changes area manually made by hand on the same original print, a practice that is prone to errors and confusion; in the latter, as the arrival time for the flight in blue varies (and with it, the presentation of passengers at immigration), the plan is automatically regenerated and optimized, resulting in a reduction of open lanes when the blue flight was originally supposed to arrive and an increase around the new STA, saving physical and staff resources.

Paper-based plan for immigration lanes

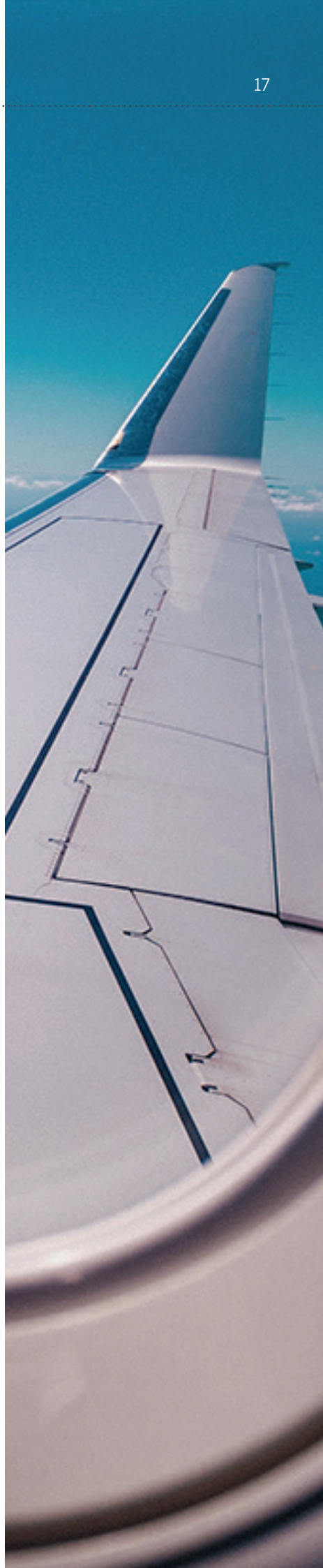


- Static
- Handmade changes prone to confusion

Real-time updated plan for immigration lanes



- Frequent update of flight schedule and corresponding passenger flow through immigration
- Real-time optimization of lane opening plan



Opportunities and benefits of Zero-Based Planning

By embracing ZBP, planners can turn the current period into an opportunity to:

- Request more collaboration and data from third parties (airlines, handlers, other operators) as part of the joint effort to overcome the crisis and enhance services
- Adjust internal and external stakeholders' contracts, including sub-optimal legacy operational rules
- Redistribute insourced/outsourced activities
- Think of new ways to do things better and more efficiently (e.g. through digitalization, more granular planning horizons)

Below we outline some of the opportunities that may arise from challenging status-quo with Zero-Based Planning, and improve efficiencies within each operational area:

Operational Area	Opportunities to improve capacity
Surface Access	Time limit restrictions, incentivize the use of public transport
Check-in	Counters allocated based on passenger based demand (instead of rule based like 2 counters per flight/airline), flexible allocations, check-in areas with multiple airlines, increase use of self-service infrastructure, push for off-airport check-in.
Outbound Baggage	Infrastructure allocated based on baggage demand, flexible allocations, implementation of new processes.
Security	Introduce peak shaving with for instance, a time slot booking process for passengers. Implement flexible rosters and breaks.
Stand&Gate	Flexible allocation, ground equipment pooling, standardization of processes, real time optimized reallocation, increase number of remote stand operations to shave the peak
Border Control	Coordination with stand and gate allocation to minimize passenger overflow in the hall, introduce flexible rosters and breaks
Baggage reclaim	Balanced allocation based on passenger and baggage demand, linkage with border and stand and gate processes.

The need to understand the impact of the changes to the operation caused by COVID-19, makes this a better time than ever to consider how to collect and use more data, and with it mature the analytical mindset in the organization.

Early identification and implementation of existing opportunities (among the ones outlined in the table) will allow airports better management of operations once traffic recovers to a level that challenges capacity.

Conclusion: Constantly evolving conditions call for more dynamic and optimized planning concepts

A few months into the crisis that plummeted civil aviation, airports are coming to terms with an ever-changing reality, driven by passengers, airlines, authorities, and the development of the pandemic itself.

A successful and sustainable resumption of airport operations requires adapting to rapidly evolving scenarios, which challenge static, experience-based, legacy-driven plans and call for a switch to a more dynamic, data-driven, mathematically optimized planning method, as the one outlined within the concept of Zero-Based Planning.

Reading material mentioned in this article

Operational Impact on Air Transport, ICAO, https://data.icao.int/coVID-19/operational.htm

About Copenhagen Optimization

Copenhagen Optimization is a combined consultancy and software company specializing in analyzing and planning any operation on a strategic, tactical, and operational level. We improve your airport operation through data-driven analytics and strategic consultancy in combination with our BETTER AIRPORT® software suite to support you all the way. Working with more than 50 airports globally, we offer our unique services and technology to support airports of all sizes.

If you would like to learn how we can help your airport navigate through the COVID-19 aftermath, reach out to us for a personal talk via:

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