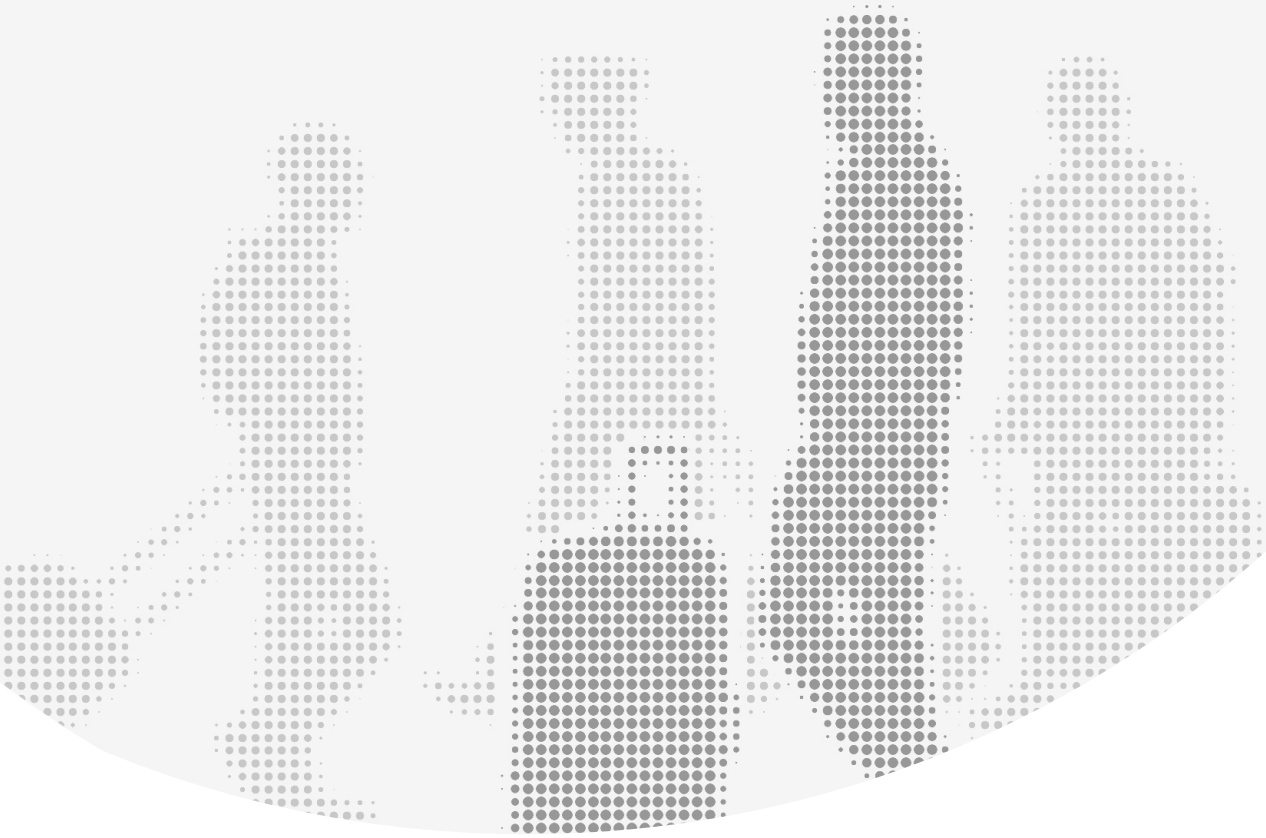

WHITE PAPER

Waiting times grow faster than queues

WHY AIRPORTS SHOULD OPEN COUNTERS
BEFORE PASSENGERS ARRIVE

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WHY AIRPORTS SHOULD OPEN COUNTERS BEFORE PASSENGERS ARRIVE

DURING THE PAST EIGHT YEARS XOVIS HAS EQUIPPED MORE THAN 45 INTERNATIONAL AIRPORTS WITH ITS TECHNOLOGY TO MEASURE PASSENGER THROUGHPUT, WAITING TIMES AND OTHER KPIS. THE SWISS BASED COMPANY HAS DEVELOPED A PROFOUND UNDERSTANDING OF WAITING TIME MATHEMATICS WITH SOME UNEXPECTED INSIGHTS.

Long queues frustrate passengers and make airports look bad. It's too bad that is already too late to open counters when passengers arrive. Just like many other modern-day nuisances waiting times follow a non-linear, but exponential function. A simple example published in the May-June 2017 edition of the Harvard Business Review ("Linear thinking in a non-linear world") generally illustrates this surprising conclusion and why our intuition often tricks us.

WHAT IS NON-LINEARITY?

Imagine a family with two cars: the SUV gets 10 miles to the gallon (10 MPG), and the sedan gets 20 miles to the gallon (20 MPG). Both cars travel 10,000 miles a year. There are two options to replace one car with a more fuel-efficient vehicle.

Which upgrade is better?

- Option A: Replacing the 10 MPG vehicle with a 20 MPG vehicle
- Option B: Replacing the 20 MPG vehicle with a 50 MPG vehicle

Intuitively, option B seems better leading to a larger increase in both absolute (30 MPG vs 10 MPG) and relative (150% vs 100%) numbers. However, A is by far the better deal. Table 1 reveals in more detail why our linearity-biased intuition fools us. Travelling the annual 10,000 miles, option A will result in fuel savings of 500 gallons. Although option B is comparatively the more efficient solution before and after the upgrade, it reduces the fuel required to travel annually 10,000 miles only by 300 gallons. The upgrade of the less efficient solution is more efficient. Surprised? Welcome to the non-linear world.

Current	After Upgrade	Savings
A: 1000 gallons (@ 10 MPG)	500 gallons (@ 20 MPG)	500 gallons
B: 500 gallons (@ 20 MPG)	200 gallons (@ 50 MPG)	300 gallons

Table 1: Comparison of different upgrade options

Figure 2 visualizes the counter-intuitive, non-linear relation between MPG and the fuel consumption for 10,000 miles per year. This surprises us, because due to our linearity-biased intuition we would expect a linear function as shown in figure 1.

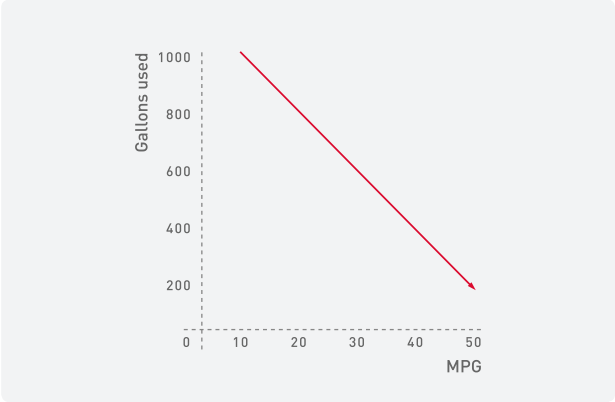

Figure 1: Human intuition

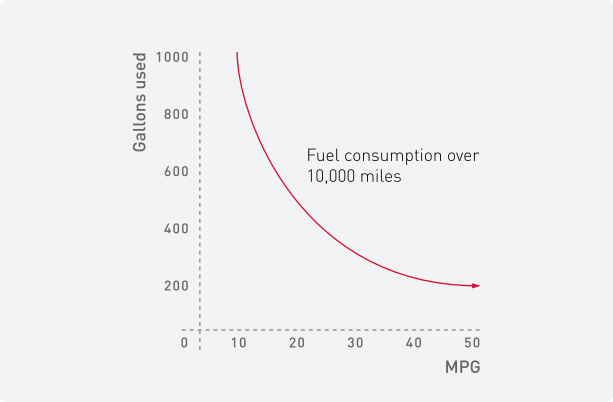

Figure 2: Actual relation

NON-LINEAR WAITING TIMES

The reality gap between human intuition and the actual numbers apply to many spheres of every-day life – also to waiting times. The exemplary waiting time statistic in table 2 depicts the typical development of waiting times, when a queue builds up at a dynamic airport site such as check-in and security checkpoint. While a queue with 100 people results in a waiting time of 3 min, 150 people wait 7 minutes (not 4.5 minutes), and 300 people wait 12 minutes (not 9 minutes) – because the relationship between queue length and waiting times is non-linear:

Queue Length	Average Waiting Time
100 persons	3 min
150 persons	7 min
300 persons	12 min

Table 2: Non-linear increase of waiting times

The International Air Transport Association (IATA) expects 7.2 billion passengers to travel in 2035. This equals almost a doubling of the 3.8 billion air travelers in 2016 and will force airports to optimize capacity utilization while increasing customer satisfaction.

Again, the relationship between queue length and waiting time is exponential, meaning that the waiting time naturally gets out of control once a queue starts building up. Therefore, airport operators should open additional counters before the peak and avoid the build-up of a queue and the resulting long waiting time proactively.

XOVIS

WAIT LESS, SPEND MORE

People that wait more, spend less. Not surprisingly, waiting times have a negative impact on the airport's overall performance, customer satisfaction and particularly retail sales. That's where Xovis comes into play to help airports measure crucial KPIs (queue lengths, waiting times, process times etc.), improve customer experience and increase customer satisfaction.

The combination of 3D sensors and software solutions are deployed at 45 international airports and deliver sampling rates up to 98%, meaning that 98% of the passengers in the covered area are counted and tracked anonymously. Considering the mathematics behind the exponential relation between queue length and waiting times, high sampling rates are key to obtain consistent data regarding queue length and waiting times. The Xovis system also calculates expected waiting times. Based on the measured KPIs, airport operators are empowered to act instead of to react. They know when and where to open more counters or to deploy more staff – before passengers arrive and waiting times get out of control.

According to the study "Rise to Challenge – The Risks and Opportunities of Digitization for Airports." from Roland Berger, a five-minute delay for 25 percent of passengers at the security checkpoint could induce a drop in retail sales of 2 to 3 percent. People that wait more, spend less.

ABOUT THE AUTHOR

Thomas Vogel is VP Operations Xovis Airports. Tom and his team are in charge of implementing the Xovis technology catered to the individual needs of any airport.

More than 45 international airports count on Xovis to measure numerous KPIs such as queue lengths, waiting times, process times and passenger throughput. Based on the gathered data, airports optimize the planning of resources and the use of infrastructure to improve passenger experience and increase customer satisfaction.