Door-to-Door in 4 Hours

Time Efficiency and Air Travel in Europe

It's all about more planes and more routes, faster planes, better access to airports and making sure people get through the arrivals process without queues.

Francesca Matarese is research and innovation director with the Italian air traffic research company SESM. She frequently travels from her office in Giugliano in Campania near Naples Italy to the European Commission's Research directorate at the Covent Garden building in Brussels. The journey - which door to door as the crow flies is 1341km - would take a little over 2 hours if she had her own private Boeing 737 and runways. And she could travel just in time for her meetings, avoiding overnight stays. In reality, even though both her office and the Commission's directorate in Brussels are within 15km of airports - as the crow flies - the trip takes about 9 hours at business class rates or 11 hours at economy rates. She needs to travel via Munich, Istanbul, Rome or Milan. In addition Francesca needs to arrive a day in advance and/or leave a day later, effectively adding 14-28 hours to her journey time. In needing and taking two flights instead of one she spends double on the tickets, spends several hundred euro more on hotel stays, uses double the aviation fuel and generates double the noise and CO₂ emissions. Most other European travelers on most other routes have similarly cumbersome experiences. Yet as quality of life improves in Europe and the economy develops, the transport system will need to support improved mobility and increased capacity.

Air transport is inherently an efficient way of getting people from A to B over medium to long distances. In terms of fuel consumption per passenger per kilometre it is comparable to a private car with one or two persons on board. Compared to rail travel flying typically uses more fuel per km travelled but it does not require the massive ground works and capital expenditure of either road or rail and it is highly flexible. Planes can be shifted around the world to suit demand and to assure they fly at maximum capacity and efficiency. While air travel growth in Europe is currently stagnant it is expected to be grow at 5% over the
long term. Boeing expects European airlines to acquire about 7500 new aircraft in the coming 20 years of which half will be replacements within the existing fleet of 4400 planes. 

In December 2010 Slim Kallas, the EU Commission’s vice-president for transport, formed a panel of experts – called the High Level Group on Aviation and Aeronautics Research - to look at how EU research money should be spent, emphasising the need for demand driven policy and a focus on real industrial priorities. Some months later the group published *Flightpath 2050*, a vision document, which stated – among other goals - that by the year 2050 90% of travelers within Europe should be able to complete their journeys door-to-door within 4 hours. This compelling and appealing vision, while giving ample scope for discussion and interpretation, provides policy makers with a tangible and valuable target. For the most part it relates to trips where air travel is involved but also includes high speed ground transport for the equivalent journeys. It mostly covers the 400km-1000km range but also covers 200km-2000km distances. It goes without saying that the goal is to be pursued in tandem with Europe’s important environmental aims. And naturally it means journeys for which there is demand and at times and frequencies that are convenient for the passengers (i.e. that allow people travel where they want to go when they want to go). Mr. Kallas’s department has nearly six and a half billion euros to spend on research – or about €3.7 million per day - between 2014 and 2020. 

Naples and its hinterland, with a population of 7 million living within 200km, are served by the airport Capodichino (pronounced *capo-di-keyno*) which connects with about 30 destinations of which 10 are in Italy. Capodichino is the EU’s 67th busiest airport with 2.7 million passenger departures per year or 60 flight departures per day. In all, there are around 2000 airports in continental Europe. 500 of them account for 98% of departures and 250 for 90% of departures. 50% of European travelers’ air journeys start in, end in or transit the top 25 busiest airports. Unfortunately Neapolitans using Capodichino cannot reach 17 of Europe’s 25 busiest airports without taking a second flight. Brussels, Athens, Copenhagen, Dublin, Madrid and Stockholm are among the 41 capital cities in continental Europe not served by Capodichino and clearly they cannot reach 220 of the 250 locations that account for 90% of the continent’s air traffic. So the vast majority – at least 70% but possibly substantially more – of Neapolitans’ desired journeys are taking 8 hours or more or are not being taken at all due to poor connectivity.

While people living close to mega hub airports have somewhat better point to point connectivity it by no means reaches anything near full coverage. Paris Orly for instance, the 12th busiest, reaches just 50 EU destinations outside France (just over double the number reached by Capodichino). Most EU citizens, to a greater or lesser extent, are spending much more time travelling than desirable or are not travelling at all due to limited connectivity.
The EU28 countries have a combined surface area of about 4 million square kilometres, so – by the very crudest of reasoning – less than 500 airports are needed to assure most citizens are within 50km of one of them. With over 1700 airports in EU28 territory currently, airport density does not appear to be a limiting factor. The biggest barrier to Francesca’s being able to travel to her destination in Brussels - or indeed most other places she or her fellow Neapolitans wish to visit - in less than 4 hours is lack of frequent direct flights. Naples airport is about one sixth the size of the average top-25 airport so presumably could handle considerably more traffic. Two return flights per day to each of the 17 top-25 destinations currently not served would increase Capodichino traffic by about 50% and make life richer in opportunity for the regions inhabitants.

To make progress towards the 4 hour door-to-door goal the conundrum for Europe’s mobility policy makers and industrialists is in determining how to dramatically increase air connectivity between several hundred airport locations. The hub and spoke system, concentrating traffic on about 10% of airports and involving considerable amounts of time going in the wrong direction, moving slowly or not moving at all, is not going to satisfy the 4 hour aspiration. Add to this the fuel consumption, CO₂ emissions, noise, cost and traveler discomfort and the hub and spoke system starts to seem starkly anachronistic.

Since the year 2000 Ryanair, followed by easyJet and Air Berlin, has been the main innovator in European air travel. With its point-to-point connectivity, on-line ticketing and check-in, 180 locations and 300 aircraft (plus orders for 175 more placed in 2013) Ryanair and the other low cost lines are turning the industry on its head. Air travel in Europe has nearly doubled in the past ten years and 100% of the growth is based on the Ryanair approach. The so called low cost airlines will likely account for 50% of demand by the end of 2014 and already do so in several large national markets. Currently the low cost carriers account for 40% of flights out of Capodichino. Ryanair doesn’t do Naples yet but in 2013 it requested slots for 8 destinations from the airport. None of them are for Brussels however in January 2014 it commenced services for the first time to the conveniently located Zaventem Brussels airport. EasyJet’s boss Carolyn McCall is targeting business travelers who account for 18% of her firm’s seats and Ryanair’s CEO Michael O’Leary has promised that in the future they will try not to unnecessarily piss people off. Who knows, maybe Francesca might soon become a frequent Ryanair business flyer.

Let’s assume for now that she already is. Her road journeys at both ends are wonderfully short at about 20km each and take about an hour and a quarter in total including contingency or buffer time. She uses her car at the Naples end and leaves it parked there. She uses the number 272 bus in Brussels. She then has a two hour flight plus landside departure and arrivals proceedings to deal with. She allows one hour for departure - half of which is idle buffer time - and needs nearly 30 minutes to get out of Zaventem airport once landed. Total door-to-door time is about five hours. For a 1341km journey this is pretty good. Most EU journeys are well under 1000km and the 4 hour goal is intended for the 90% most common ones. But it
could be 20% better. In flight she probably loses 15-30 minutes due to sub-optimal airside routing, holding and buffering. Getting to and from the airports she loses 45 minutes due to traffic or contingency for traffic and in the airport another 30-40 minutes are lost in landside queues or buffer time for queues. That adds up to an hour and a half of hanging around time. It would be great if airports could assure near zero queues through their premises and if air traffic managers could shave fifteen or twenty percent off flight times. Her journey to DG Research might very plausibly take under four hours.

time buffers due to uncertainty in ground traffic, airport and airside queues is major cause of inefficiency

The quality of the information available to travelers planning their journeys to and from airports is - as users of navigators like Google Maps and Waze are experiencing - improving rapidly. Both in Naples and in Brussels Francesca can check for routes and transport services. When seeking flight options she can use Skyscanner and eDreams. As anyone with an android phone and Gmail will know, on the morning of your flight your phone tells you how long it will take to reach the airport even if you have not asked it to. It figures it out by itself from your emails and your location! GPS based tracking and tracing will soon allow customer location and transport facilities information to be integrated as the travelers approach the boarding area. When Galileo, Europe’s own high precision positioning service, becomes operational in 2019 (hopefully!) a whole raft of new information services will be possible. At six years from the introduction of the first iPhone progress has been immense yet we know it is still only the beginning and that we can be sure of lots more great business innovation in the short term. It is only a matter of a time before Google will have fully integrated travel, navigation and queuing information in user customised real time web services. Whatever about questions of privacy, lackluster European leadership and monopolies, the whole process of travelling is being supported by ever better information services.
No amount of improvements to air connectivity and journey information will alter the fact that one of most time consuming, inefficient and frustrating segments of air journeys in Europe is getting to and from the airport without a private car. Capodichino is 4km from Naples central station yet it is virtually impossible to get between the two in less than an hour. Covering the 12km to the port can take an hour and a half by public transport while taxi drivers may ask for €50 or so. Francesca uses her own car or gets a friend to pick her up or, in extreme cases, charges the taxi as a business expense. Travelling via many of the secondary airports in Europe such as Charleroi near Brussels, Weeze near Dusseldorf or Hahn near Frankfurt can involve coach trips of an hour or more, wait times of up to half an hour and connections to just one or two city centre locations. Taxi’s are prohibitively expensive – costing more than the flights - and the generosity of friends and family quickly wears thin. Francesca has experimented with the Ryanair Rome-Charleroi (Brussels) route and while Ciampino in Rome is just 15km from the centre, Charleroi has proven to be a blocker. The time and cost of travelling the 63km to DG Research – via Gare du Midi - make it impractical.

**local ground transport to airports the 3rd biggest barrier to time efficiency**

Yet if the 4 hour goal of Flightpath 2050 is to be reached dozens or hundreds of smaller airports are going to have to become much more accessible to their hinterlands. The innovations to make this possible are low tech. At Charleroi for instance it would be nice to be able to buy the bus ticket while in the queue for the bus. Instead you queue twice: once for the ticket and once for the bus. Better still: buy it on-line on the plane or on the bus.

At Ciampino it would be great for many passengers to be able to get off the shuttle bus before getting to the central railway station instead of going all the way in. At Naples a bus would be nice.

Current passenger aircraft cruise at about 850km per hour. In a door-to-door journey, assuming two hours are spent on the ground and two in the air, one could hope to go from Rome to London in under 4 hours, assuming the plane goes in a reasonably straight line and doesn’t hang around waiting for a landing slot. Passengers going from Spain to Poland, or Greece to Belgium, or Portugal to Germany will simply not make it inside the four hours. Lots of Europe’s distances – perhaps as many as 20%-30% of them – are simply too long.

**faster planes needed**
Undoubtedly there will be science and technology advances which will both continuously and disruptively make air mobility better for travelers and the environment over the coming 35 years. Electrical and hydrogen fuelled self-driven cars, integrated tracking and of passengers and vehicles, and smaller more agile and quieter aircraft will all become the norm. We may even surprise ourselves in that timeframe and come up with demonstrators of super conductor tracks in the air carrying futuristic modular cars, trains and aircraft.

However real progress towards the 4 hour goal – driven by demand based industrial priorities - will only be possible through traditional business entrepreneurship, managerial, local government and political heavy lifting: Europe will need a five or even ten-fold increase in the number of routes spread over several hundred airports in a point to point system as well as major process efficiencies, i.e. more Ryanair, more Google-GPS type online services, more airport and air traffic process efficiencies to cut buffer times and lots more shuttle buses and trains to service those busier airports. It’s mostly about good business management, industrial engineering, local government and politics. It’s not so much about break-through advances in science and technology. Francesca’s best hopes for a better traveling experience will come about when easyJet or a nicer Ryanair put on a Naples to Zaventem route and when her local government decides to sort out its local ground transportation.

The quandary for Mr. Kallas’s DG transport directorate is that in comparison to the level of industrial and governmental effort needed, only small amounts of time efficiency and mobility improvements will be brought about by technology research and innovation. The Commission’s five or ten million euros per year – for scientific concept to demonstration at “TRL 6” levels – may help enable the transition to a 4 hour vision but they won’t drive it. So how to make best use of the money? And how to measure the effectiveness of the spend?

In order to manage and monitor progress towards the 4 hour goal two things are needed: Firstly some simple metrics are needed to measure mobility time efficiency. This is mostly a question of counting the number of point to point routes in operation, clocking average throughput times through airports and flight paths, knowing the speed of planes and monitoring levels of accessibility of airports to hinterlands. Secondly, clear distinctions should be made between the progress which can be driven by technology advancements and progress which cannot, together with some degree of weighting or relative impact.

Your feedback welcome. Please send your views to James Cogan.
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