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Airports in the mobility chain

– challenging business models

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>> *Challenge in context*

> CAMERA, definitions, data, issue

>> *Exploring dwell times*

> Behaviours, trends, relationships

>> *Future solutions*

> Airport business model

> Airline business model

>> *Issues for debate*

Challenge in context

Challenge in context

Key features of CAMERA (1/2)



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>> Coordination and Support Action; "2017 – 2021

> Mobility for Growth Call (Horizon 2020)

> Innaxis, University of Westminster, EUROCONTROL, Bauhaus Luftfahrt, Deep Blue

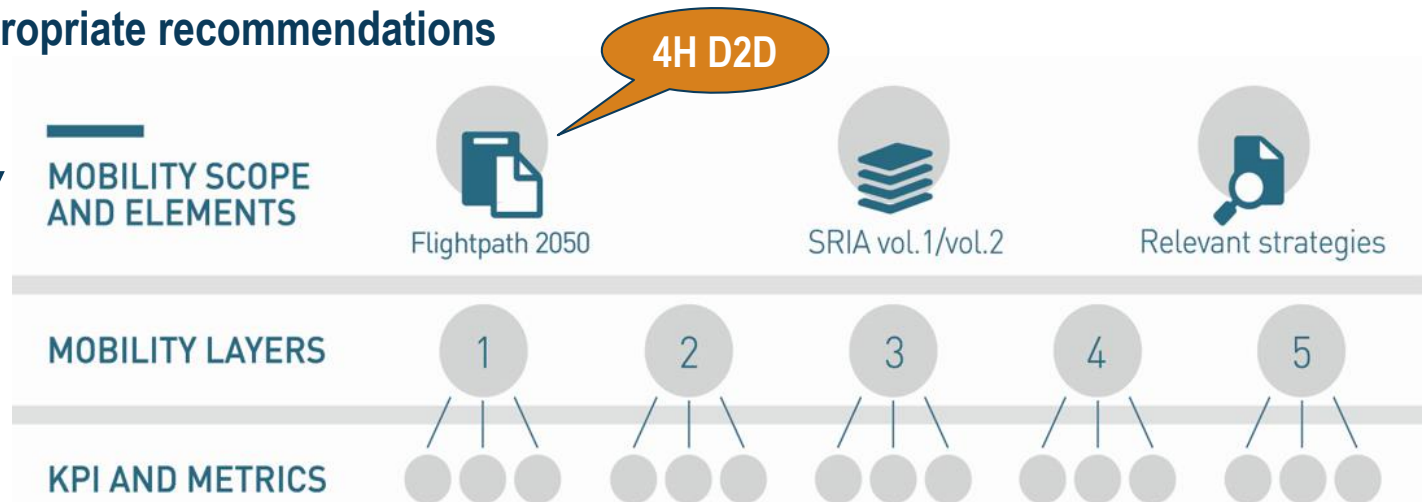
>> Objectives

> qual & quan assessment of impact of research initiatives from last decade on European mobility research – where should future work focus?

> identify current / future gaps and innovation bottlenecks re. mobility goals

> formulate appropriate recommendations

>> Methodology



Challenge in context

Key features of CAMERA (2/2)



>> Performance framework (D2.1)

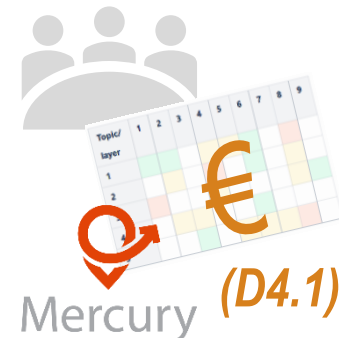
- > 5 mobility layers, new/existing KPIs in each (ICAO KPAs)
 - > customer demand; mobility performance; resilience and reconfiguration; ATM system and performance; mobility supply
- > explicit D2D components (D2K, K2G, G2G, G2K, K2D)

>> Mobility modelling assessment (D3.1)

- > topic modelling: latent Dirichlet allocation (LDA)
- > 40k+ documents, FP7 & H2020, EU Open Data Portal (CORDIS)
- > semi-supervised LDA → 158 'mobility projects' → 9 topics

>> Annual mobility reports (D5.3, 1st)

- > high-level, less technical public reports
- > need special focus on D2D delivery and passenger experience
- > resilience is a particular area that is under-explored



<https://h2020camera.eu/>
<https://tadorea.com/mercury/>

Challenge in context

Dwell time definition

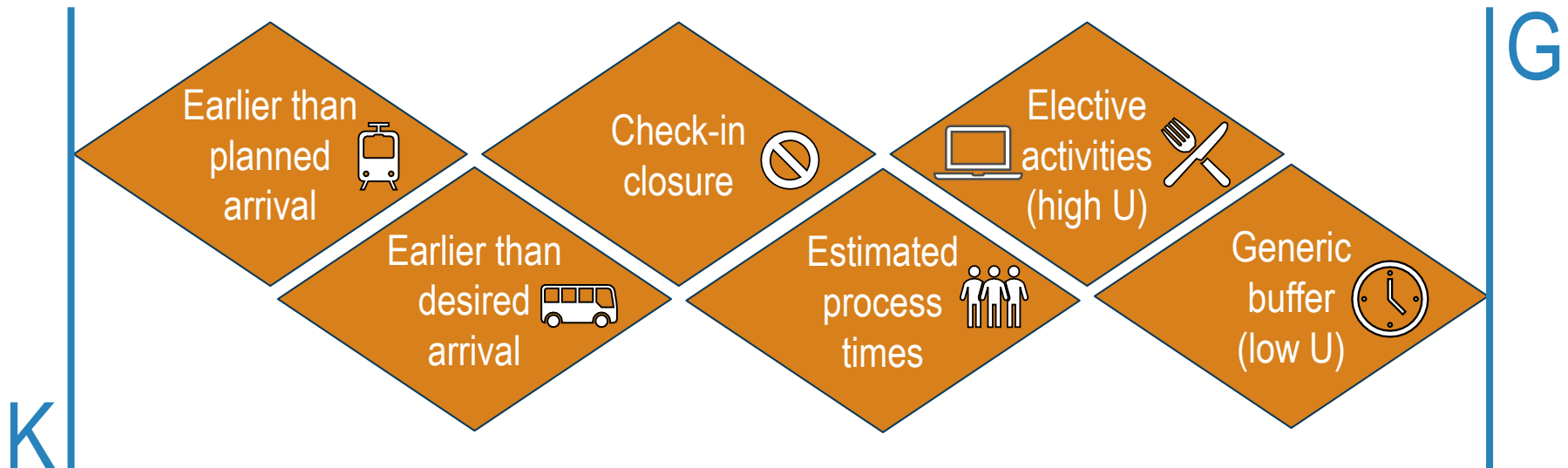


>> Dwell time = K2G

> some variation in metrics used by different airports

>> Different components

> complex definitions, overlaps, mutual dependencies



> typical minima across AOs, LHR–EU: kerb: -2H00 (rec.), check-in: -0H45, gate: -0H20

> travel agents and tour operators may advise check-in closes -2H00, etc.

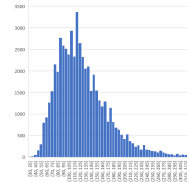
Challenge in context

Data sources and wider model



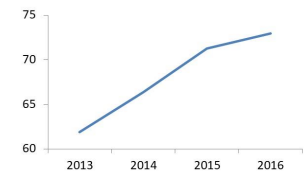
>> Dwell time data source (specific examples)

- > large European hub
- > appx. 200k dwell time records
- > mid-2012 to mid-2017
- > cleaned: outliers etc.
- > filtered out: connecting, extra-European



>> Access time survey separate source (nota bene) (specific examples)

- > appx. 45k access time records (appx. same period)



>> Limited data from other large hubs supports validation (generic model)



Challenge in context

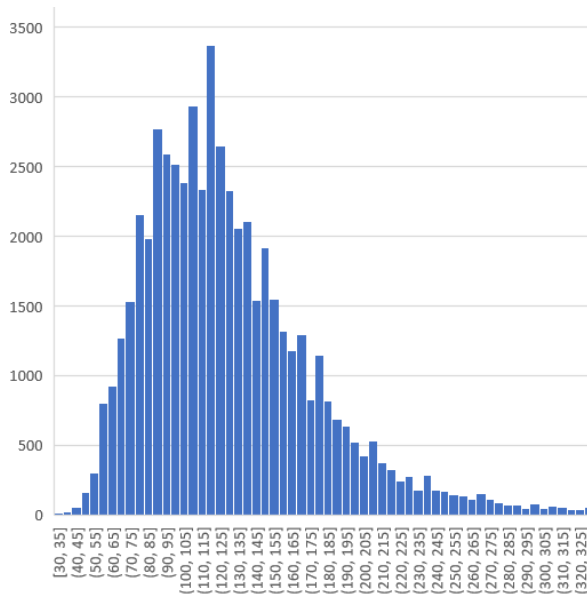
The issue



- >> Average dwell time: 2H15
- >> Average access time: 1H20
- >> Simplistic sum for non-G2G: $1H20 + 2H15 + (0H40) + (1H20) = 5H35$
 - > dwell time = $f(\text{access time, perceived uncertainty, elective activities, non-electives})$



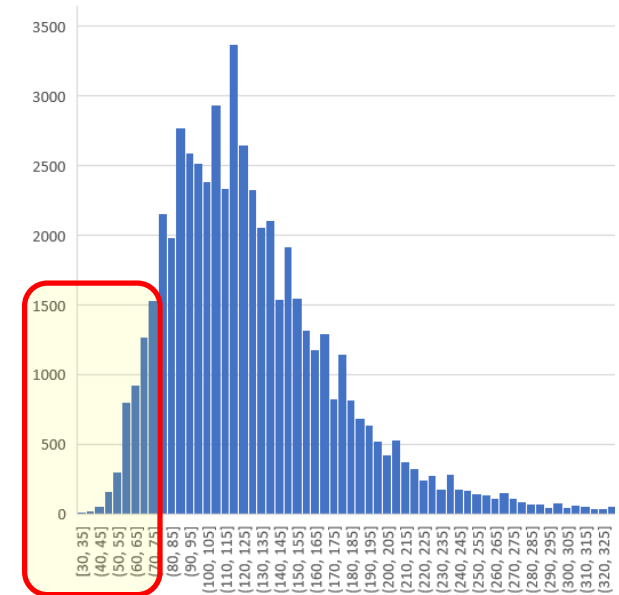
↪ ... $f(\text{access time, frequency of travel, flight duration, ...})$



Connecting c.f. NC pax: +20%
Extra- c.f. intra-European: +40%

Exploring dwell times

Generic no-show rates:	3-6%
Rebooking straw-polls:	
Network carrier, <u>return</u> fares	€170-210
Missed flight, rebook next	€370-<u>760</u>
LCC 'rescue' fees	up to €100
GatwickConnects 'protected connection'	est. €100



Average:	2H15
Median:	2H00
Lower 4.5 percentile:	1H10

'If you've never missed a flight, you're probably spending too much time in airports'
(George Stigler)

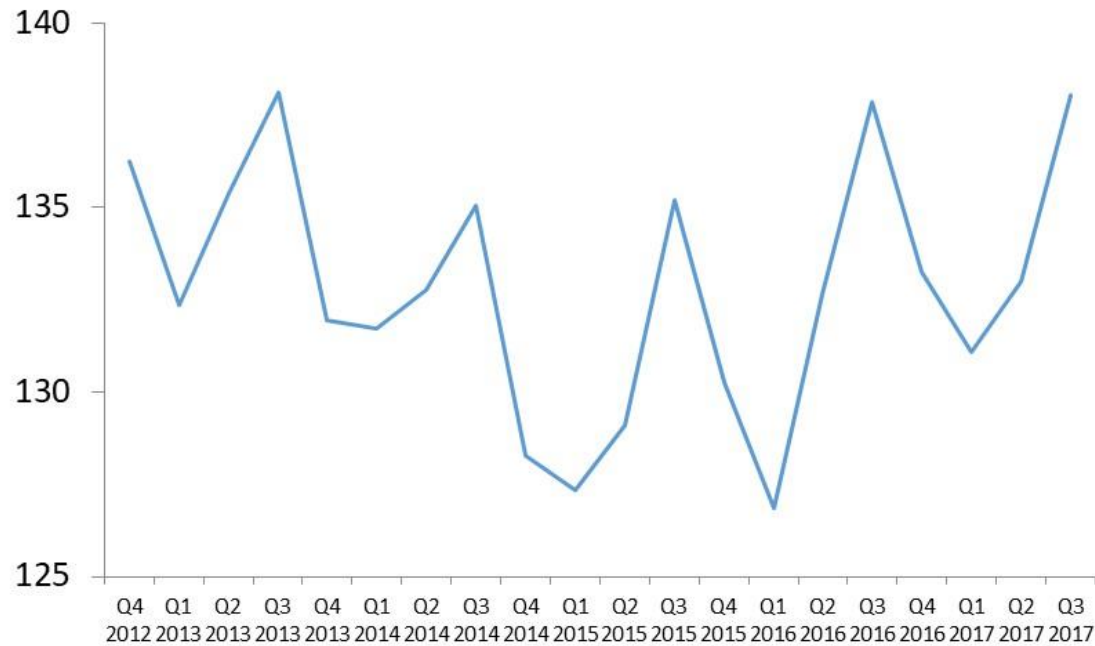
Exit expected utility theory ... enter prospect theory

Exploring dwell times

Trends



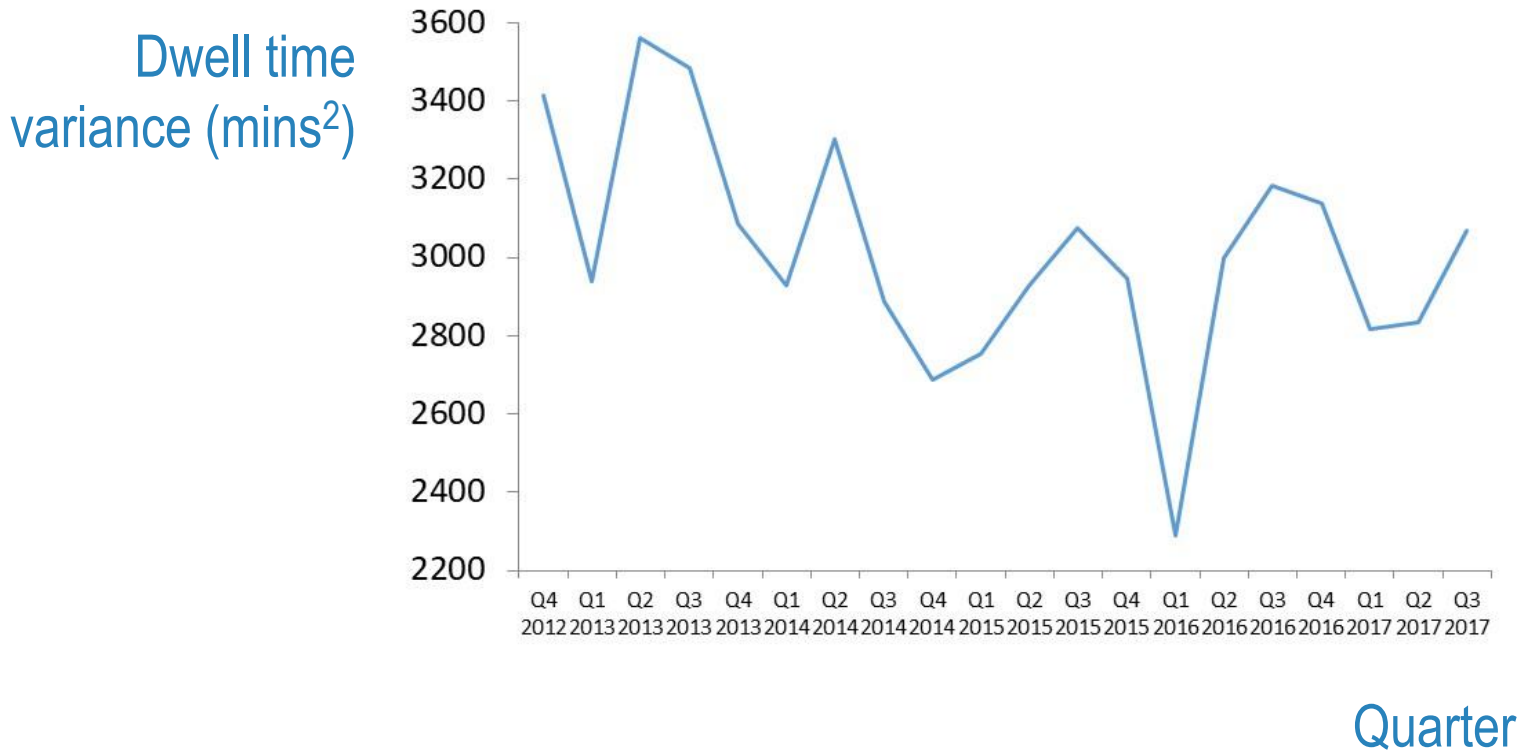
Mean dwell
time (mins)



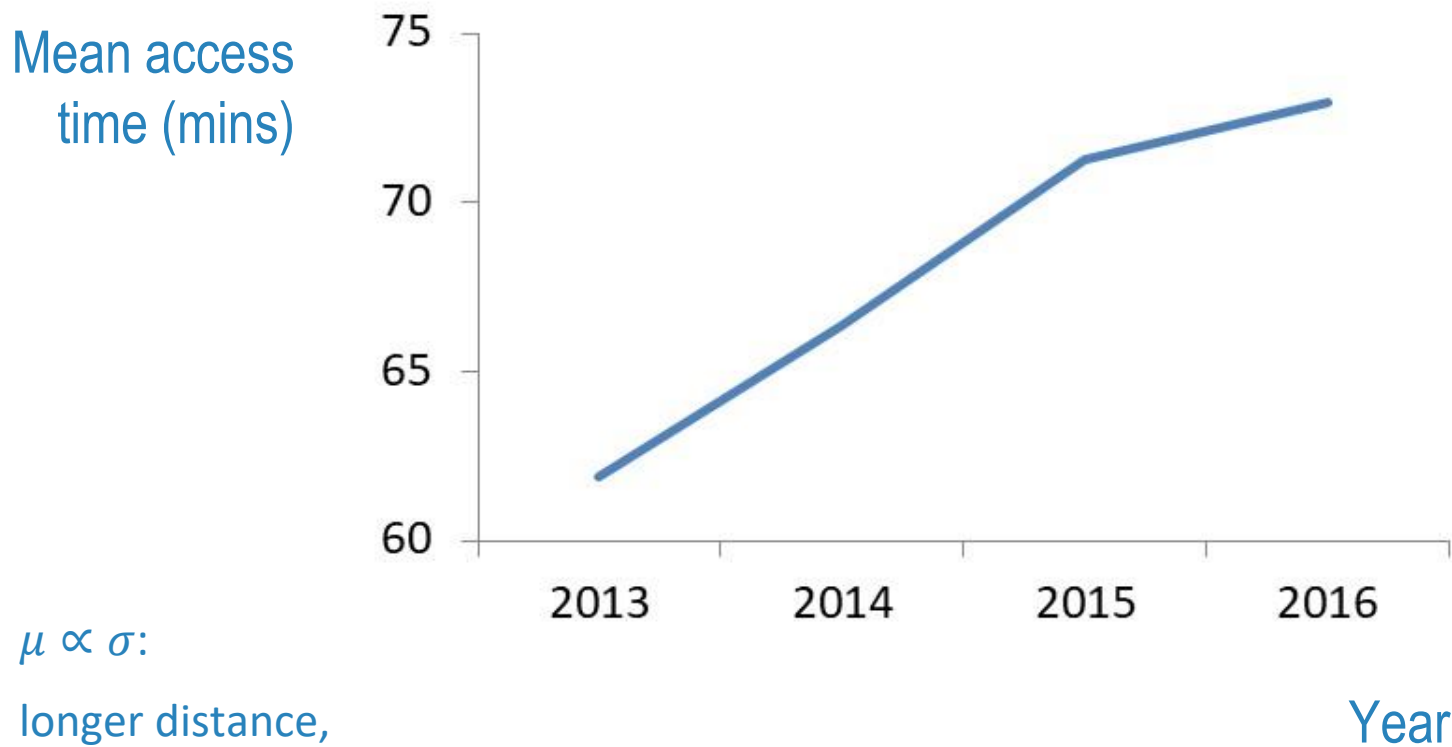
Quarter

Exploring dwell times

Trends



Extra- c.f. intra-European: +30%



$\mu \propto \sigma$:

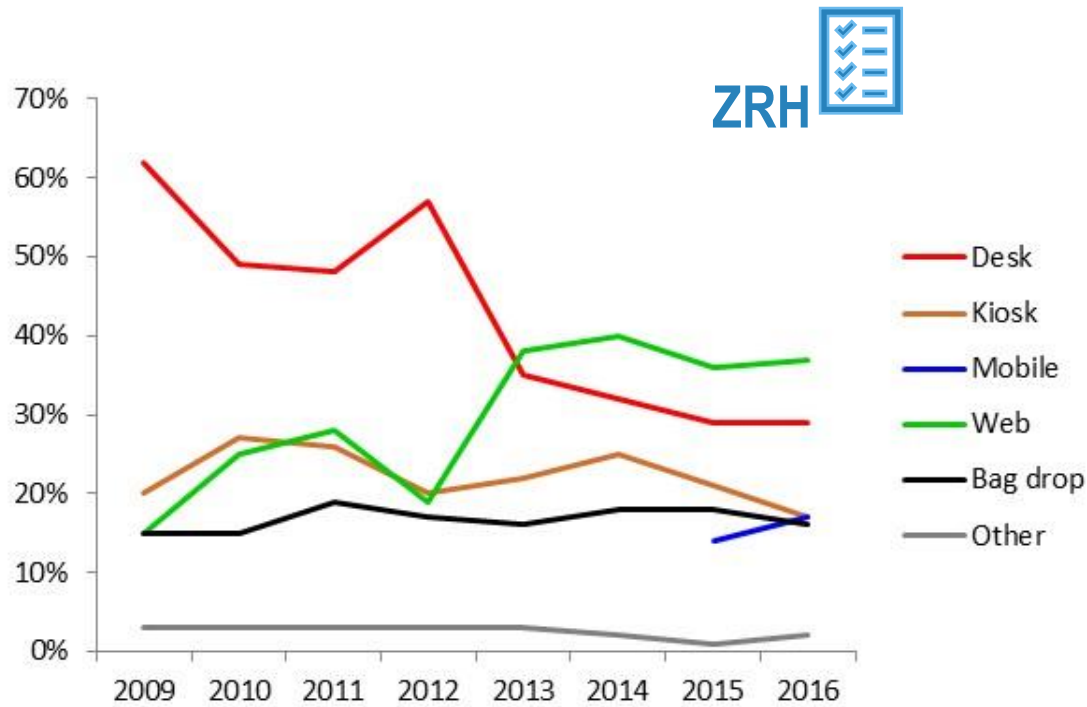
longer distance,
greater uncertainty

Exploring dwell times

Trends



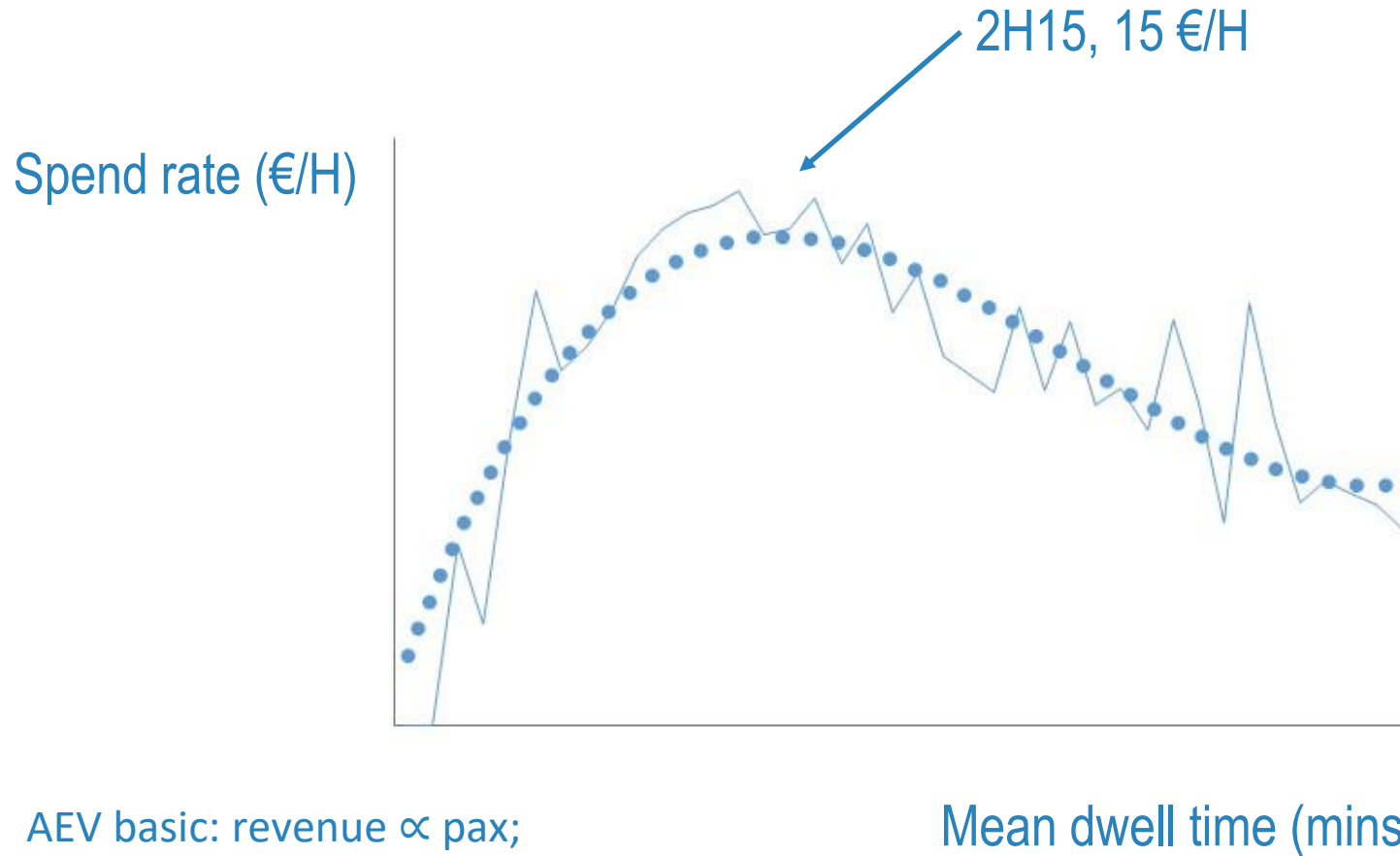
Options used
(multiple)



Year

Exploring dwell times

Relationships



AEV basic: revenue \propto pax;

exploratory: $f(\text{pax}, t_d, t_d^2)$

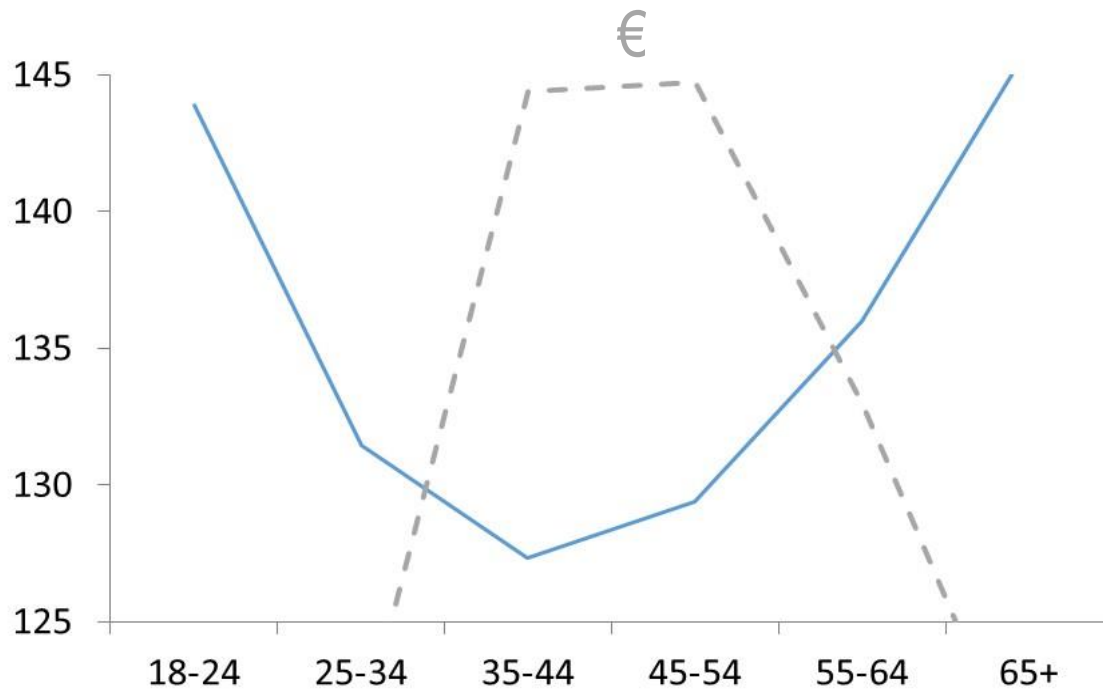
Mean dwell time (mins)

Exploring dwell times

Relationships



Mean dwell
time (mins)



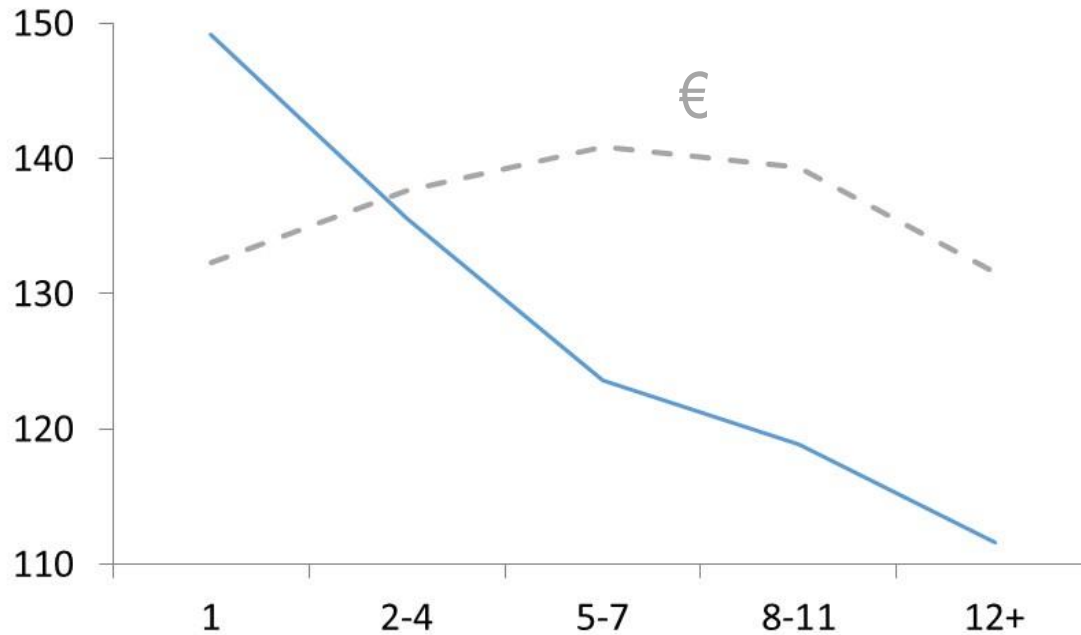
Age

Exploring dwell times

Relationships



Mean dwell
time (mins)



Trips/year

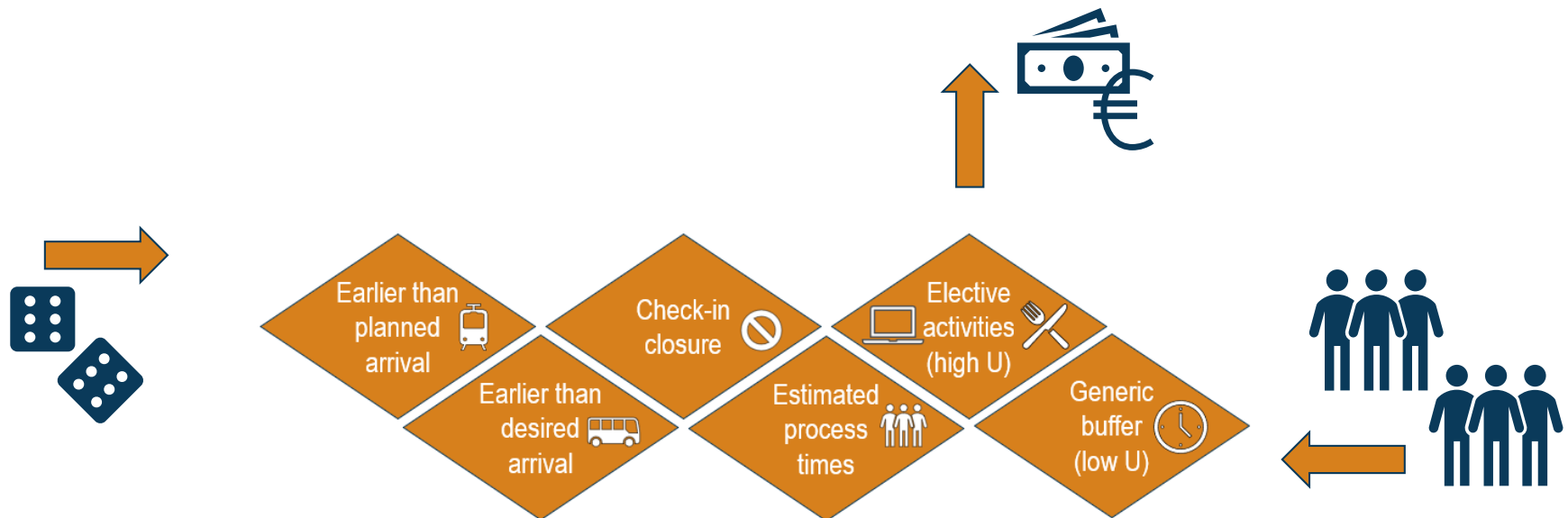
>> The story so far

- > *loss aversion*
- > *no downward dwell time trend yet (although throughput pressure at (larger) airports)*
- > *access times (and uncertainty) not rescuing 4H D2D target*
 - > *future: modal shares? autonomous vehicles? traffic volumes? expansion regulations?*
- > *(K2G) technologies poised (2017-18 data)*

>> Airport business model: effects on spend

- > **ageing population: downward pressure**
- > **decreased frequencies: complex / mixed effect**
- > **decreased dwell times: downward pressure**

Future solutions



Future solutions

Airport business model (1/3)



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Adapt or Die

non-aero, aero: 40%, 55% (appx.)
food & beverage: fastest growing
income category*

"It is not the strongest species that survive, but the ones most responsive to change"

Charles Darwin

documenting how passengers approach the terminal environment to make purchase decisions. What psychological lens do they use, and how can airports work this knowledge to advance non-aeronautical revenues?

behavioral
science
lab

Tomorrow's thinking.™

* Over 11% p/a, albeit from low base of appx. 5% of non-aero sales; all data global. Non-aero share typically higher at LCC-dominated airports.

Future solutions

Airport business model (2/3)

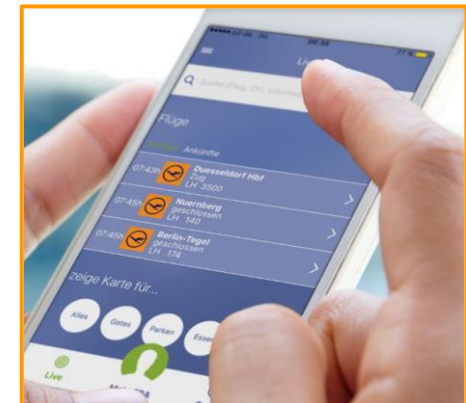


- >>> **Airport preparedness and development**
- >>> **Example: e-commerce implementation, Fraport app**
- >>> **'Omni-channel' functionalities**



- > **order gifts, e.g. en-route to airport: many concessions, any terminal**
 - > 'Reserve & Collect', or delivered to gate (real-time info); also currency
- > **delayed flight, directed beacon technology**
 - > invitation to restaurant with reserved table
- > **buy from concessions, delivered to home**
 - > order groceries from in-bound flight, collect after reclaim

- >>> **Largest shopping complex in Germany**
- >>> **Concessions pay revenue-based rents**
- >>> **Aligned with general on-line retail fulfilment trends**



Future solutions

Airport business model (3/3)



Home ▶ Shops and restaurants ▶ Restaurants A-Z ▶ Pre-order food and drink

Pre-order food and drink at Heathrow

Order ahead and cut the queues

We have teamed up with Grab to offer you a food and drink pre-order service. We are working with a selection of Heathrow restaurants to provide the service via the Heathrow smartphone app. Why not try it for yourself?

Download the app to pre-order food and drink at Heathrow

Minimum system requirements Apple: iPhone 4 and iOS7. Android: Version 5 ("Lollipop").

>> **Fraport not alone**

>> **Focus: targeted sales**

> **less left to chance**

> **'better' use of time**

>> **... and of course airlines**

Services for your trip

From Heathrow (London) to Toulouse on 15 April 2019



Personal Shopping Experience

Book a complimentary stylist-trained Heathrow Personal Shopper for all your treats and gifts

>>> Airline business model

- > maximise yields, maximise profits – but with different load factor (LF) objectives
- > how might increased flexibility be factored into business models, and at what cost?
 - > regulatory intervention: ‘mobility’ capacity reserves ... *buying-up seats*
 - > free market: commercial insurance ... *re-book if miss flight*

>>> Existing intermodal, insurance & ‘flex’ services (e.g.s)

- > ‘Rail&Fly’ such as AccessRail (AMS to QYG in GDS)
- > CIV guarantees (Convention Internationale pour le transport des Voyageurs)
- > Nederlandse Spoorwegen – commercial insurance
- > flexible tickets on network carriers; P2P choices: flexible tickets or rescue fees
- > (GatwickConnects)



>> LCCs: lower fares largely due to very high LFs

> e.g. appx. 90% for easyJet and Ryanair

> e.g. if forced to reduce to 80%, could anticipate fare increase of appx. 12%

>> Network carriers maintain lower LFs (appx. 80%) on intra-European flights

> allow for missed connections & pax with flexible tickets

> later close-outs & more staff supporting disrupted pax

>> Regulatory intervention (buying seats) would distort free market

> disruption to yield management (e.g. cheapest fares up by €30, average fare up by €3)

> inequitable impact on network carriers c.f. LCCs

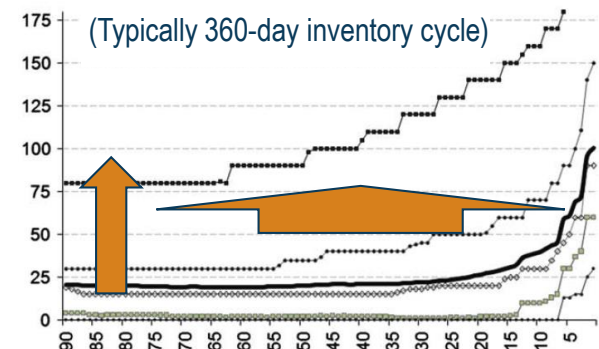
>> Solutions?

> reversion to regulated fares and capacities (!)

> insurance (standard?) linked to PT access zones?

> modal price competition? valid LCC → network carrier?

> no ultimate guarantees (next flight no use to pax?)



Issues for debate

>> *No silver bullet*

- > cost of reducing dwell times c.f. doing nothing?
- > *desirability* of 4H D2D? speed paradigm?

>> *Airport model*

- > how close to turn-up-and-go could work?
- > timeframe for resolving access (uncertainty)?

>> *Airline model*

- > viable option for increased resilience / flexibility?

>> *Further dwell time issues*

- > full intermodal mobility management – KPI trade-offs (e.g. delay)
- > opportunities for further modelling (e.g. factor analysis and behavioural science)



Thank you