



**Imperial College  
London**

# Designing the Next Generation Check-Point with Data

*ADSA14*

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# Highlights and benefit

- *Additive/isolated/component design for security systems remains standard practice but is dated*
- *The future of airport infrastructure is interconnectedness*
- *Data and data systems will permeate all of our infrastructure*
- *Security systems **MUST** become data driven to keep step with the environment in which they operate and handle increased pax loads*
- *We show a mature and proven crowd analytics technology that provides **real-time** passenger movement data for airport operational effectiveness*

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## Catching a Flight? Budget Hours, Not Minutes, for Security

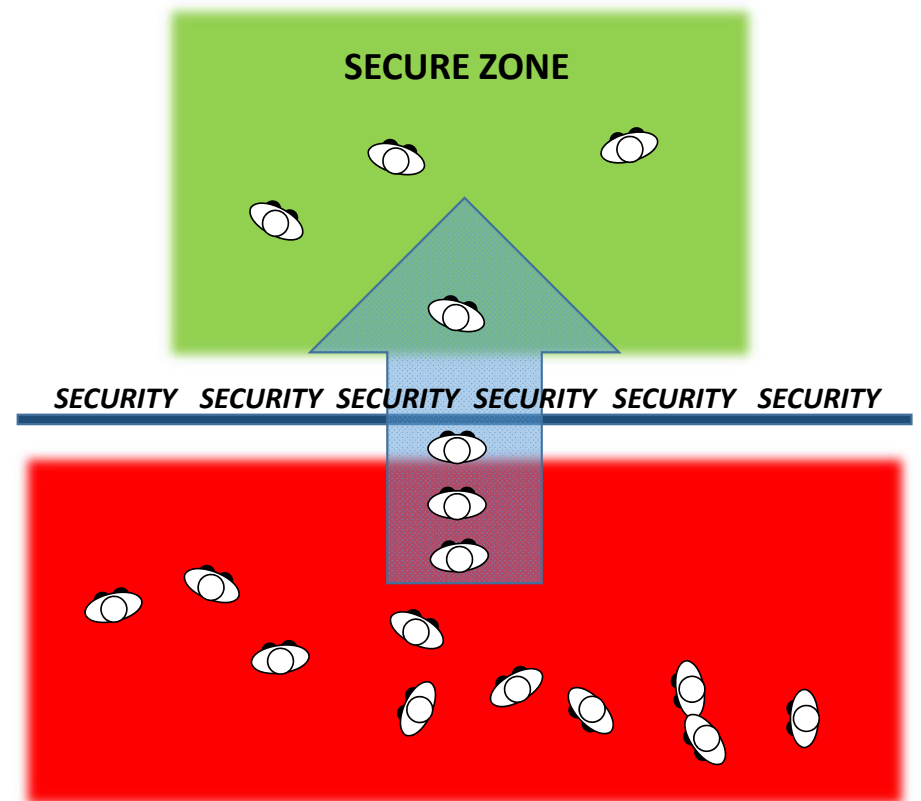
By JAD MOUAWAD MAY 2, 2016      706



Travelers waited in line for security screening at Seattle-Tacoma International Airport in Seattle in March.  
Ted S. Warren/Associated Press

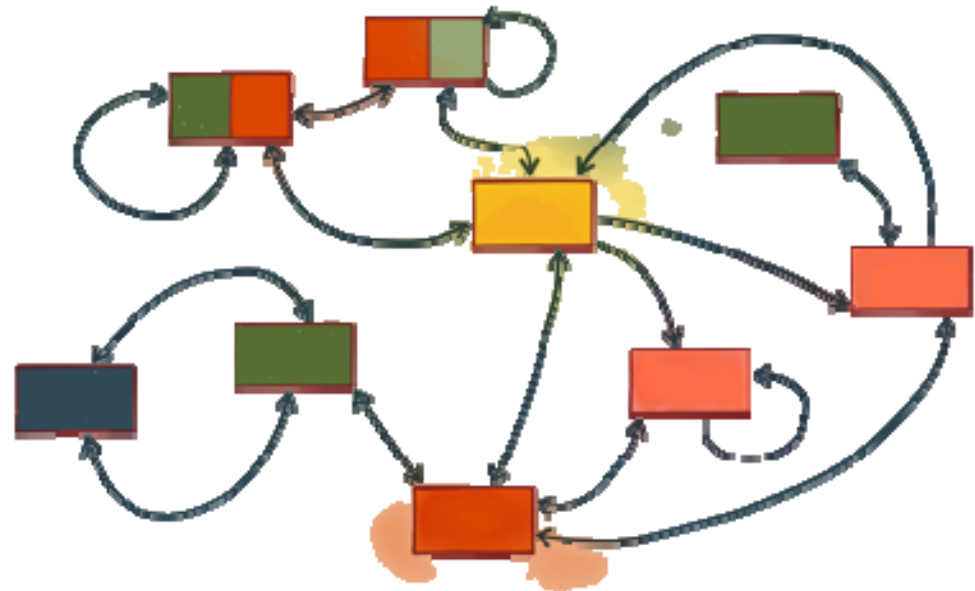
# Isolation architecture – a dated idea

- Some extant security design assumptions
  - What needs to be protected is known and isolated
  - Vulnerabilities and risks are *broadly* understood
  - Effective to draw *a line of security* to separate secure and unsecure zones
  - Data outputs from security technology are *vaguely connected* by operators

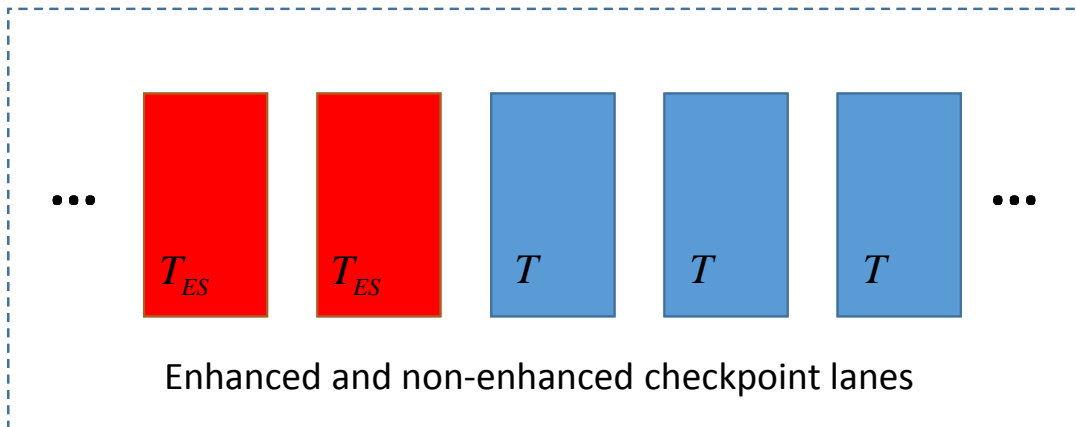
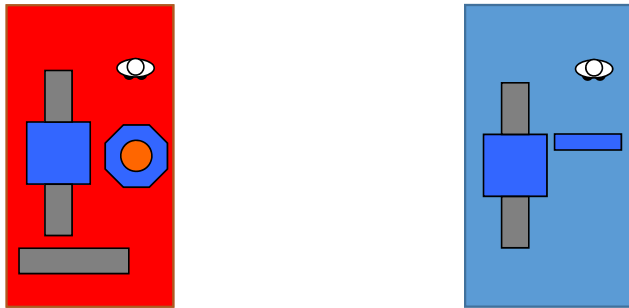


## ... architecture of now ...

- Cyber-physical interconnectivity
- Networks are increasing in physical reach and complexity
- Interconnectivity proving to be transformative
- Decision algorithms combine & correlate **data** and information
- Physical security needs new *focus on data & information in this environment*

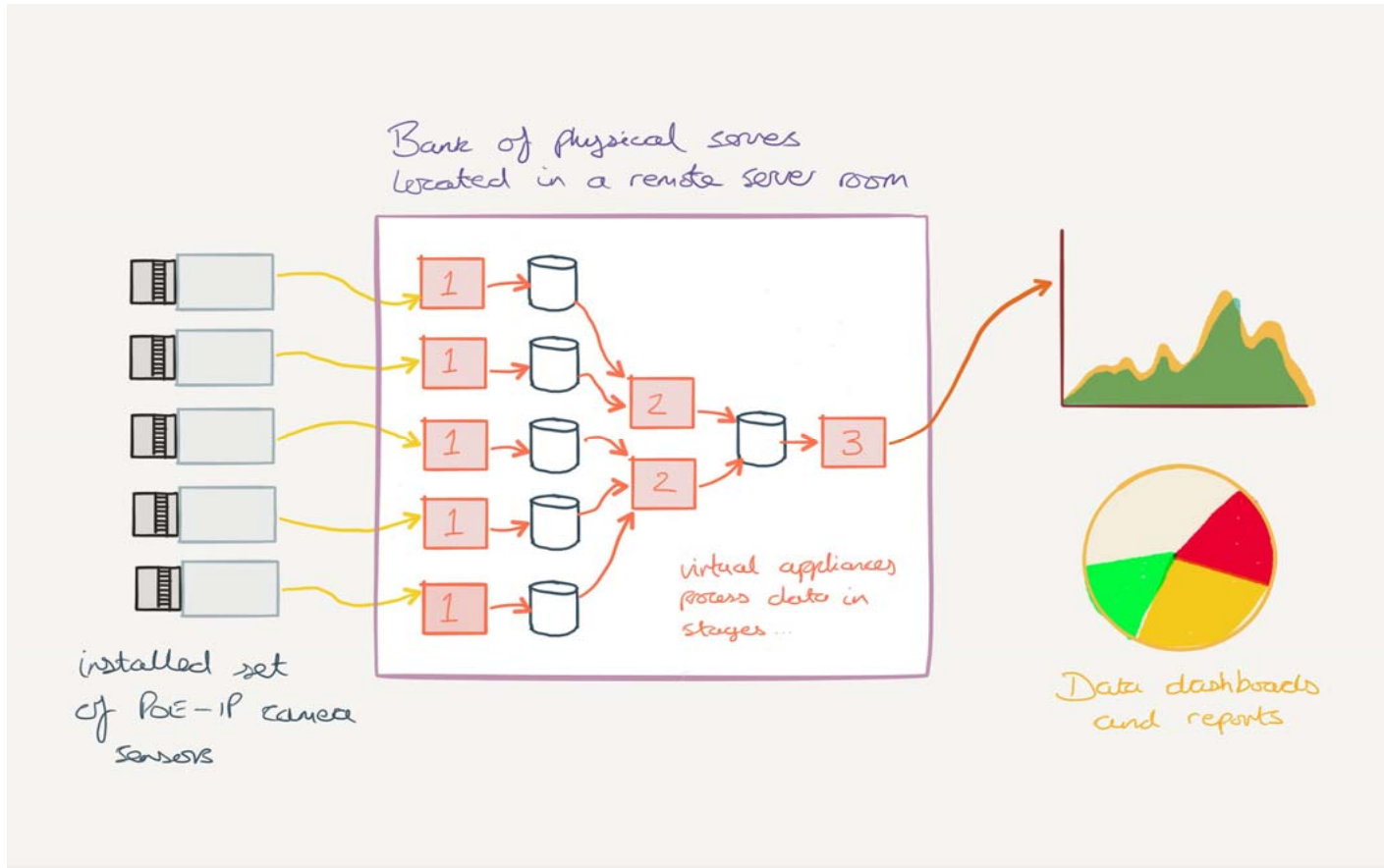


# Data gaps in the checkpoint of the future

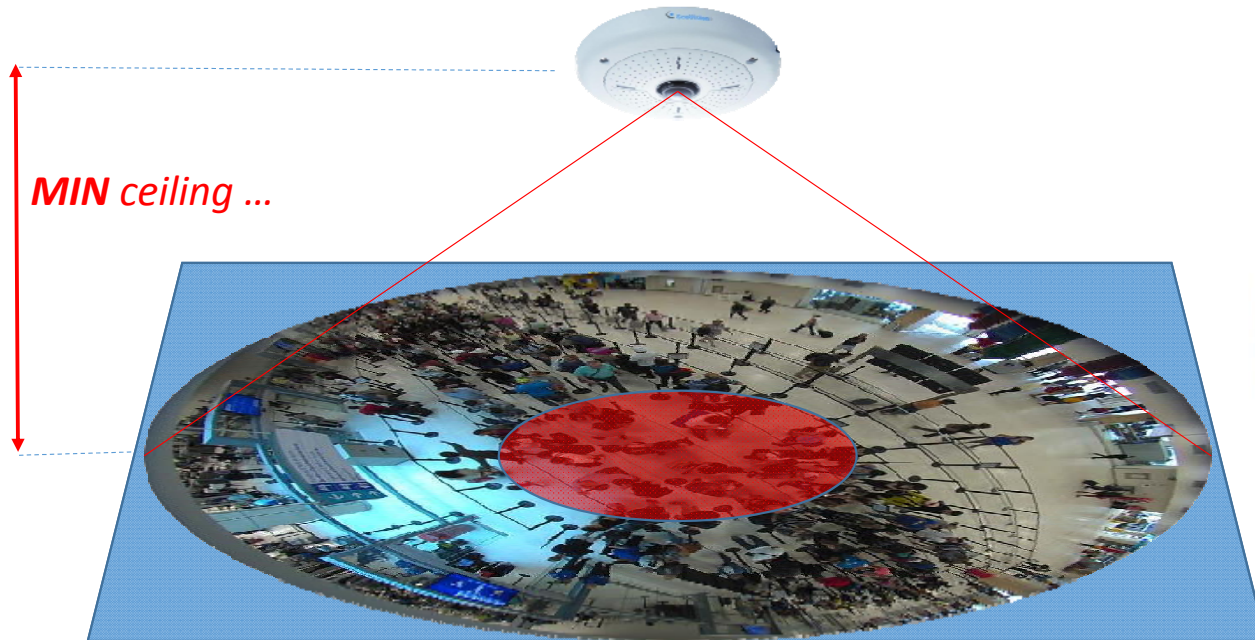


- Mixed modal operation as an example architecture
- Do we understand loading of this system?
- Can we design a system for load variability without security compromise?
- How can we predict how and when to staff this system?
- Can we get **data** to dynamically modify policies in the system?

# Designing a crowd analytics system



# Single sensor *data* ...

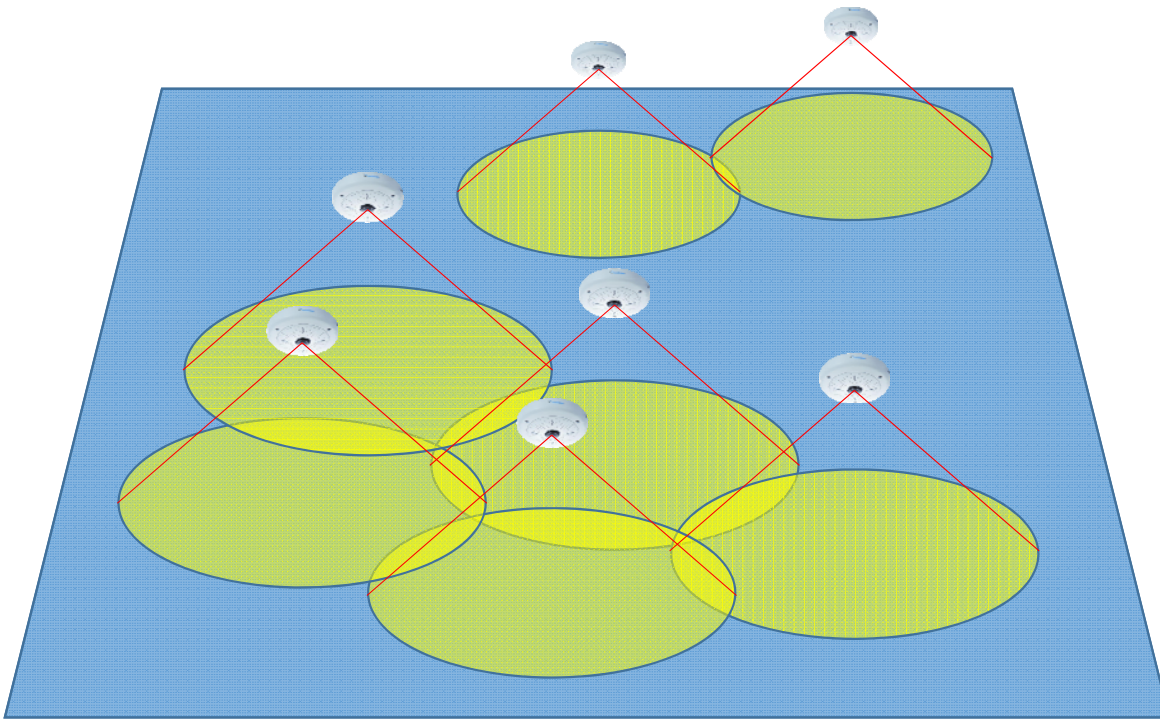


**MIN** ceiling ...

... **MAX** floor  
coverage



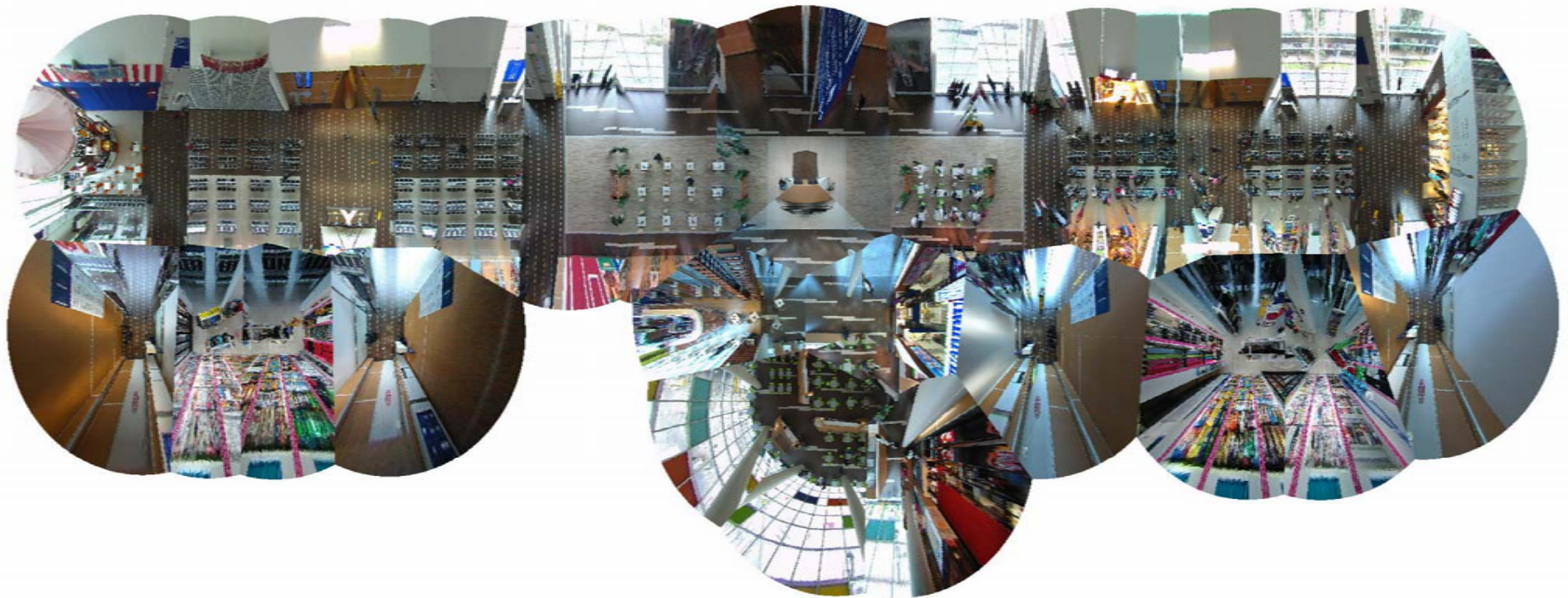
... combined sensor *data* ...



- *Registering* multiple camera views gives *spatial and temporal correlation*
- Using this method we can cover large spaces as though looking through a single synthetic camera
- There is no limit to the size and shape of the monitored zones
- Multiple zones are no problem

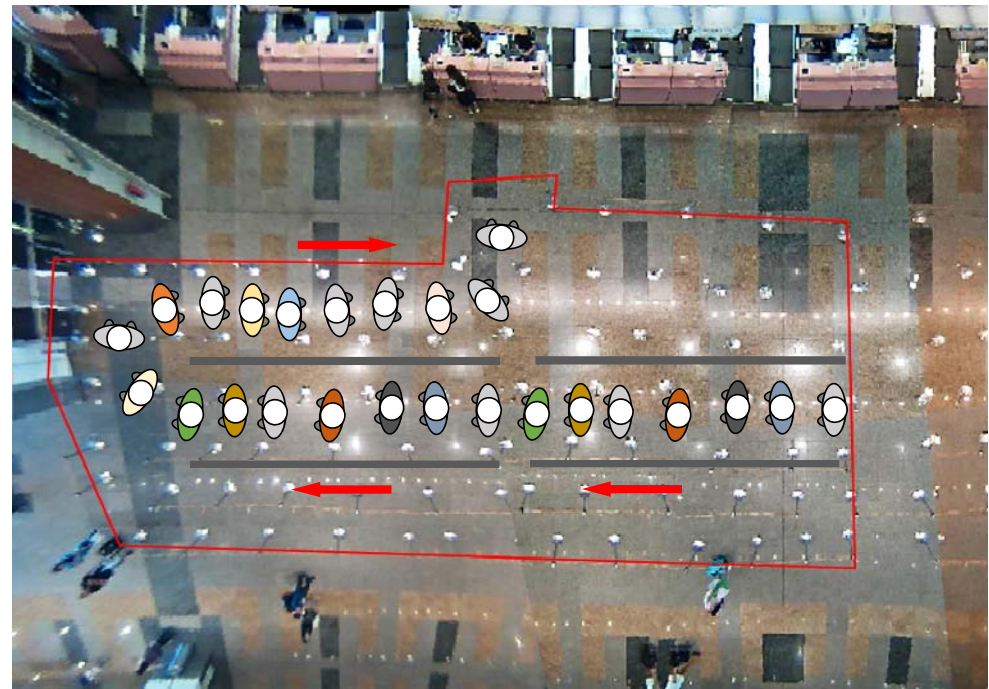


... *big* composite sensor ...

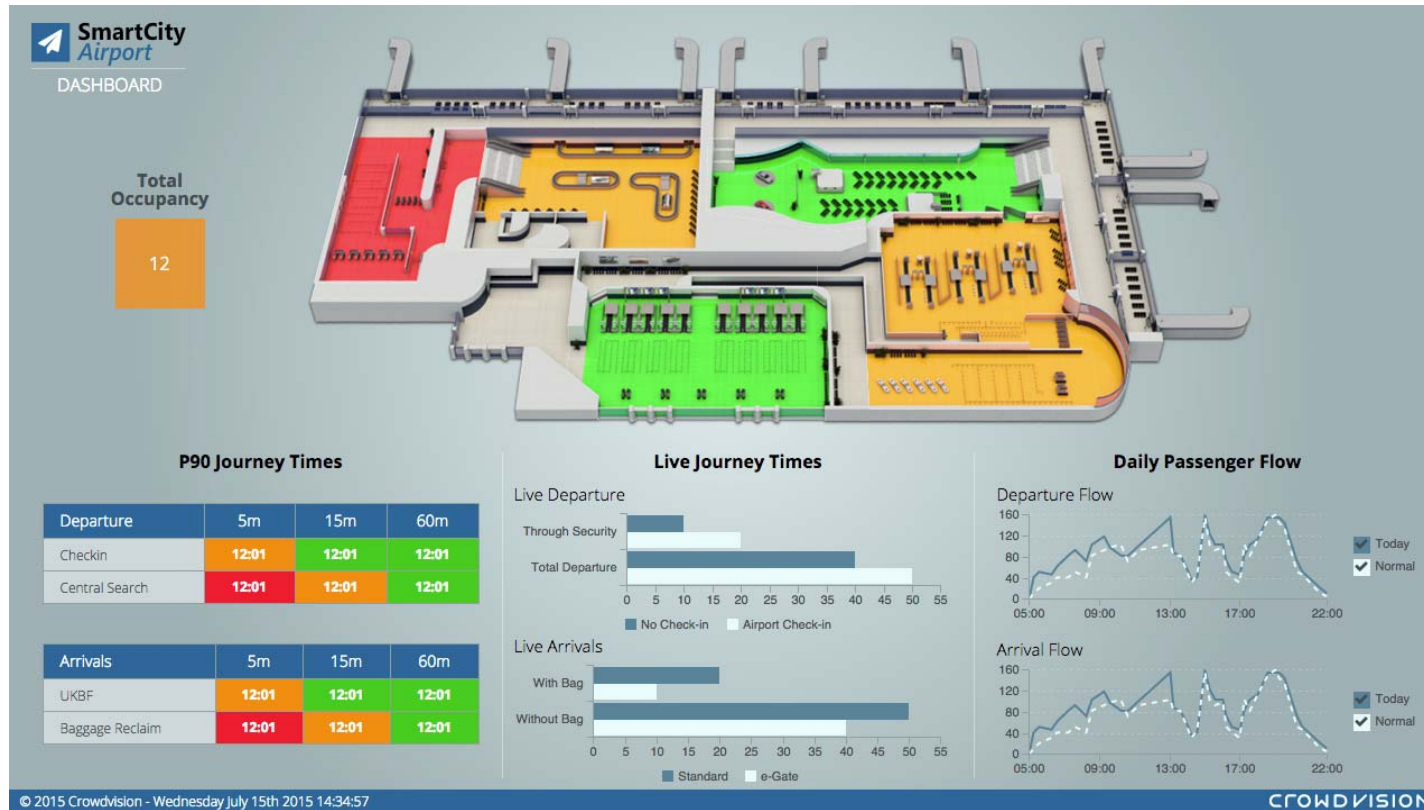


# ... *data-rich* actionable analytics delivered ...

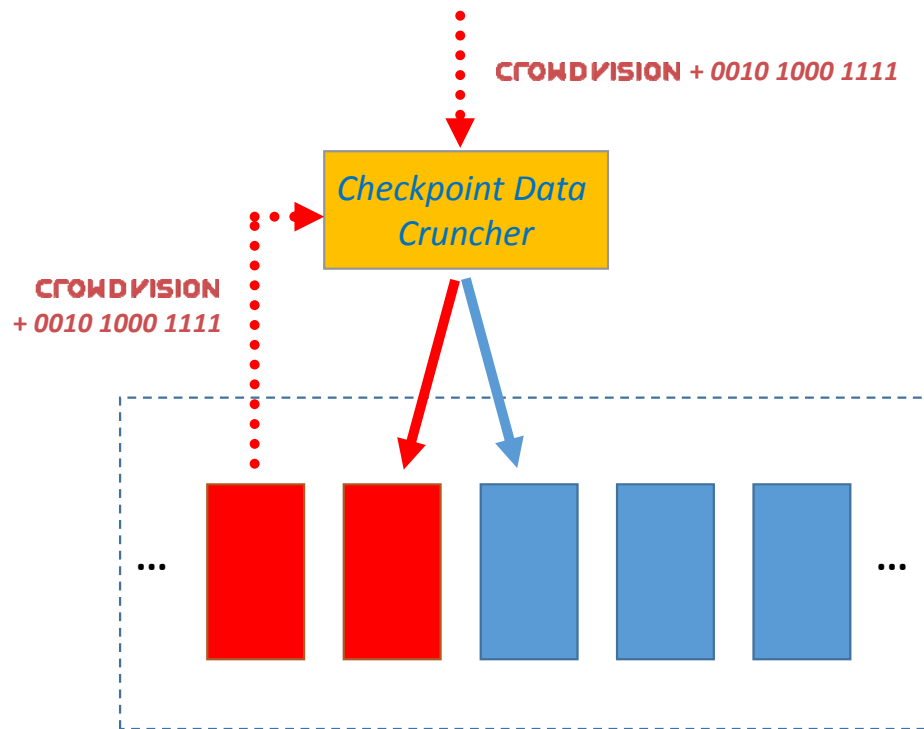
- Queue time and processing rate
- Area occupancy
- Journey times
- Historic trends
- Predictive analysis
- Data → models → data
- ***Second-by-second*** updates



... *data* visualisation



# Outlook: a *data driven* security checkpoint



- Crowd analytics inputs allow dynamic load analysis and performance measurement
- Lane throughput feedback → dynamic *detection* control at lane level
- Pre-prepare checkpoint [*minutes, hours, days, weeks, month*]
- Monitor performance → Effectiveness of current security policies
- Feed prediction models with *real and relevant* data
- Measure impacts of policy changes → zonal, local, regional, national, global
- Monitor the changing nature of the wider airport to drive changes in security policy, processes and technology
- ... *use cases go on*

