London City Airport: Design optimisation to achieve 20 minute “Check-in to Gate” and “Landing to Exit” target. Enhanced capacities within tight footprint with effective utilisation of processes and staffing.

Modelling of the holistic airport functions including check-in, security, retail, arrivals hall and transfer; integrated the retail strategy for the airport within passenger movements.

Buro Happold

SMART Space

Optimising the interface between people and places
SMART Space
Optimising the interface between people and places

We know people. We understand how people behave and interact with spaces. People are at the heart of our design process. Our circulation modelling service helps to define efficient spaces where people feel comfortable and secure but are also able to achieve bottom line results for clients operating in commercial environments. We use modelling to assess the interaction of people with buildings, processes, and environments. This provides an evidence based approach with powerful results – to assess performance of designs and operations so they can be optimised.

Space is a rare commodity today. Maximising what we have is crucial to success and longevity. The benefits of our work can be far reaching and range from improving human productivity and contributing to wellbeing to achieving cost savings, maximising revenues and minimising operational management. Places are nothing without people and people are nothing without places: our work seeks to integrate the relationship between the two.

We use sophisticated simulation tools e.g. SMART Move – our in-house software – and commercial tools like Legion, Exodus, and CAST. With realtime simulation capability our BIM-integrated tool SMART Move can help optimise the spaces and processes during early stage design as well as operational planning stages.

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SMART Urban Spaces

Our connection and relationship with our environment defines the places we inhabit. Understanding the human factors that shape our world is a powerful tool. Our modelling and analytics are invaluable in the creation of vibrant public spaces.

- Pedestrian flow simulations
- Site-wide and city-wide modelling
- Network analysis of urban streets
- Transport and parking strategies
- Wayfinding and accessibility
- Crowd-traffic interactions
- Risk assessments / optioneering
- Emergency planning for major events
- Dashboard for realtime data visualisation

St Giles Circus, London:
Venue and event management support to mitigate congestion issues near the new Tottenham Court Road station in central London.

Makkah Masha’er Masterplanning:
Integrated crowd-traffic modelling assessment of 28km pedestrian corridor for 5 million Hajj pilgrims from Makkah to Arafat.
Before a journey even starts, a passenger’s airport experience begins. From small operations to international hubs, our experts create environments that encourage return visits, increase loyalty and generate greater revenue opportunities.

- Terminal design and capacity assessments
- Passenger flow modelling
- Airport layout and process optimisation
- Baggage, vehicular and logistics flow analysis
- Check-in, security and immigration flow analysis
- Retail layout optimisation
- Baggage reclaim layout and sizing
- Transport links and drop-offs
- Escalators, stairs, lift sizing
- Fire evacuation modelling
- Phasing and buildability studies to minimise disruption to passengers

**London City Airport:**
Design optimisation to achieve 20 minute ‘Check-in to Gate’ and ‘Landing to Exit’ target. Enhanced capacities within tight footprint with effective utilisation of processes and staffing.

**New Baku Airport:**
Optimisation of the circulation spaces within the whole terminal right from car park and drop-off areas to all passenger areas in departure and arrivals.
SMART Healthcare

Care, value and elegance epitomises our approach to healthcare building design; placing people firmly at the heart of our solutions. Improving patient and staff experience, balanced with creating more for less for stakeholders, is reached through our holistic approach to problem solving. We go beyond assumptions and use evidence based solutions to deliver optimal designs for this diverse occupant environment.

- Patient, staff and visitor journey analysis
- Layout and process optimisation
- Wayfinding strategy
- Stairs, corridors and lift sizing
- Supply logistics modelling
- Pinch point assessments
- Travel distance optimisation
- Fire evacuation
- Audit of hospital flow and process efficiency
- Dashboard for realtime flow monitoring

Queens Hospital Romford:
Study to improve A&E patient waiting times. Mapping current journey patterns to identify bottlenecks and optimise Triage and RAT (Rapid Assessment Treatment) processes. Input to business case to evaluate reconfiguration and capacity expansion options against expected increase in patient numbers.

A major orthopaedic hospital in London:
Major savings in corridor width and bed-lift capacities by optimising design for predicted journey and activity patterns.

Buro Happold SMART Space
SMART Rail Interchange

Complex environments where space is of a premium and passenger comfort and safety a priority, raises a number of challenges. Our advanced simulation and real world scenario planning tools help us assess the pinch points at transport hubs and design solutions accordingly.

- Station design and capacity assessments
- Passenger flow modelling
- Drop-offs and links to multi-modal transport nodes
- Ticketing and validation strategy (turnstiles/gateways)
- Platform, stairs, escalator, corridor and lift sizing
- Testing of wayfinding strategies
- Retail layout optimisation
- Staffing and operational guidance
- Design compliance review against international design standards

Haramain Makkah-Madina High Speed Rail Stations:
Conceptual design development of multiple state of art stations with a focus on improving passenger experience. Rapid optioneering of design, operational and population parameters.

Cardiff Central Station:
Optimised the Masterplan design as well as the wayfinding, signage and queue management during busy events e.g. egress from 80,000 capacity Millennium Stadium.
SMART Sports Stadia

Sports stadia and arenas thrive on capacity crowds who arrive, circulate and depart across a relatively short space of time. Understanding the requirements of each venue and what makes a positive visitor experience is essential in designing and operating world-class venues.

- Circulation design and capacity assessments
- Ingress, egress and internal flow analysis
- Transport drop-offs and security
- Sizing of turnstile/gate, concourse, vomitory, gangway
- Stairs, escalators, lifts and corridor sizing
- Design guideline compliance

- Testing of wayfinding strategies
- Accessibility to transport nodes
- Crowd flow surveys and evacuation modelling
- Toilet and concession analysis
- Operational planning for special events
- Audit and improvement of circulation efficiency

Lord’s Cricket Ground:
Masterplan design support to enhance capacity from 26,000 to 40,000. Major crowd flow survey to capture arrival and departure profiles, flow patterns during breaks, etc.

Sochi Winter Olympics Stadium:
Detailed design optimisation for diverse modes of the stadium operations (Olympics, FIFA World Cup, and Legacy modes).
SMART Museums

No longer purely archives, museums are commercial ventures that require efficient space planning to ensure retail opportunities are maximised, comfort/accessibility is addressed and facilities are easy to find. Our experts do just that through their sophisticated analysis and modelling techniques.

- Circulation design for visitors and staff
- Space planning for masterplanning and design development
- Journey analysis to enhance throughputs and footfalls
- Process and staffing analysis (e.g. ticketing, guidebooks, retail)
- Exhibition layout optioneering and optimisation
- Wayfinding strategy
- Crowd flow surveys
- Fire evacuation analysis
- Operational management and planning for special events

Wellcome Collections London:
SMART Space informed the reconfiguration, capacity expansion and management measures to mitigate major congestion issues for this prime London museum.

Louvre Abu Dhabi:
Optimisation of spatial layout and entrance processes. Maximising visitor comfort within design constraints by informing staffing levels and procedures for security, reception, ticketing, cloakrooms and guidebook sales.
SMART Theatres

In competition with other entertainment forms, an evening at the theatre must leave visitors with a positive memory and encourage loyalty. Enjoying a drink and finding seats with ease are just part of the way we can help theatre custodians provide a high quality cultural experience to their clients.

- Circulation design for visitors and staff
- Integrated space planning and sizing (stairs, escalators, doors, gangways)
- Interval flow analysis (bars, toilets, kiosks)
- Ticketing and queuing strategies
- Foyer sizing
- Bar layout optimisation (including pre-order provisions)
- Surveys to capture data and highlight bottlenecks
- Audit and improve circulation efficiency

First Street Cultural, Manchester:
Modelling and implementation of simple operational measures to mitigate congestion issues throughout this major cultural venue in Manchester.

Expo City, Cairo:
Design layout optimisation of a multi-purpose convention centre for 5,000 delegates and an exhibition space of over 60,000 capacity.
The environment in which we learn has an enormous influence on our performance. Circulation design and space provision integrate seamlessly with lighting and environmental control to provide optimal teaching spaces that are efficient and congestion-free.

- Spatial layout optimisation for schools and university buildings
- Space planning for masterplanning and detailed design
- Classroom and faculty travel distance optimisation
- Stair, corridor and entrance sizing
- Congestion modelling and pinch point assessments
- Timetable advice
- Landscaping advice (hard-play areas)
- Classroom usage analysis
- Dining area layout optimisation

Thomas Deacon Academy: SMART Space saved a potential 70% of stair widths and over 40% corridor space by optimising the layout and operations.

Image: Buro Happold / Robert Greshoff
The global workplace of the future needs to be flexible and responsive to the needs of its users. To attract and retain the best talent, a working environment must be inspiring and stimulating. Our studies provide the knowledge to create productive sustainable offices.

- Office layout optimisation
- Design with flexibility and efficiency
- Movement modelling
- Space utilisation analysis
- Activity and collaboration modelling
- Social network analysis to improve interactions
- Meeting room usage analysis
- Survey to audit bottlenecks and improve flow
- Meeting room usage analysis
- Lift usage, café queues and corridor flow analysis

**SMART Workspace**

**Project Floyd:**
Activity and flow modelling for workspace and collaboration areas.
SMART Labs

Our meticulous approach to designing our environment beyond physical fabric supports the ethos and rigour applied in many scientific laboratories. We help shape cutting edge facilities with complex needs by integrating our services to deliver efficient and sustainable solutions.

- Science lab layout optimisation
- Site-wide space planning (labs, circulation, dining, meeting etc)
- Activity and collaboration modelling
- Operational management
- Space utilisation analysis
- Social network analysis to map interactions
- Equipment utilisation optimisation

A major orthopaedic hospital:
Entrance space and circulation layout optimisation by mapping of activities, flow and bottlenecks.
SMART Logistics

Managing flows, whether it’s people, goods or resources, is at the heart of most commercial operations. Through our modelling and analysis, the complexity of logistics can be simplified and solutions developed to solve problems.

- People, vehicles and supplies modelling
- Construction logistics flow analysis
- Process mapping and optimisation
- Time motion surveys to identify process bottlenecks
- Spatial visualisation of performance
- Warehouse layout optioneering and optimisation
- Dashboard for realtime flow monitoring

London 2012 Olympics
Media Hub:
Integrated modelling and optimisation of transport drop-off, parking and security.

Gatwick Airport Pier 6:
Integrated modelling of baggage, passengers and vehicular traffic.
SMART Events

Global mega events are now commonplace. Huge volumes of international visitors must be managed as part of any major event strategy. From big picture to minute detail, our experts can provide the specialist data and advice required to ensure the smooth and safe running of highly respected events.

- Crowd management planning
- Crowd flow modelling
- Design development support
- Operational planning
- Pinch point assessments
- Emergency evacuation
- Risk assessments
- Transport and parking strategies
- Concessions and retail advice
- Crowd flow surveys

Swiss National Day event, Basle:
Crowd flow advice to Swiss Police on the gathering of over 100,000 people for the National Day fireworks. Detailed survey and assessments of flow rates, pinch points and densities.
We work closely with our clients to provide a good night’s sleep for their residents. Guest expectations are paramount in this competitive sector and our skills enable hoteliers to run cost-effective, flexible and comfortable buildings.

- Circulation space optimisation
- Lobby and lounge space design
- Wayfinding strategy
- Vertical transportation to residential floors
- Check-in and check-out queue optimisation
- People flow surveys
- Fire evacuation
- Planning for conferences and events

**Jabal Al Kaaba, Makkah:** Major masterplanning support to optimise the circulation and lobby spaces, lifts and bus and car parks for over 20,000 Haj pilgrim residents.

**Palace Hotel, New York:** Time motion study for an exhaustive analysis of the holistic flows to inform the redevelopment plans of the hotel.
The decision to buy or not to buy is often determined by the mood and behaviour of shoppers. By improving the layout, quality and ambience of a shopping environment, allows retailers to improve their chances of selling and providing retail therapy.

- Retail layout optimisation
- In-store to site-wide journey mapping and analytics
- Cost per square foot space modelling
- Wayfinding and line of sight analysis
- People counting surveys to monitor footfalls and dwell times
- Transport and parking strategy
- Food court and toilet location optimisation
- Accessibility assessments
- Escalators, stairs, corridors and lift sizing
- Fire evacuation modelling

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SMART Retail

**Retail Mall Zibo:** Saved 5.5m stair width from a total 18m by informing and optimising a fire evacuation strategy in this major shopping mall with over 5,000 capacity.

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**SMART Counter:**
Automated measurement of retail flows and dwell times in shopping malls and airport retail.

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**Buro Happold**
SMART Counter

**SMART Space**
SMART Move is our state of art visual simulation tool to analyse the flow and interaction between people, spaces, and processes, with a view to optimising them. It brings together the strengths of spatial analysis and agent-based simulation technologies to offer a fast, flexible and visual tool, with significant functionality for rapid testing of complex movement scenarios. Its intuitive drag-and-draw interface, integration with BIM, real-time feedback, and rapid sensitivity analysis capability make it a unique tool for early stage design optioneering as well as operational planning.

SMART Move capability is complemented by our team’s powerful data capturing and analysis methodology for the understanding of population behaviours and movement patterns. We have developed SMART Counter software that allows rapid analysis of video data to generate statistical information on walking speeds, queuing behaviour, service times, limiting flow rates, etc. This data can be superimposed on a circulation network to obtain visual flow paths and congestion maps.

SMART Counter: Our in-house tool SMART Counter uses sophisticated video image processing, Kinect and Bluetooth sensing to enable automated people counting and dwell time assessments.
About Buro Happold

Buro Happold is a practice of problem solvers working in the built and natural environment tackling the hardest issues that are most relevant to buildings, cities and strategic plans. After 35 years in the industry we have never lost our desire to be challenged, our passion for creativity and our sense of adventure. We know that building a place with a future involves creating strong communities that enable economies to thrive, engaging with society’s big issues and enriching people’s lives.