

The background of the entire page is a photograph of a modern office interior. In the foreground, two people are walking past, their figures blurred to suggest motion. In the middle ground, a group of four people is gathered around a long wooden table, engaged in a meeting. One man is seated with a laptop, while a woman stands and points towards a framed picture on the wall. In the background, another person is walking. The office features large windows, several cylindrical pendant lights, and a tall indoor plant. The floor is made of light-colored wood.

PEOPLE FLOW PLANNING AND CONSULTING SERVICES

Max WONG, KONE Elevator (HK) Ltd
BEng(Hons) MSc
CEng MCIBSE MHKIE RLE REE RPE

What is the People Flow?

People flow means people moving smoothly, safely, comfortably, and without waiting in and between buildings.

- Ease of movement
- Effectiveness of transport choices
- Great user experiences



The world's cities are growing

By 2018, the number of cities with at least 1 million inhabitants had grown to 548 and in 2030, a projected **706 cities will have at least 1 million residents.**

By 2030, urban areas are projected to house **60% of people**

People Flow in city streets and buildings is evolving

our lifestyle is changing

Changing use of buildings – flexibility and adaptability play a key role

Ease and convenience – seamless experience increasingly important



Due to changes in lifestyle, the lines between living, working and entertaining blur.

The background image shows a bright, modern office space. In the foreground, a man in a patterned shirt and khaki pants walks while looking at his phone. In the background, several other people are working at desks with computers. Large windows let in natural light, and there are decorative spherical pendant lights hanging from the ceiling. A grey sofa with colorful patterned pillows is visible in the lower right foreground.

In today's world,
we all expect a fluent
user experience.

Different user groups need to be considered



EMPLOYEE



VIP



VISITORS



SERVICE
PERSONNEL



DELIVERY
PERSONNEL



PEOPLE WITH
RESTRICTED
MOBILITY

What does good people flow look like?

Quick and secure access



Effortless navigation



Lack of congestion



Clear guidance and timely information sharing



Fewer bottlenecks



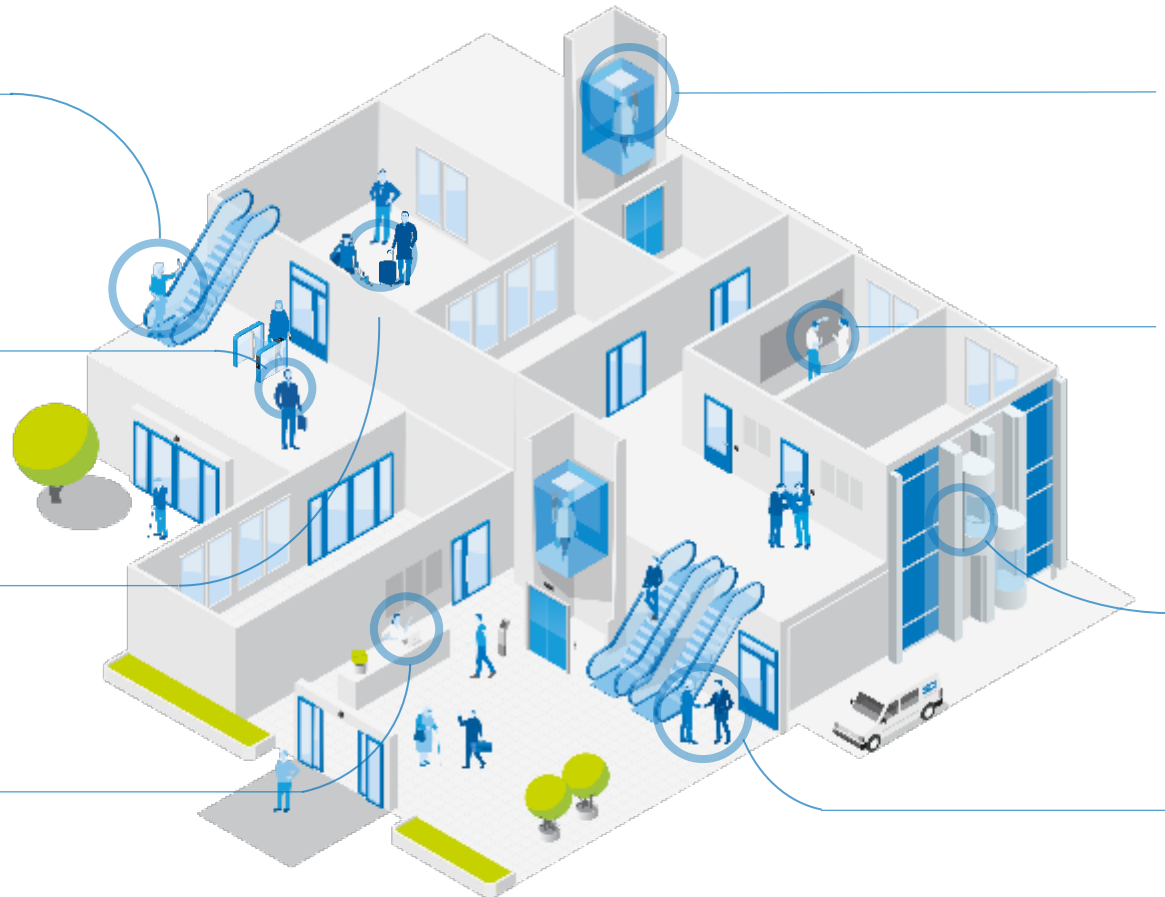
People flow is performing well



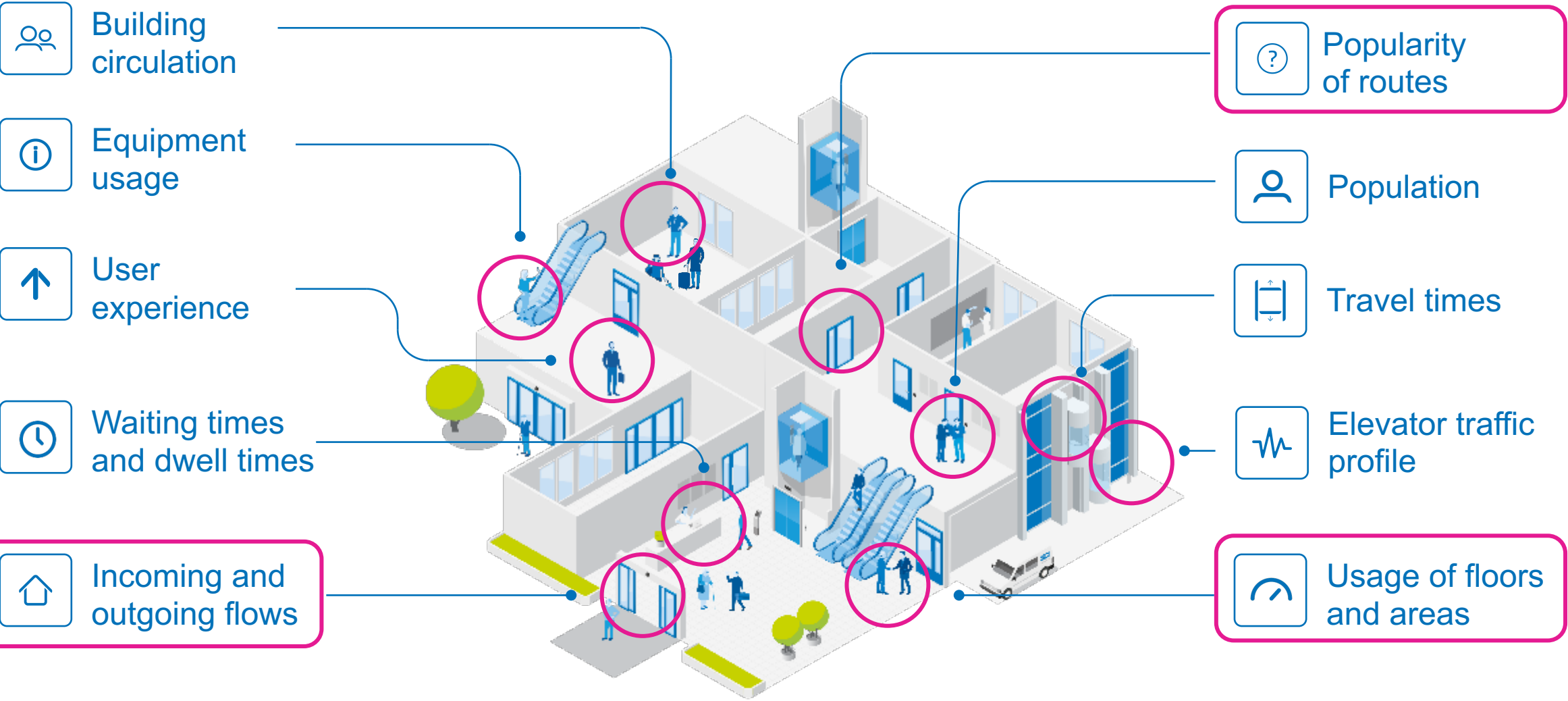
Shorter travel times



No cross-flows



How do we measure the flow of a building?




Traffic patterns are unique in every building



Morning up-peak  08-09.00

 09-10.00

 08-10.00

Mid-morning peak 



 10-11.00

Lunch peak 

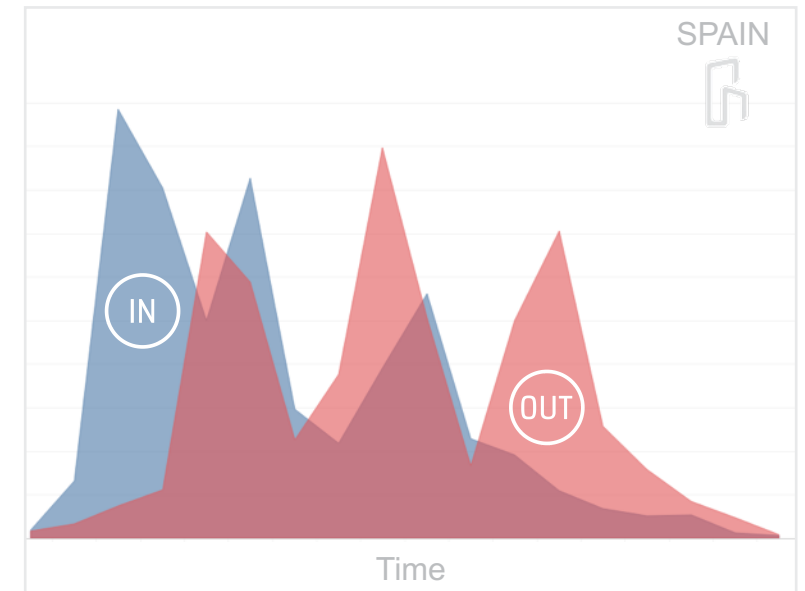
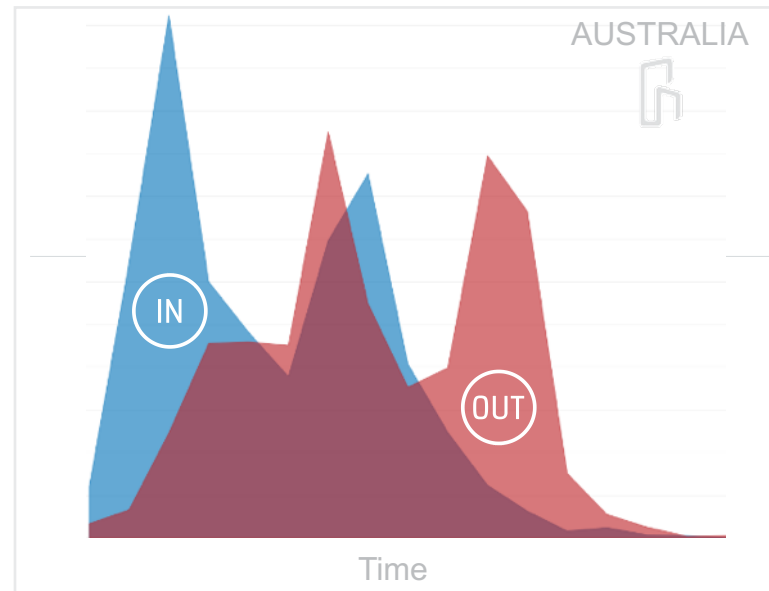
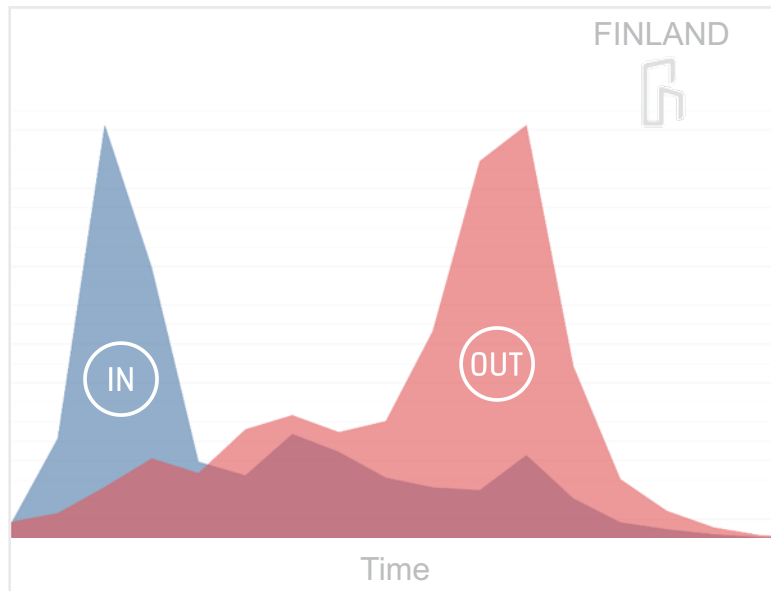
 12-13.00

 13-15.00

Evening down-peak  15-17.00

 16-17.00

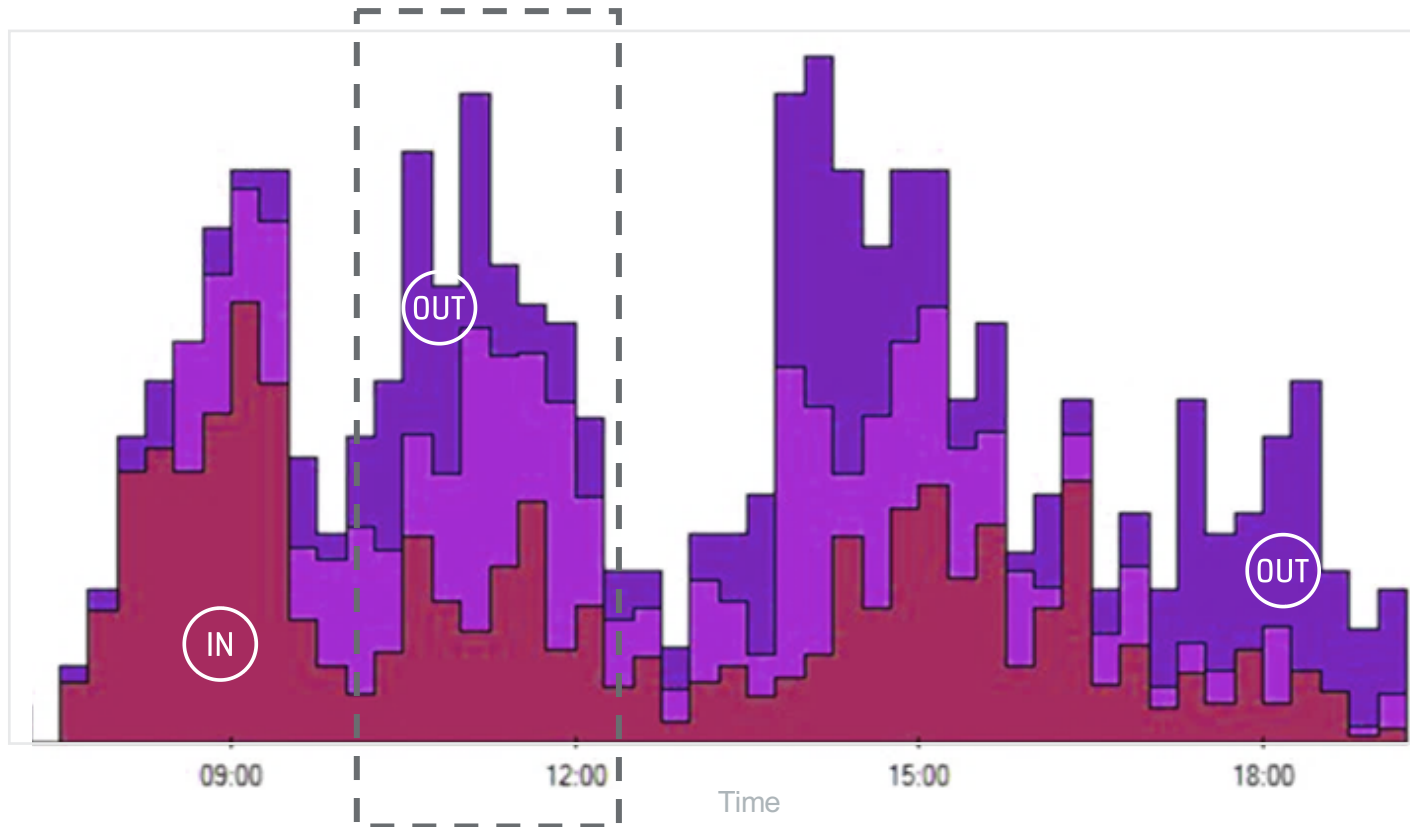
 17-19.00



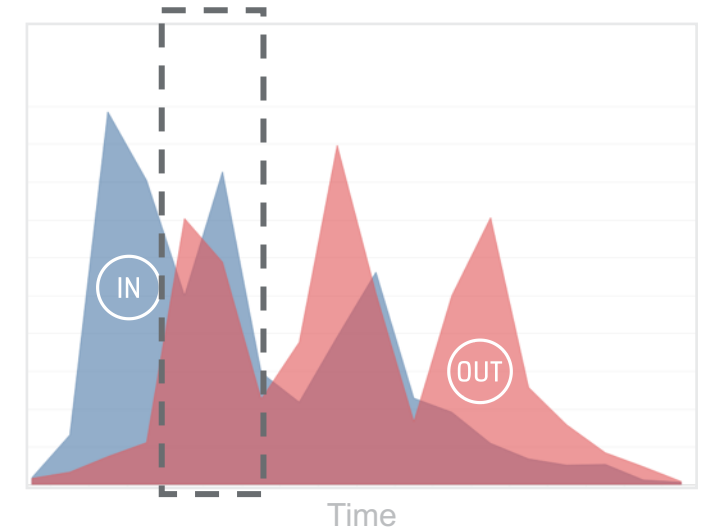
Vertical traffic profile of the building shows the type of traffic at different times of the day



Elevator traffic profile



Incoming and outgoing flows



- Leaving the building
- Interfloor
- Entering the building

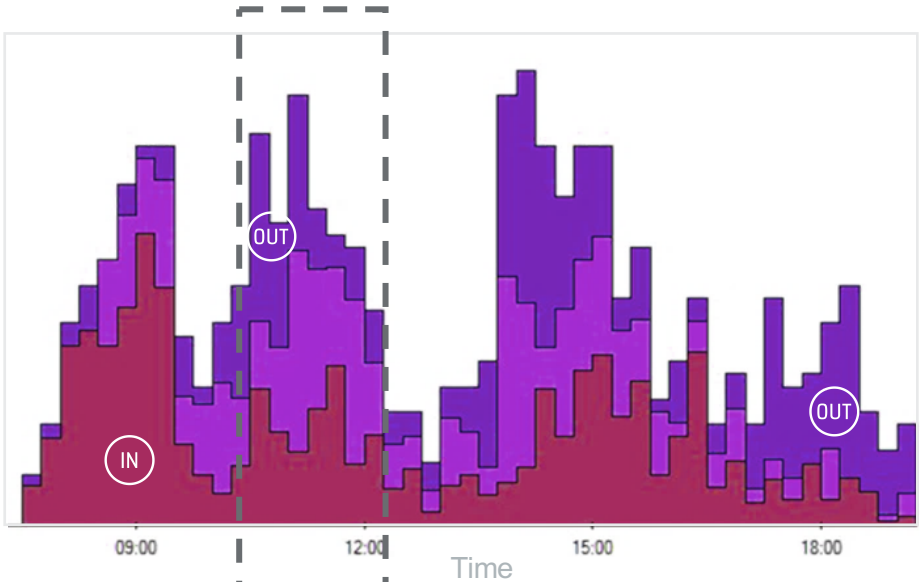
Building circulation is a holistic view on indoor traffic



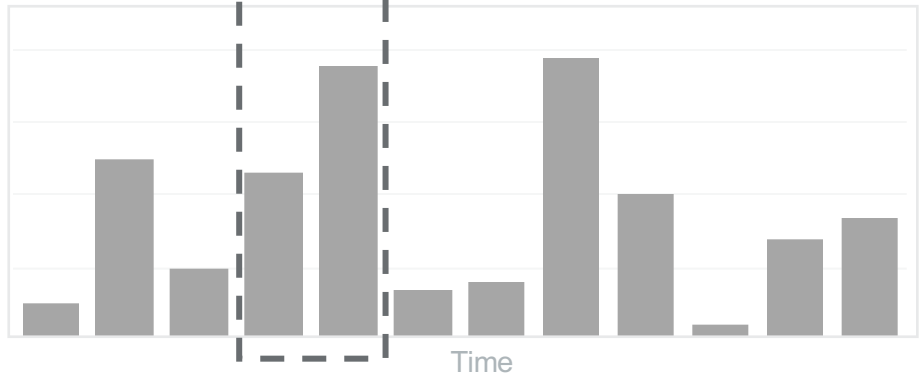
Building circulation



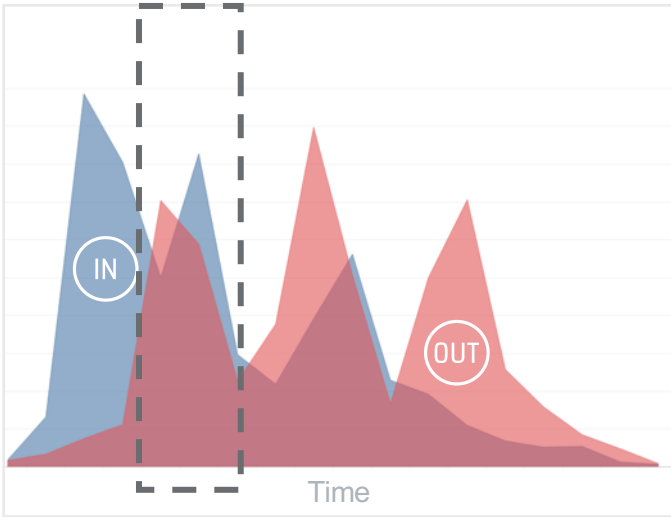
Elevator usage



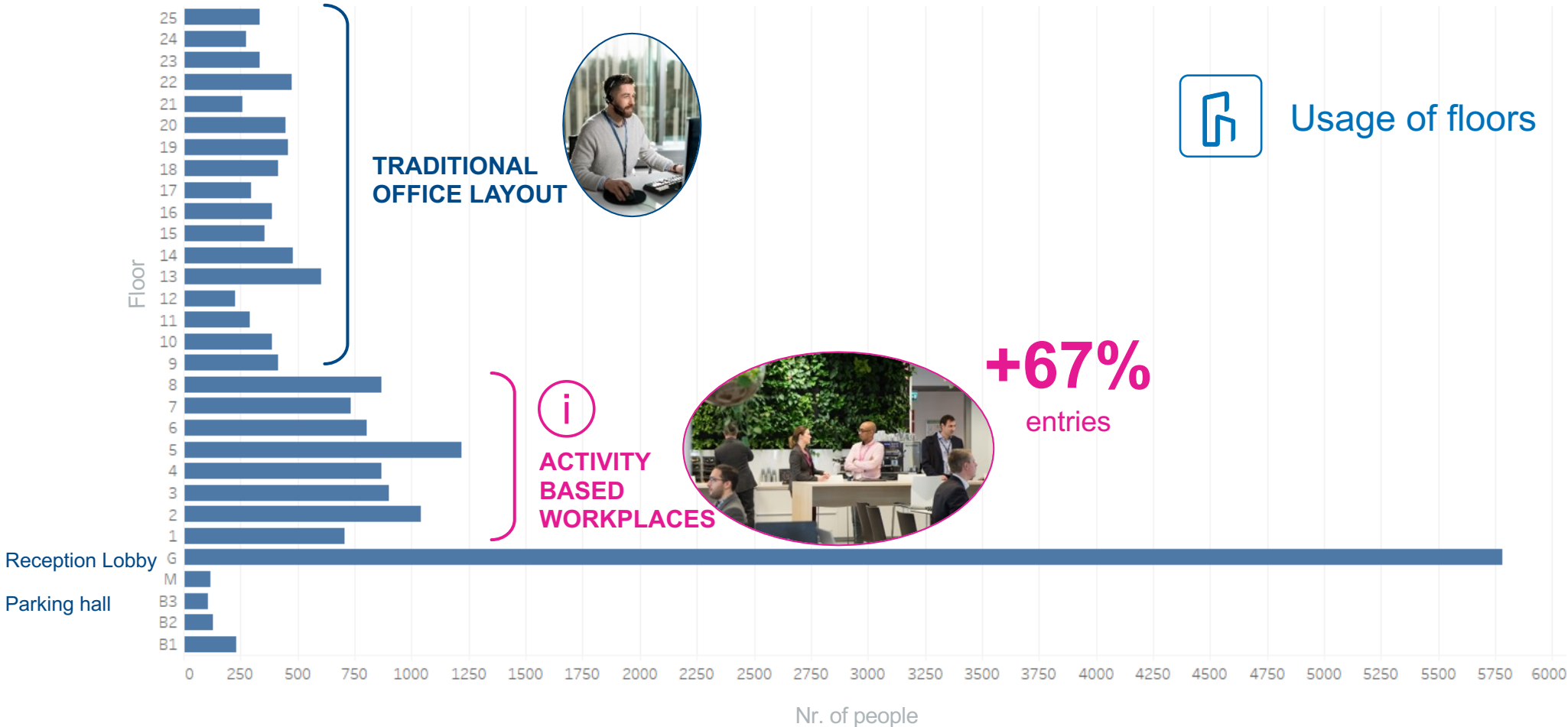
Stair usage



Incoming and outgoing flows



By measuring the flow on floor level we can discover changes in building usage



Data-driven design



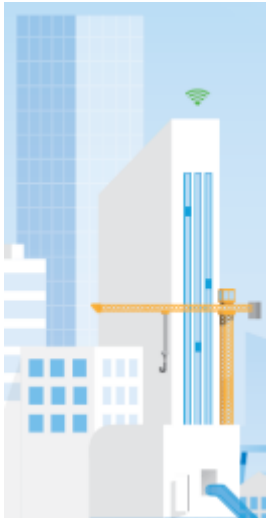
Human behaviour is hard to predict –
you need to observe and measure it

How can you understand people flow in your building?

When to do it?

Planning a new building

- New construction



Changes in your Customers lifecycle

- Tenant leaves
- New tenant moves in
- Regulations change



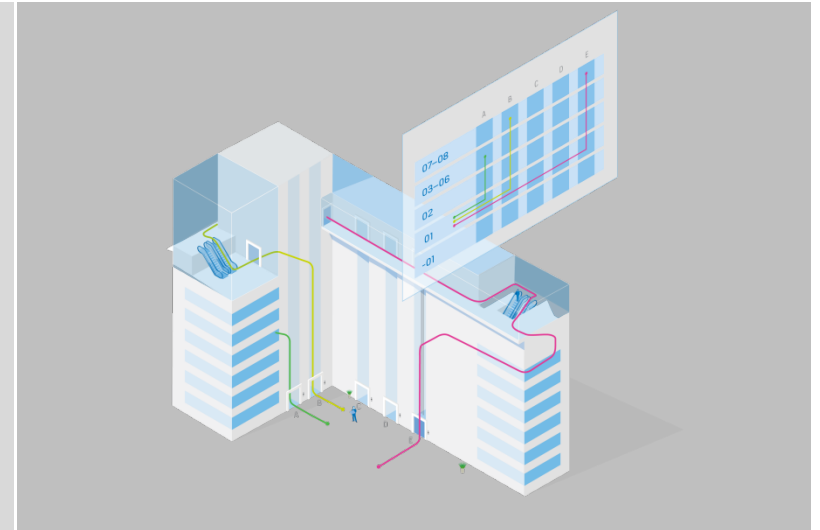
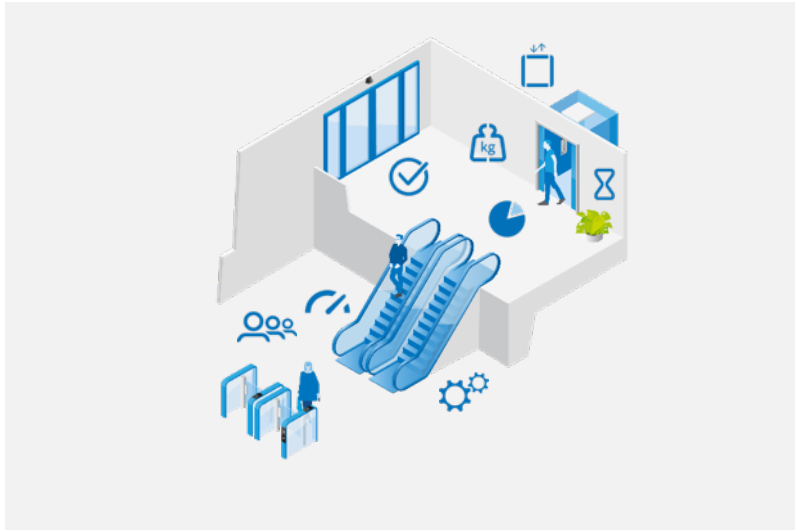
Changes in your building lifecycle

- Refurbishment
- HVAC renovation
- Facelifts
- Functions change



How People Flow Planning and Consulting is done?

FROM THEORETICAL ASSESSMENT TO HANDS-ON RESEARCH AND COMPREHENSIVE PLANNING



A

”Theoretical calculations”

Standard elevator traffic analyses and simulation based on given building population data

B

”Advanced vertical analysis”

Vertical people flow analyses using sensor data when possible

C

”Comprehensive building analysis”

Vertical and horizontal people flow analysis, using sensor data when possible with qualitative insights

How can People Flow Planning and Consulting help you?

EXAMPLES

Need to make sure building is safe and secure for users. Need to prepare for evacuation and know who is in the building.

Need to ensure optimal level of eco-efficiency in the building.

C. COMPREHENSIVE BUILDING ANALYSIS

Help with planning and fact based understanding of people flow at the start of a new building project

A. THEORETICAL CALCULATIONS

Proof that recommended solutions are the right ones

Understanding current or potential people flow and how to best plan it for new setup, when there is a need/desire to change building layout (renovation/change of ownership etc).

B. ADVANCED VERTICAL ANALYSIS

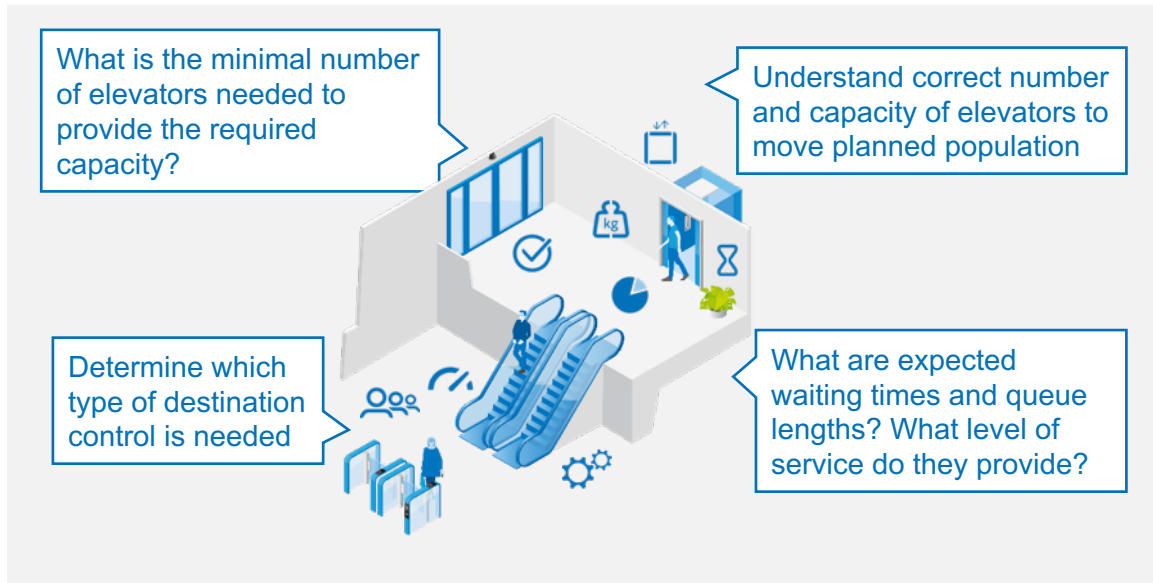
Understanding the root causes of complaints from users and tenant, and how to solve problems with people flow in existing building

Need to maintain good people flow – continuous monitoring

SUPPORT IN DECISION MAKING



A "Theoretical calculations"

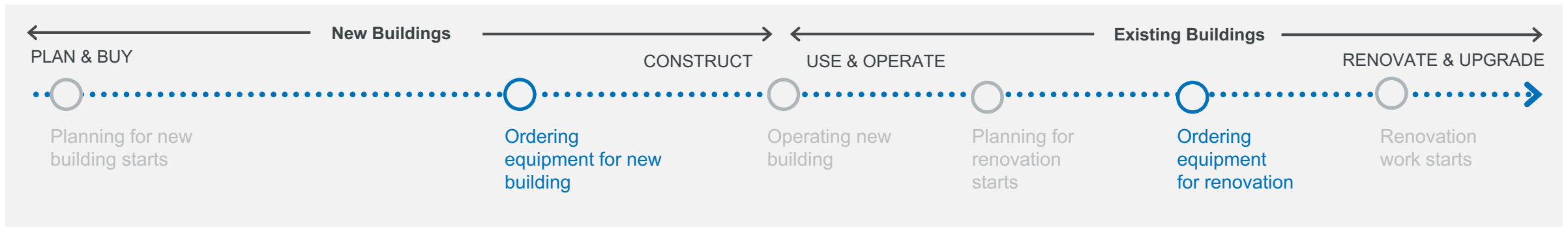


Planning a specification of a new building or modernization project based on given building population and elevator, escalator, entrance and turnstile parameters.

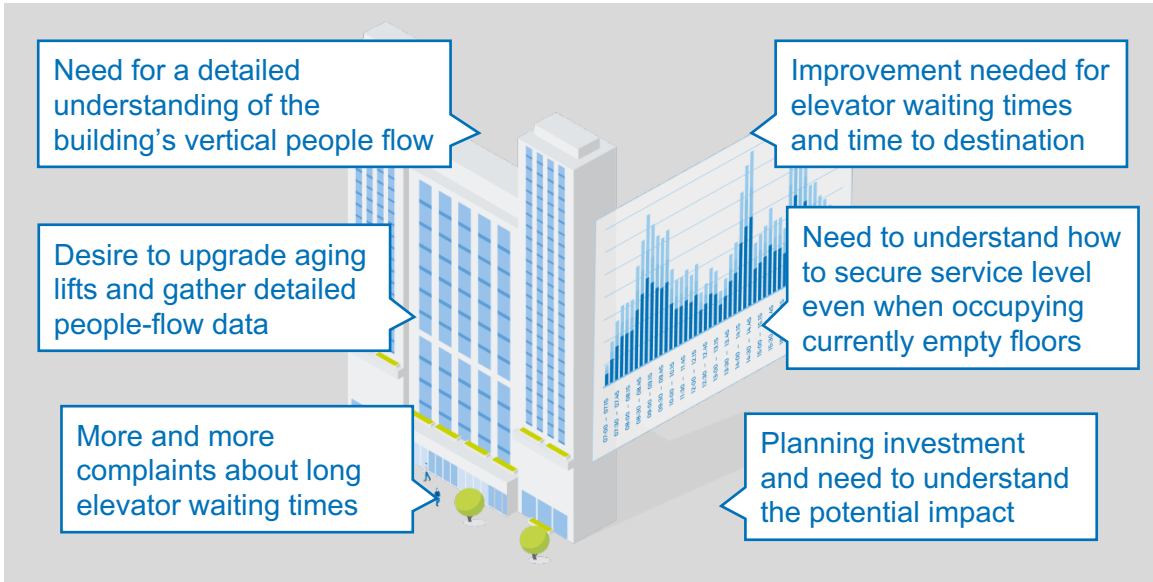
 1-2 days

OUTCOME

Traffic analysis report shows theoretical people-flow performance for new and existing buildings



B "Advanced vertical analysis"



Vertical analysis based on sensors installed inside the elevator cars

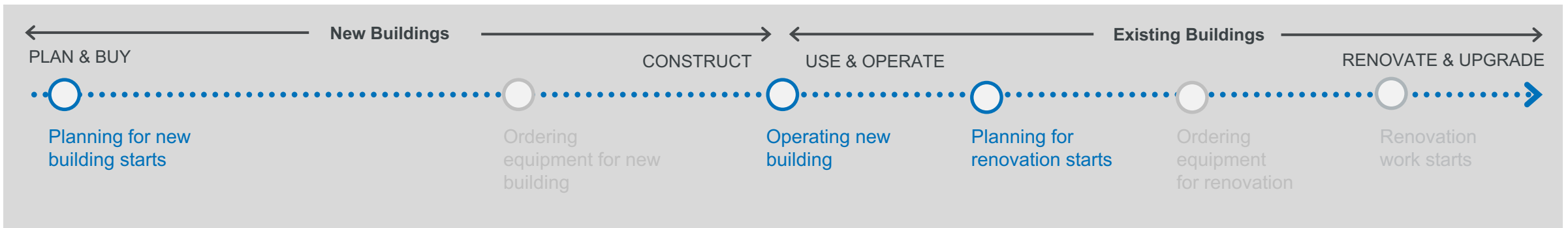
Qualitative observations and collection of necessary elevator data using mobile application

 **1-4 weeks**

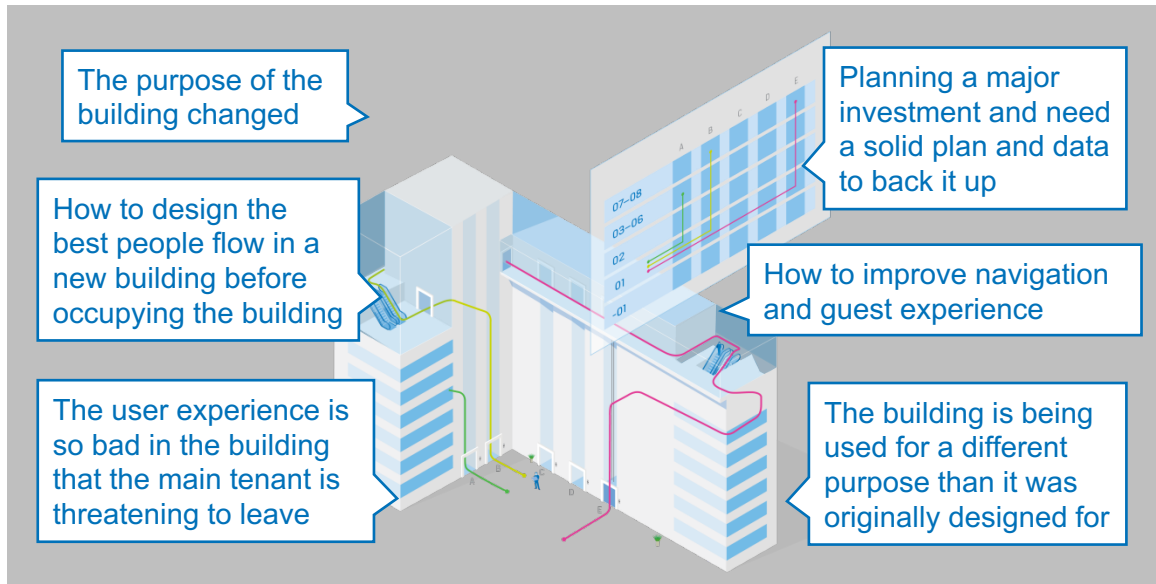
OUTCOME

Comprehensive report can include:

- Traffic analysis
- Analysis of elevator usage levels
- Recommendations on elevator arrangement



③ "Comprehensive building analysis"



360-degree vertical and horizontal analysis

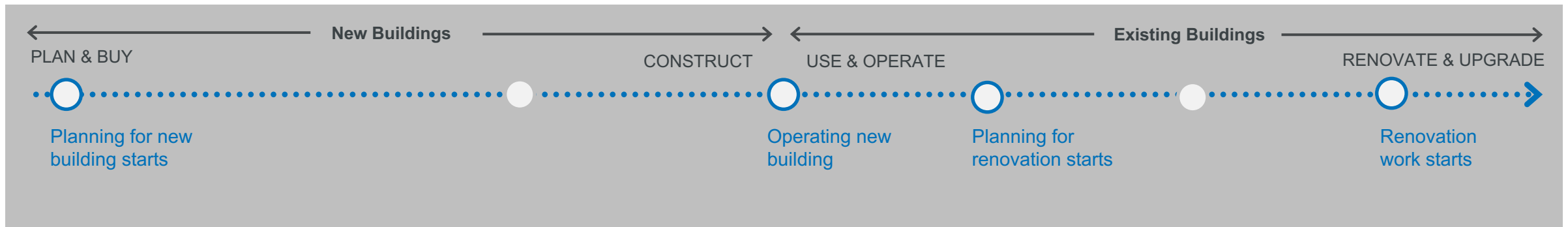
Based on sensors installed inside elevator cars as well as in lobbies and at entrances

Qualitative observations and collection of necessary elevator data using mobile application

 **3-6 weeks**

OUTCOME

- **Comprehensive report including recommendations**
- Preparing the report including the recommendations will be tailored according to customer needs

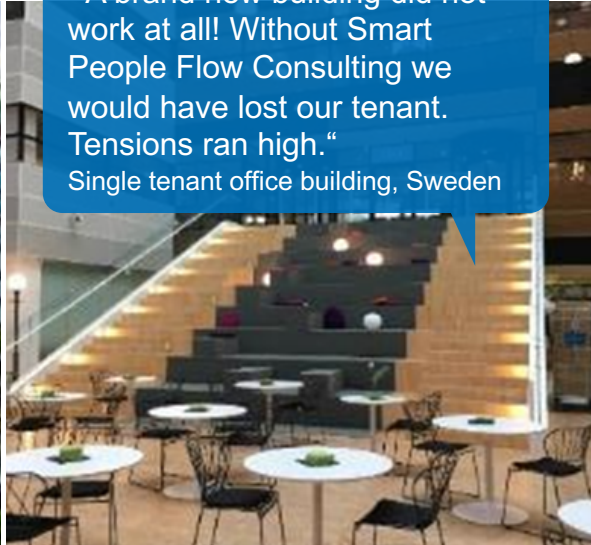


Concrete benefits for the customer have been achieved

"We are confident now to be able to increase the building tenant population by 25% and still maintain same excellent waiting times!"
Customer building, Canada



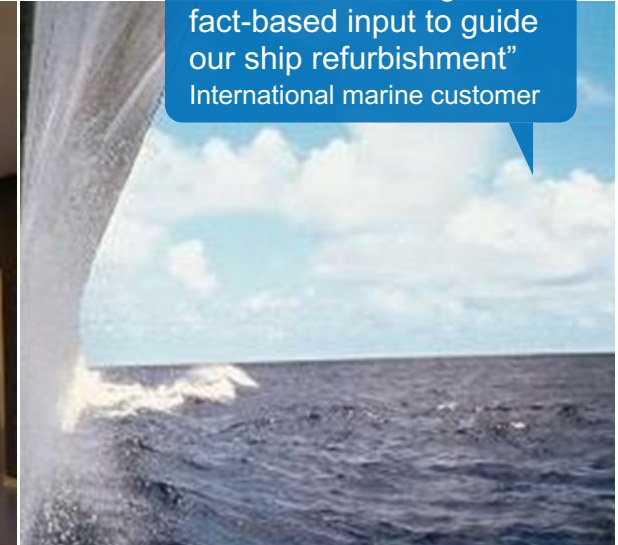
"A brand new building did not work at all! Without Smart People Flow Consulting we would have lost our tenant. Tensions ran high."
Single tenant office building, Sweden



"Through the consulting service we learned our estimates for our building population were completely off!"
Customer building, Finland



"We were able to get fact-based input to guide our ship refurbishment"
International marine customer



Population can be increased by
+25%
and still maintain the same excellent waiting time durations.



Originally 25% of the population had waiting times of over
46 sec
As a result of the service, waiting times are reduced to



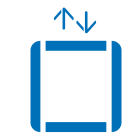
25 sec



Population was initially
52%
higher than the elevators could manage. This would have caused long waiting times and complaints from tenants.



The elevator group use is unbalanced with elevators in the back being used
70%
of the time compared with:
30%
in the front

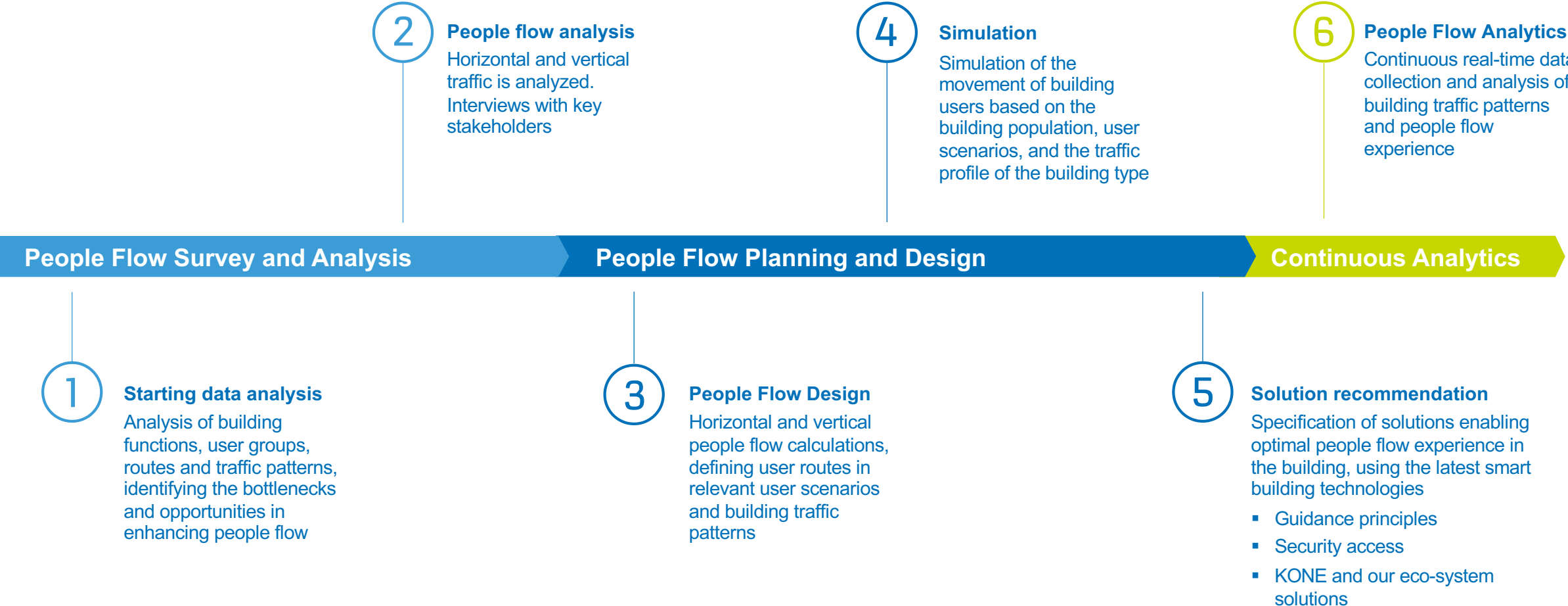


A woman with blonde hair tied back, wearing a grey and white striped t-shirt and dark pants, is walking and looking down at a tablet computer she is holding with both hands. The background is a blurred city street with a glass railing in the foreground.

What does People Flow Planning and Consulting involve?

KONE People Flow Planning steps

NEEDED STEPS ARE ALWAYS DEFINED CASE-BY-CASE



Data collection and analysis for existing building

STUDYING VERTICAL AND HORIZONTAL PEOPLE FLOW USING SENSORS AND SPECIAL TOOLS

Vertical flow analysis

Sensors to determine:

- served floors
- travel distances
- passengers entering and leaving the elevator car
- Elevator door opening/closing speed



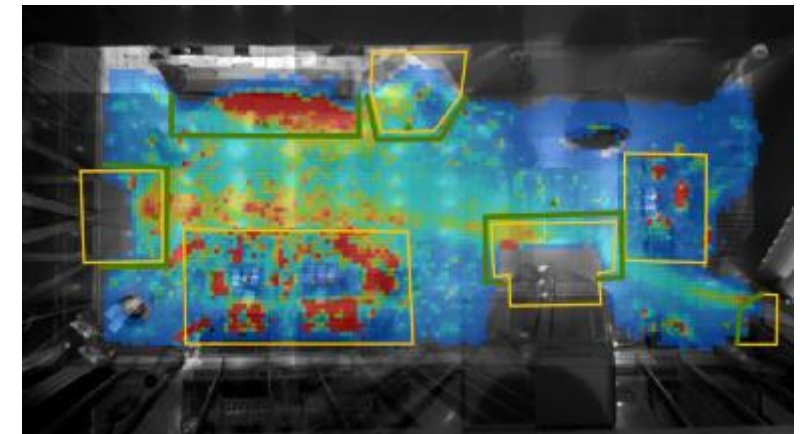
Horizontal flow analysis

People counters at doors
at building entrance doors
to detect flow variance per
entrance per time of day

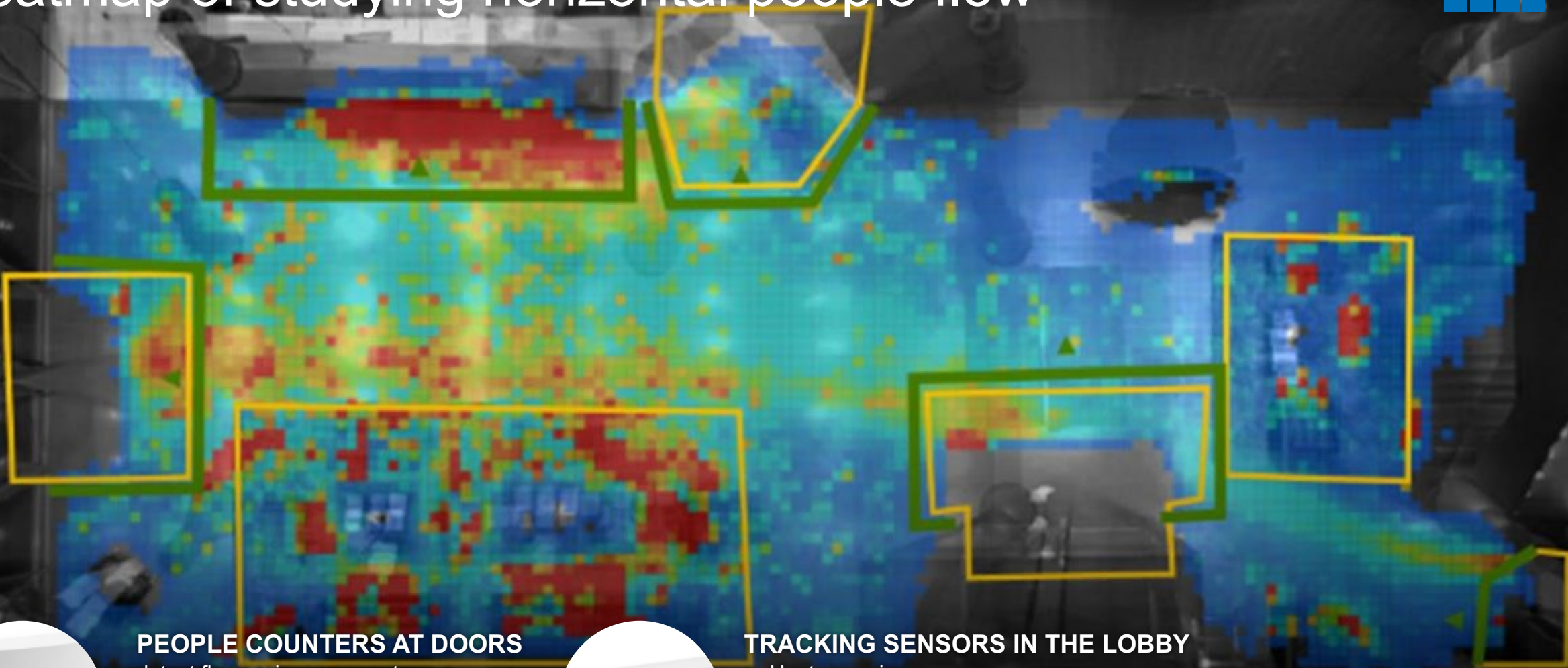


Tracking sensors in lobby

- Heatmap views
- Popular routes
- Dwell times
- Usage of space



Heatmap of studying horizontal people flow



PEOPLE COUNTERS AT DOORS
detect flow variance per entrance,
per time of day

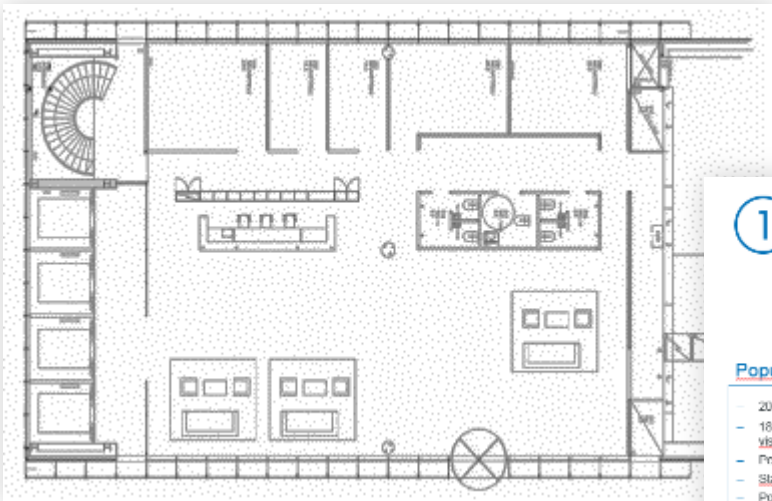


TRACKING SENSORS IN THE LOBBY

- Heat map views
- Popular routes
- Dwell times
- Usage of space

Data collection and analysis for new building

STUDYING CURRENT POPULATION PLANS AND PLANNED USER ROUTES BASED ON EXISTING INFORMATION



1 Background information

Population

- 2000 visitors and users
- 1800 employees + 200 visitors
- Peak traffic + 10 %
- Stability rate 70 %
- Population per elevator group 5/9
- Worst case scenario + 10 % + 400 visitors simultaneously

Building data

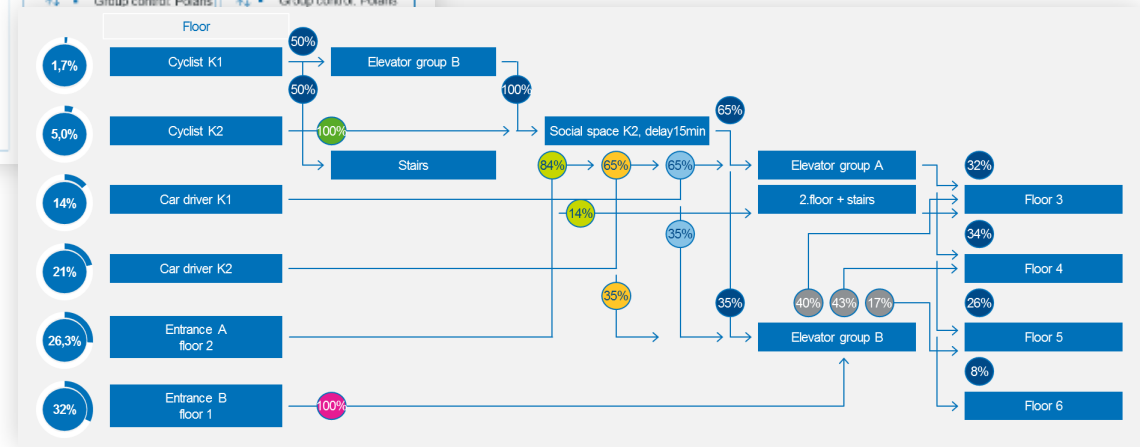
| Entrance % | Population by floor | Traffic | Population by floor |
|------------|---------------------|---------|---------------------|
| 0 | 14 | 7 | - |
| 0 | 95 | 6 | 6 95 |
| 0 | 94 | 5 | 5 94 |
| 0 | 94 | 4 | 4 94 |
| 0 | 94 | 3 | 3 94 |
| 0 | 100 | 2 | 2 100 |
| 0 | 0 | - | 1,5 0 |
| 50 | 53 | 1 | 1 53 |
| 10 | 0 | K | K 0 |

Elevators Group 1

- HR1 4 Hissis
- Group control: Polaris DCS 800/900
- Load (person) 17
- Speed (m/s) 1,5
- HR2 4 Hissis
- Group control: Polaris

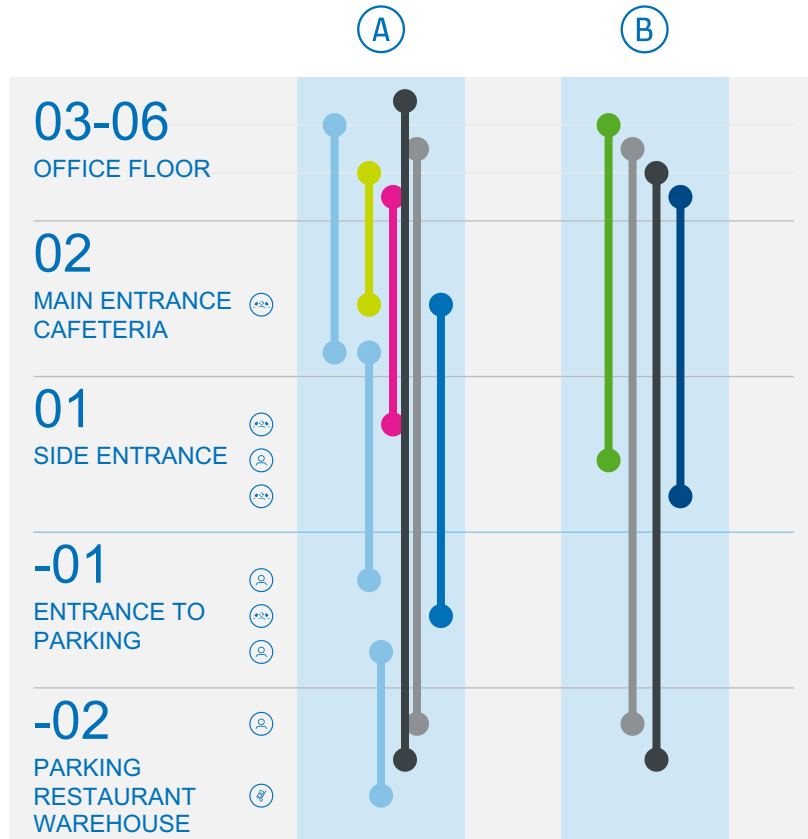
Elevators Group 2

- HR1 3 Hissis
- Group control: Polaris DCS 800/900
- Load (person) 17
- Speed (m/s) 2
- HR2 3 Hissis
- Group control: Polaris



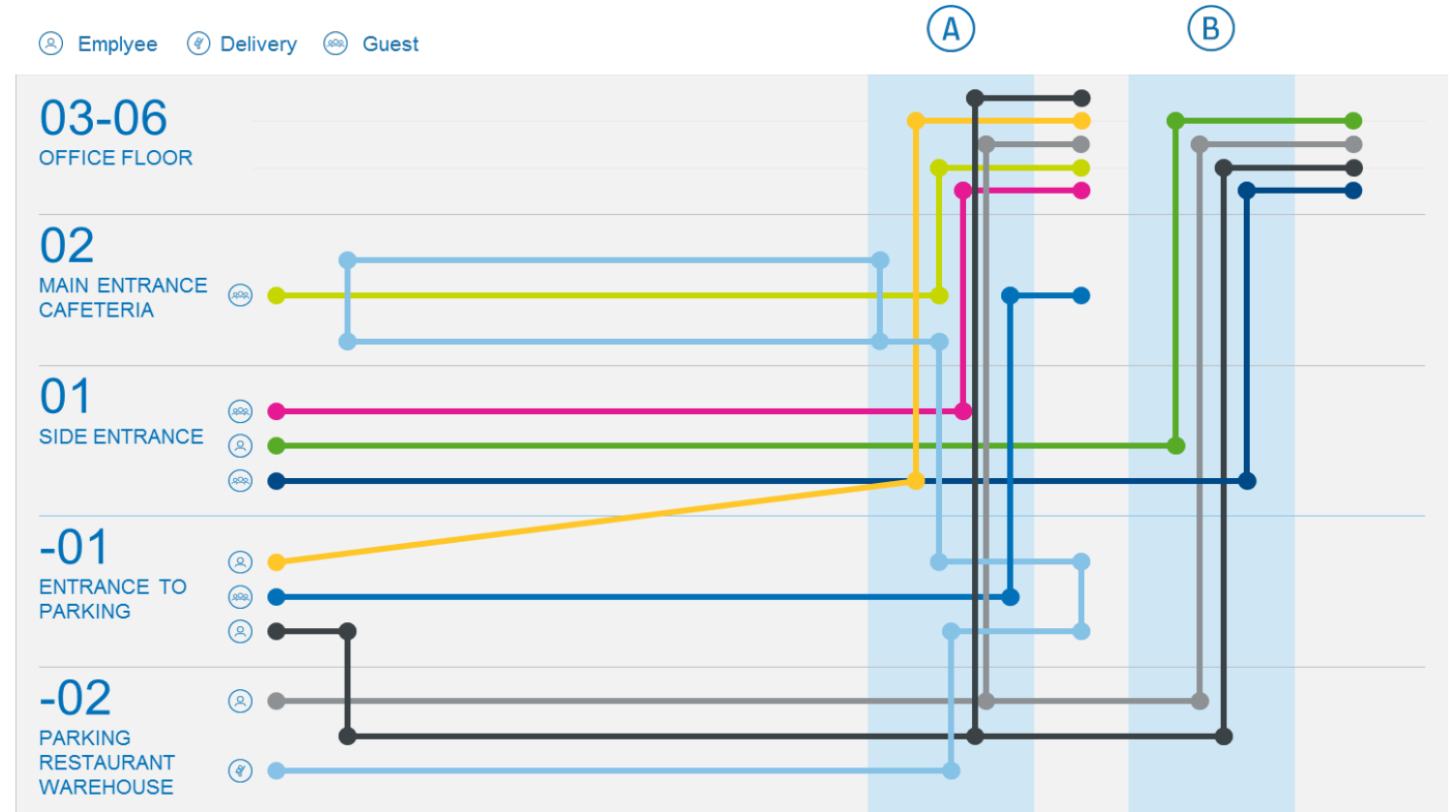
People Flow plans based on careful study of data

ADVANCED VERTICAL ANALYSIS



User routes for different user groups are defined vertically

COMPREHENSIVE BUILDING ANALYSIS



User routes for different user groups are defined both horizontally and vertically

”Advanced vertical analysis” Case Study in Hong Kong

Office area: 10,600 sq.m.

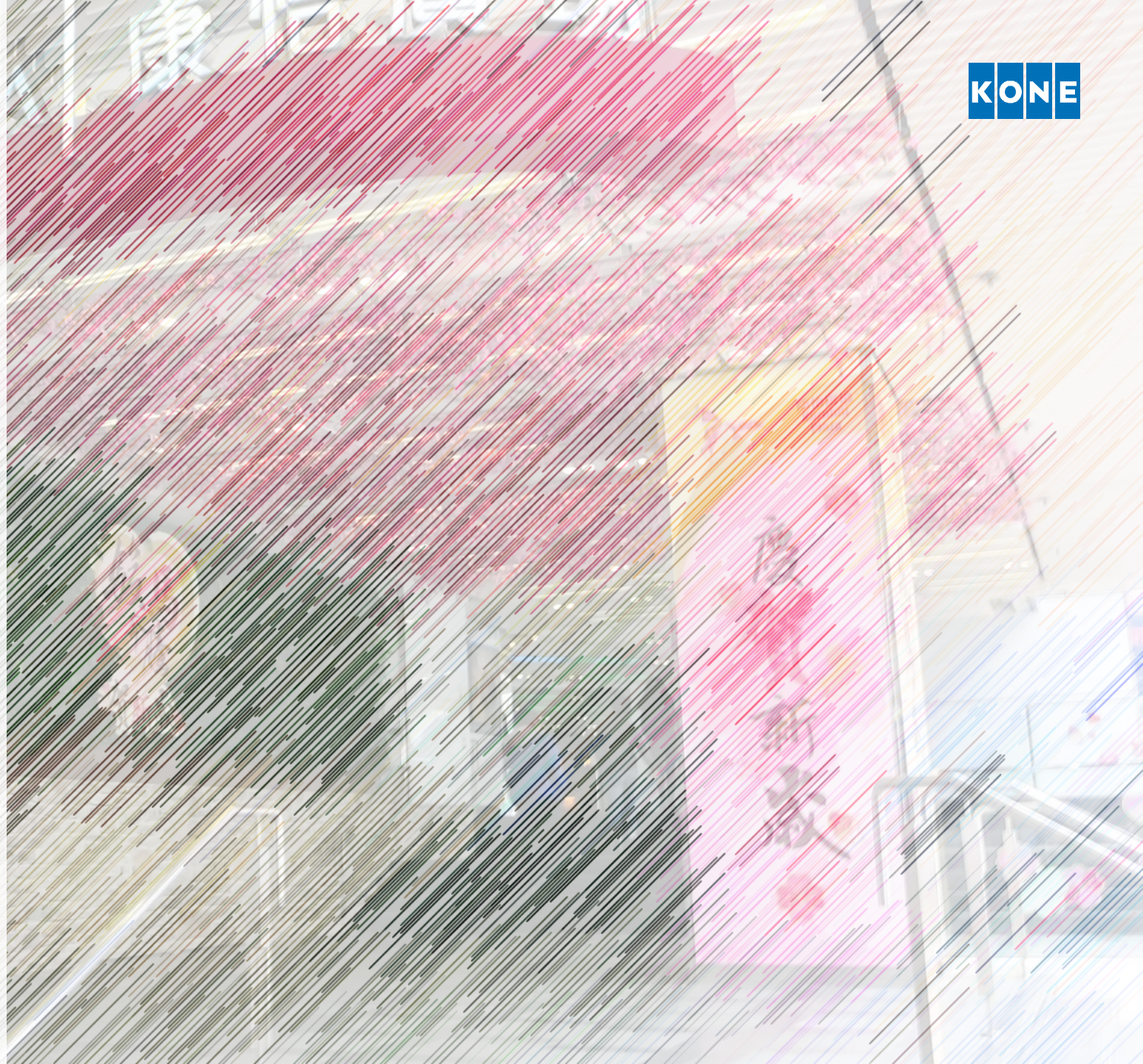
Year of completion: 1987

Multi-tenants Building, mixed use building
with different types of tenants


Operating hours are unique and not equal
to other general office building

Unexpected traffic demand to lift system
from the “learning schools”

Inter-floor traffic is minimal



Existing Lift Information

| Lift No. | L1 | L2 | L3 | L4 | L5 | L8 | L9 |
|--|------|------|------|------|-----|-----|-----|
| Rated Speed (m/s) | 1.75 | 1.75 | 1.75 | 1.75 | 1.5 | 1.0 | 1.0 |
| Capacity (person) | 18 | 18 | 18 | 18 | 20 | 20 | 20 |
| 17 | X | X | X | X | X | | |
| 16 | X | X | X | X | X | | |
| 15 | X | X | X | X | X | | |
| 14 | X | X | X | X | X | | |
| 13 | X | X | X | X | X | | |
| 12 | X | X | X | X | X | | |
| 11 | X | X | X | X | X | | |
| 10 | X | X | X | X | X | | |
| 9 | X | X | X | X | X | | |
| 8 | X | X | X | X | X | | |
| 7 | X | X | X | X | X | | |
| 6 | X | X | X | X | X | | |
| 5 | X | X | X | X | X | | |
| 4 | | | | | | | |
| 3 | | | | | | X | X |
| 2 | | | | | | X | X |
| Main Entrance 1 | | | | | | X | X |
|  M | X | X | X | X | | X | X |
| G | | | | | X | X | X |



Existing Lift Technical Specification

FOR L1 – L4

| Lift No. | L1 | L2 | L3 | L4 |
|-------------------|------------------------|------------------------|------------------------|------------------------|
| Rated Speed (m/s) | 1.75 | 1.75 | 1.75 | 1.75 |
| Rated Load (kg) | 1350 | 1350 | 1350 | 1350 |
| Capacity(person) | 18 | 18 | 18 | 18 |
| Type | Electric / Passenger | Electric / Passenger | Electric / Passenger | Electric / Passenger |
| Model/Control | CV-40 / ACVV | CV-40 / ACVV | CV-40 / ACVV | CV-40 / ACVV |
| Floor Served | M, 5 – 17/F (14 Stops) | M, 5 – 17/F (14 Stops) | M, 5 – 17/F (14 Stops) | M, 5 – 17/F (14 Stops) |

Site Photos

Observations

- High heat dissipation from the lift system inside the lift machine room
- Lubrication oil leakage found from gearbox.
- Low energy efficiency due to ACVV drive and geared machine
- No UCMP & ACOP equipped
- Not comply with BFA requirement
- Lubrication oil leakage found from gearbox
- Counterweight safety gear equipped with two overspeed governors per lift



KONE Elevator Performance Analyzer (EPA)

KONE Elevator Performance Analyzer (EPA)

A tool which measures the number of people entering and leaving an elevator at all floors served.



Minimum disturbance to building operations

Components:

Hardware (3D sensor and data recorder)

Analysis Software

- Quick installation
- Self learning of building floor levels
- Various elevator parameters measured
- Data stored for later analysis in PC



Privacy not infringed

- 3D sensor based system for passenger detection
- Data recorder does not record anything in format where passengers could be recognized



Use of the data

The data from EPA reports is used as input for KONE Building Traffic Simulator

- It allows simulation of the current, future and during modernization Vertical People Flow in an existing building based on actual people flow in the building.
- Comparison with industry standards.
- Proposing of the best vertical transportation solution for the building.



KONE Elevator Performance Analyzer

Accurate
Measurements



Quick to install
and easy to use



Minimum
disturbance to
building
operations



Privacy of
passengers
Ensured



Site Measurement

Dates of Measurement

Agreed with the customer, 5 consecutive days were selected for site measurement as follow:-

| Date | 13 Nov 2018 | 14 Nov 2018 | 15 Nov 2018 | 16 Nov 2018 | 17 Nov 2018 |
|-------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Weekday | TUE | WED | THU | FRI | SAT |
| Period | 12:00 – 19:00 | 12:00 – 19:00 | 12:00 – 19:00 | 12:00 – 19:00 | 09:00 – 18:00 |

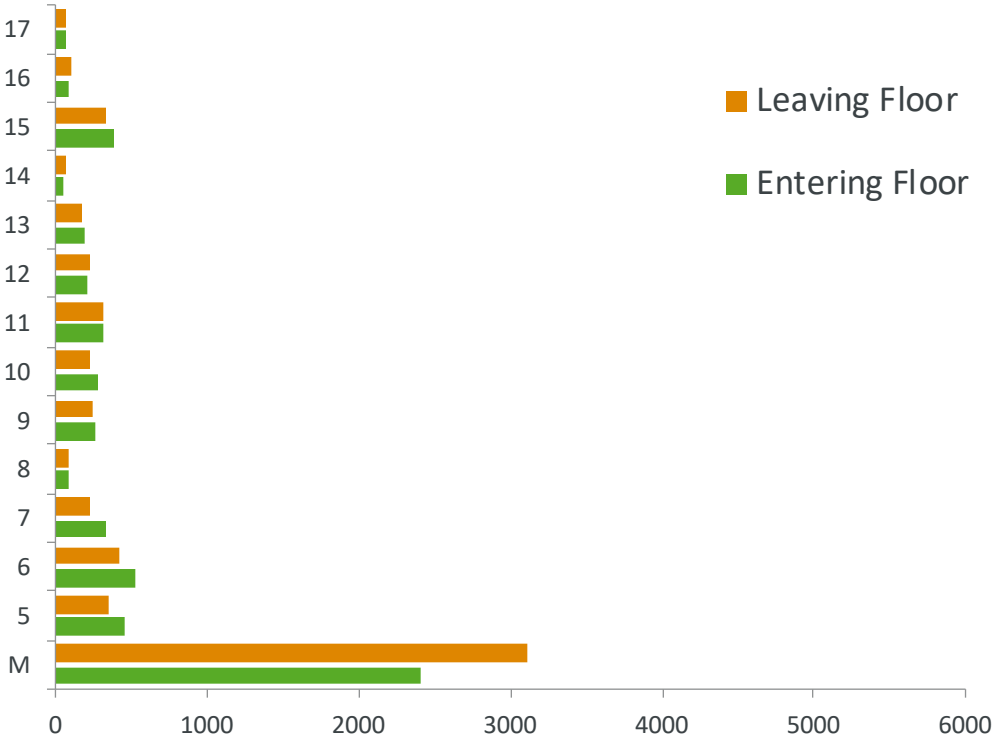
Result: People Flow by Floors

16 NOV 2018 (FRI)

Summary *(excl. main entrance M/F)*

- Total Entering Population = 3301
- Total Leaving Population = 2859
- Highest Entering Population Floor = 6/F
- Highest Leaving Population Floor = 6/F
- Lowest Entering Population Floor = 14/F
- Lowest Leaving Population Floor = 14/F

Records



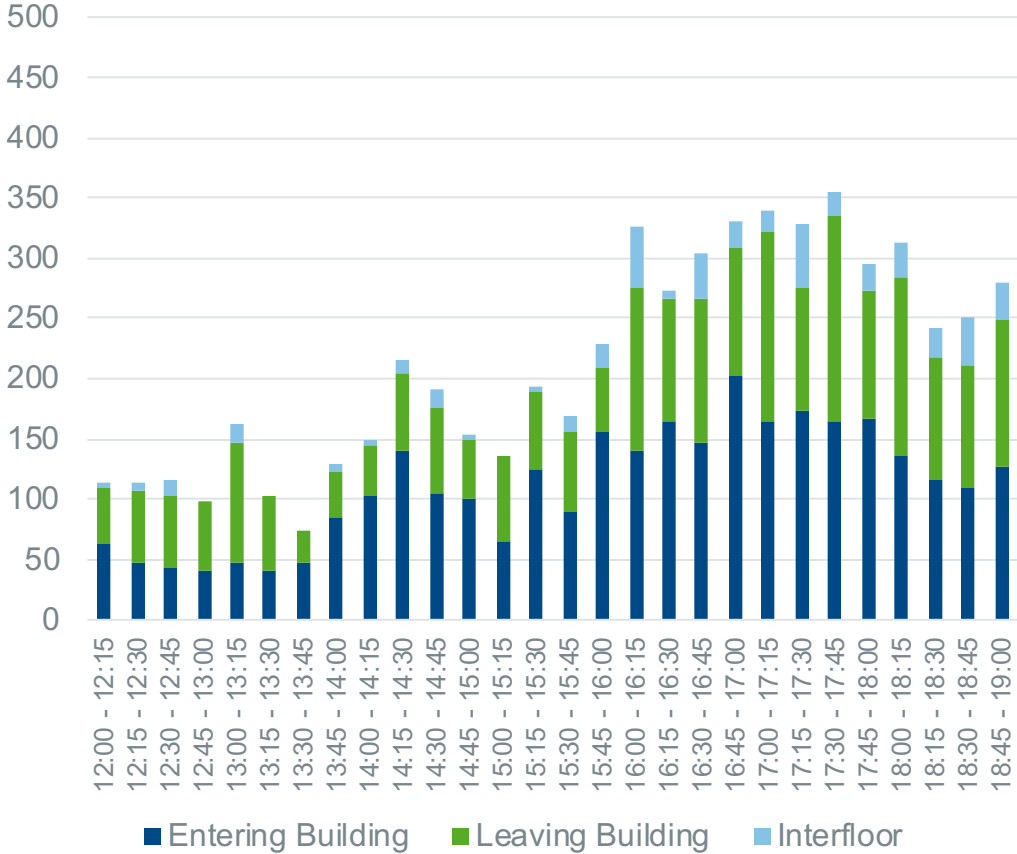
Result: People Flow by Time

16 NOV 2018 (FRI)

Summary

- Highest Entering Period = 16:45 - 17:00
- Highest Leaving Period = 17:00 - 17:15
- Lowest Entering Period = 13:15 - 13:30
- Lowest Leaving Period = 13:30 - 13:45

Records



Result: People Flow by Floors

17 NOV 2018 (SAT)

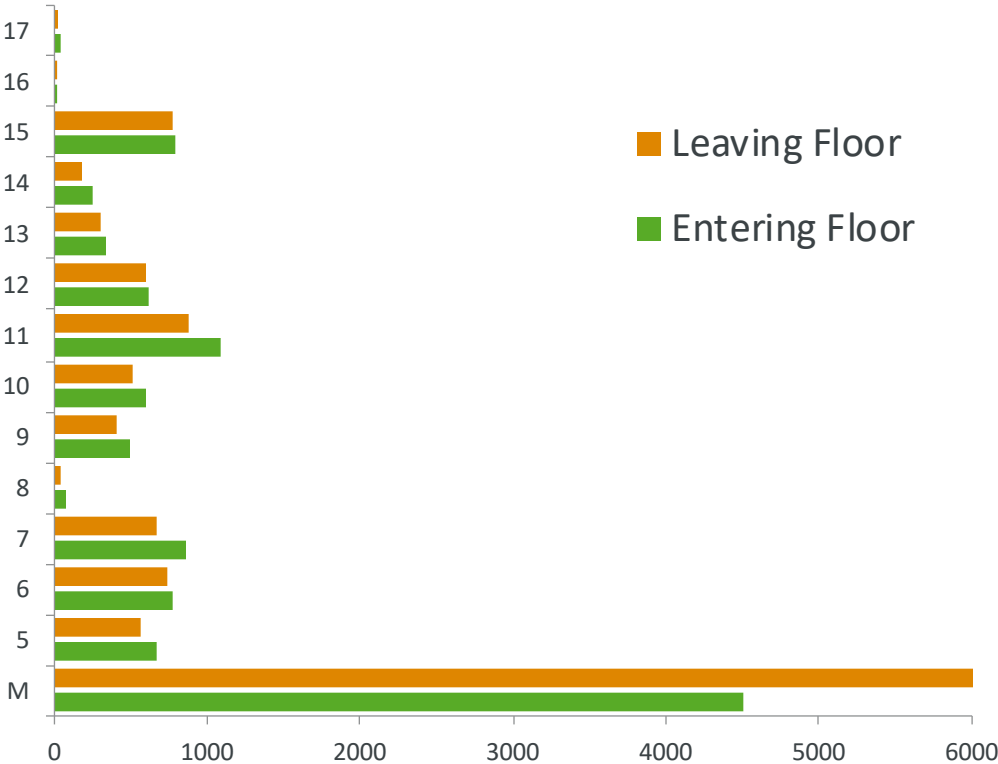
Summary *(excl. main entrance M/F)*

- Total Entering Population = 6608
- Total Leaving Population = 5734
- Highest Entering Population Floor = 11/F
- Highest Leaving Population Floor = 11/F
- Lowest Entering Population Floor = 16/F
- Lowest Leaving Population Floor = 16/F

Remark:

L4 not serve 8 – 17/F on that day

Records



Result: People Flow by Time

17 NOV 2018 (SAT)

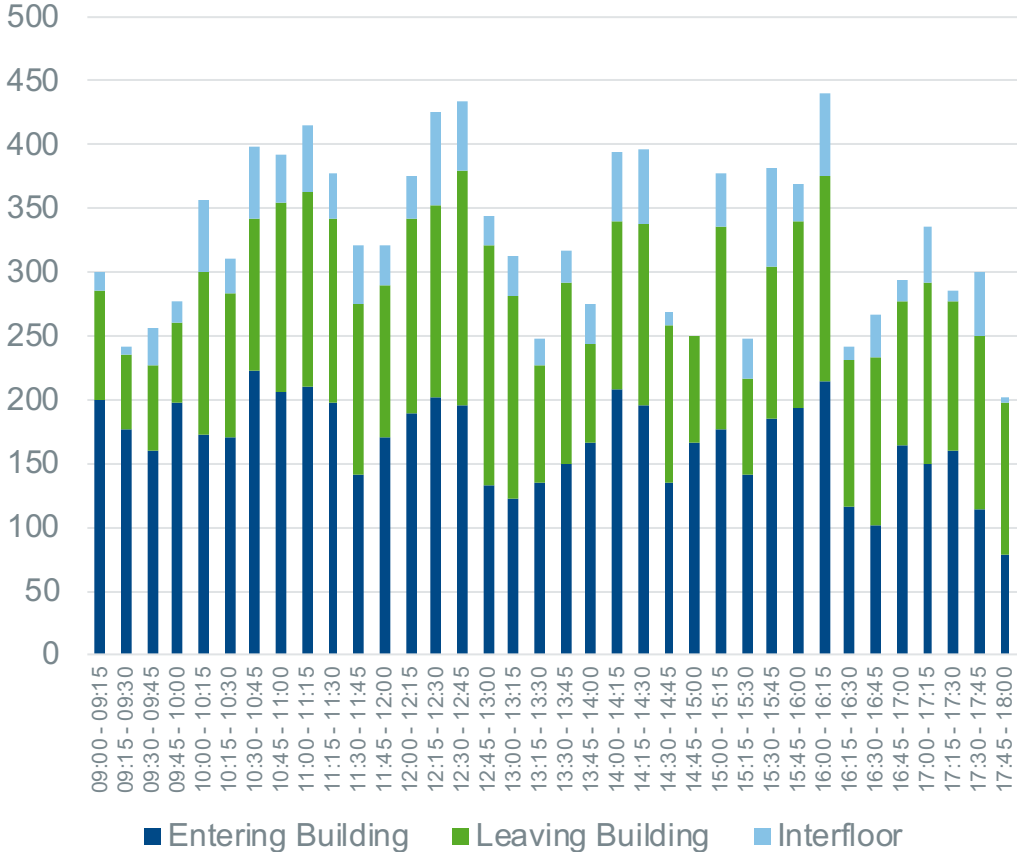
Summary

- Highest Entering Period = 10:30 – 10:45
- Highest Leaving Period = 12:45 – 13:00
- Lowest Entering Period = 17:45 – 18:00
- Lowest Leaving Period = 15:15 – 15:30

Remark:

L4 not serve 8 – 17/F on that day

Records



Summary

| | | | | Highest Population among weekdays | Special Traffic Pattern during Saturday |
|--|--------------------|--------------------|--------------------|-----------------------------------|---|
| Date | 13 Nov 2018 | 14 Nov 2018 | 15 Nov 2018 | 16 Nov 2018 | 17 Nov 2018 |
| Weekday | TUE | WED | THU | FRI | SAT |
| Period | 12:00 – 19:00 | 12:00 – 19:00 | 12:00 – 19:00 | 12:00 – 19:00 | 09:00 – 18:00 |
| Total Population = Entering + Leaving | | | | | |
| Person | 5509 | 6006 | 5612 | 6160 | 12342 |
| Peak Period = Entering + Leave + Interfloor | | | | | |
| Time Slot | 17:15 - 17:30 | 16:35 - 16:40 | 17:30 - 17:45 | 17:30 - 17:45 | 16:00 - 16:15 |

The site measurement data from 16 Nov & 17 Nov were selected for further simulation with different scenarios.

Alternative Solutions

How to improve lift performance by modernization?

| Point | Alternative Solutions | Level of Difficulty | Remarks |
|-------|--|---------------------|---|
| 1 | Addition of lift | High | Additional spacing & associated works are needed. |
| 2 | Increase of rated speed | High | Additional spacing & associated works are needed. |
| 3 | Increase of rated load | High | Additional spacing & associated works are needed. |
| 4 | Re-arrangement of lift zoning | Low | User diversion & communication are needed. |
| 5 | Re-arrangement of population per floor | Medium | Tenant relocation & communication are needed. |

Re-arrangement of lift zoning

OPTIONS

Scenario A
All Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | x | x |
| 16 | x | x | x | x |
| 15 | x | x | x | x |
| 14 | x | x | x | x |
| 13 | x | x | x | x |
| 12 | x | x | x | x |
| 11 | x | x | x | x |
| 10 | x | x | x | x |
| 9 | x | x | x | x |
| 8 | x | x | x | x |
| 7 | x | x | x | x |
| 6 | x | x | x | x |
| 5 | x | x | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |

Scenario B
High/Low Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | x | x | | |
| 15 | x | x | | |
| 14 | x | x | | |
| 13 | x | x | | |
| 12 | x | x | | |
| 11 | x | x | | |
| 10 | x | x | | |
| 9 | | | x | x |
| 8 | | | x | x |
| 7 | | | x | x |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |

Scenario C
Odd/Even Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | | | x | x |
| 15 | x | x | | |
| 14 | | | x | x |
| 13 | x | x | | |
| 12 | | | x | x |
| 11 | x | x | | |
| 10 | | | x | x |
| 9 | x | x | | |
| 8 | | | x | x |
| 7 | x | x | | |
| 6 | | | x | x |
| 5 | x | x | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |

Scenario D
3 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | | x | | |
| 12 | | x | | |
| 11 | | x | | |
| 10 | | x | | |
| 9 | | | x | x |
| 8 | | | x | x |
| 7 | | | x | x |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |

Scenario E
4 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | x | | | |
| 12 | | x | | |
| 11 | | x | | |
| 10 | | x | | |
| 9 | | | x | |
| 8 | | | x | |
| 7 | | | x | |
| 6 | | | | x |
| 5 | | | | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |

Scenario F
Others

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | | | | |
| 16 | | | | |
| 15 | | | | |
| 14 | | | | |
| 13 | | | | |
| 12 | | | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



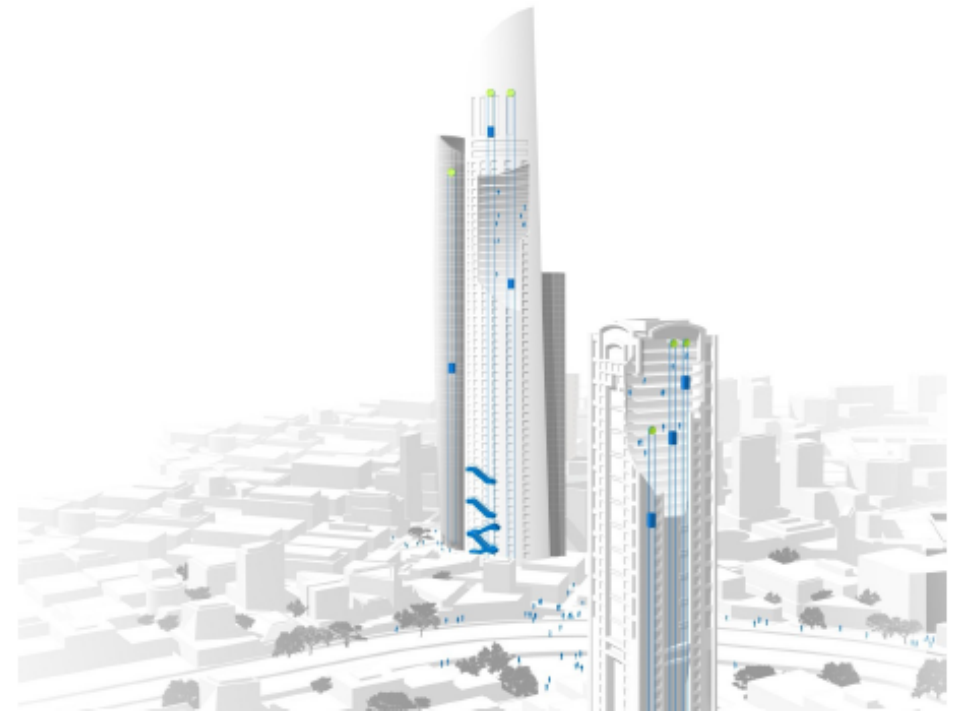
Simulations based on selected solutions

Simulation

CUSTOMER CENTRIC

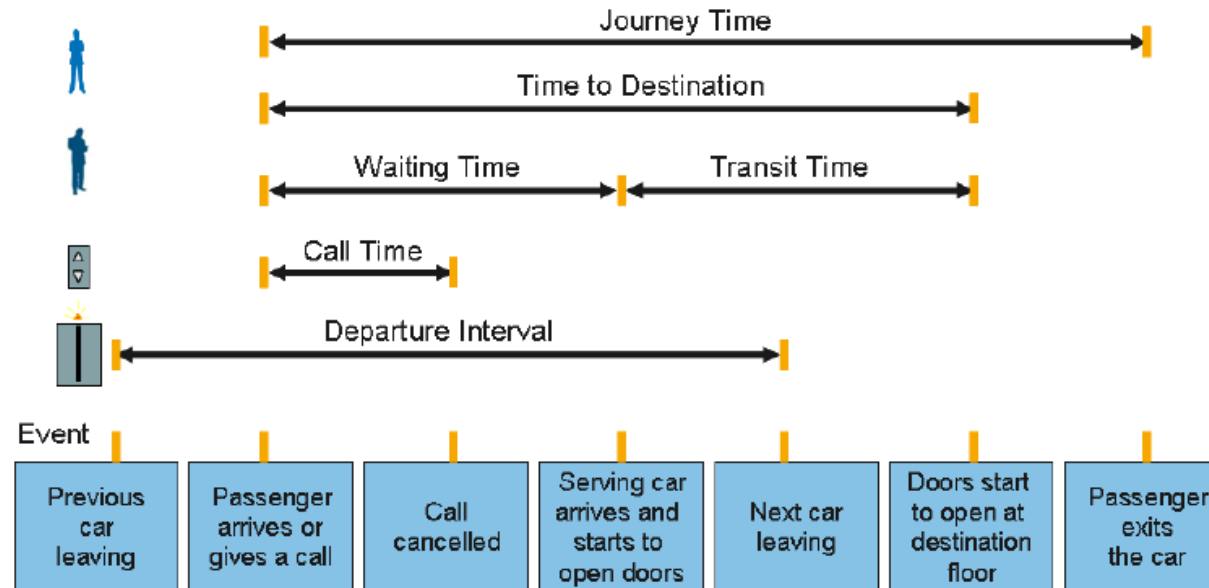
Site measurement data was imported to the KONE Building Traffic Simulator (BTS) application, and simulated the following parameters:-

- Maximum waiting time (Maximum WT)
- Maximum time to destination (Maximum TTD)



Terminology

CUSTOMER CENTRIC



- Maximum Waiting Time (Maximum WT): Time from when a passenger either registers a landing call, or joins a queue, until the responding elevator begins to open its doors at the boarding floor.
- Maximum Time to Destination (Maximum TTD): Time from when a passenger either registers a landing call, or joins a queue, until the responding elevator begins to open its doors at the destination floor.


Recommendations

Recommendations

WEEKDAYS

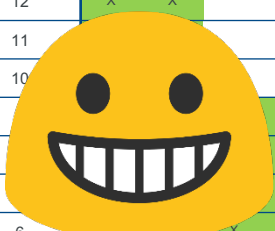
Scenario A
All Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | x | x |
| 16 | x | x | x | x |
| 15 | x | x | x | x |
| 14 | x | x | x | x |
| 13 | x | x | x | x |
| 12 | x | x | x | x |
| 11 | x | x | x | x |
| 10 | x | x | x | x |
| 9 | x | x | x | x |
| 8 | x | x | x | x |
| 7 | x | x | x | x |
| 6 | x | x | x | x |
| 5 | x | x | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



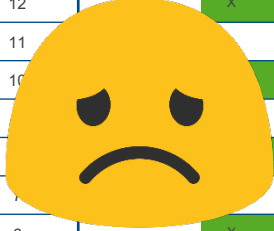
Scenario B
High/Low Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | x | x | | |
| 15 | x | x | | |
| 14 | x | x | | |
| 13 | x | x | | |
| 12 | x | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Scenario C
Odd/Even Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | | | x | x |
| 15 | x | x | | |
| 14 | | | x | x |
| 13 | x | x | | |
| 12 | | | x | x |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | x | x |
| 5 | x | x | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Scenario D
3 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | | x | | |
| 12 | | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | x |
| 8 | | | | x |
| 7 | | | | x |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Scenario E
4 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | x | | | |
| 12 | | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | | x |
| 5 | | | | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



Scenario F
Special

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | | | | x |
| 16 | | | | x |
| 15 | x | x | x | |
| 14 | x | x | x | |
| 13 | x | x | x | |
| 12 | x | x | x | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | x | x | x | x |
| 5 | x | x | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Recommendations

SATURDAY

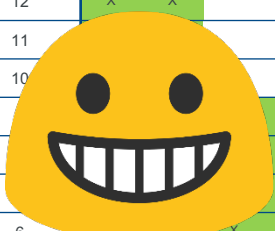
Scenario A
All Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | x | x |
| 16 | x | x | x | x |
| 15 | x | x | x | x |
| 14 | x | x | x | x |
| 13 | x | x | x | x |
| 12 | x | x | x | x |
| 11 | x | x | x | x |
| 10 | x | x | x | x |
| 9 | x | x | x | x |
| 8 | x | x | x | x |
| 7 | x | x | x | x |
| 6 | x | x | x | x |
| 5 | x | x | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



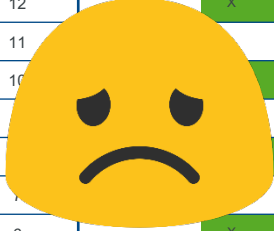
Scenario B
High/Low Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | x | x | | |
| 15 | x | x | | |
| 14 | x | x | | |
| 13 | x | x | | |
| 12 | x | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Scenario C
Odd/Even Floors

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | x | | |
| 16 | | | x | x |
| 15 | x | x | | |
| 14 | | | x | x |
| 13 | x | x | | |
| 12 | | | x | x |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | x | x |
| 5 | x | x | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |




Scenario D
3 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | | x | | |
| 12 | | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | x |
| 8 | | | | x |
| 7 | | | | x |
| 6 | | | x | x |
| 5 | | | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



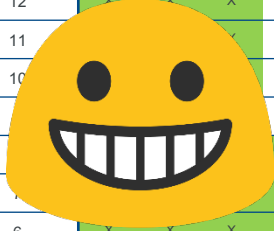
Scenario E
4 Zones

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | x | | | |
| 16 | x | | | |
| 15 | x | | | |
| 14 | x | | | |
| 13 | x | | | |
| 12 | | x | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | | | | x |
| 5 | | | | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



Scenario F
Special

| Lift | 1 | 2 | 3 | 4 |
|------|---|---|---|---|
| 17 | | | | x |
| 16 | | | | x |
| 15 | x | x | x | |
| 14 | x | x | x | |
| 13 | x | x | x | |
| 12 | x | x | x | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | | | | |
| 6 | x | x | x | x |
| 5 | x | x | x | x |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |
| M | x | x | x | x |
| G | | | | |



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