出國報告(出國類別：研討會)

出席 2019 機場全產業創新論壇
出國報告書

服務機關：桃園國際機場股份有限公司

姓名職稱：但昭璧　副總經理

　　　　　李思霈　業務員

派赴國家：中國大陸　上海

出國期間：民國 108 年 10 月 22 日至 10 月 25 日

報告日期：民國 108 年 11 月 27 日

目錄

公務出國報告提要

出國目的：出席 2019 機場全產業創新論壇

主辦單位：上海銳訊商務諮詢有限公司

出國人員姓名：但昭璧、李思霈

服務機關：桃園國際機場股份有限公司

職稱：副總經理、業務員

出國類別：5.其他(研討會)

出國期間：民國 108 年 10 月 22 日至 10 月 25 日

分類號：目：

關鍵字：現代樞紐機場、智慧機場、數字化、機場建設

內容摘要：

　　本公司於 108 年 10 月 22 日至 10 月 25 日期間出席由上海 2019 機場全產業創新論壇，本次活動係獲上海銳訊商務諮詢有限公司邀請，出席，本公司但副總經理昭璧應邀致詞演說，以「智慧機場之實踐，桃園國際機場的五導」為題，向與會貴賓進行說明，另擔任「頭腦風暴論壇」之與談人。

　　因應大陸民航局對於機場規劃建設要求「平安、綠色、智慧、人文」四大特性，建設四型機場需要透過完善的配套措施，比如 5G 網路、人臉辨識技術、移動互聯網、大數據等技術；未來，旅客出行的需求更加速機場數位化趨勢，進而提升旅客機場體驗。論壇同時邀請歐洲機場如瑞士蘇黎世機場、荷蘭史基浦機場以及最新完工土耳其伊斯坦堡機場機場代表分享其智慧機場上的建設規劃。

壹、　　目的

　　本次活動係獲上海銳訊商務諮詢有限公司邀請出席，本公司但副總經理昭璧應邀致詞演說，以「智慧機場之實踐，桃園國際機場的五導」為題，向與會貴賓進行說明，另擔任「頭腦風暴論壇」之與談人。

▲但副總經理昭璧進行演說

▲但副總經理昭璧於頭腦風暴與談發言

▲但副總經理昭璧出席頭腦風暴論壇時與其他與談人合影

▲但副總經理昭璧與伊斯坦堡機場代表交換心得

貳、 行程

日期	地點	行程紀要
108/10/22(星期二)	松山/桃園機場-上海機場	抵達上海
108/10/23(星期三)	2019 機場全產業創新論壇會議首日	
108/10/24(星期四)	2019 機場全產業創新論壇會議次日	
108/10/25(星期五)	上海機場-松山/桃園機場	搭乘班機回台

∧論壇展場入口　　　∧論壇會場外贊助商攤位展示

▲論壇會場

參、　　論壇摘要

　　本大陸民航局對於機場規劃建設要求「平安、綠色、智慧、人文」四大特性，建設四型機場需要透過完善的配套措施，比如 5G 網路、人臉辨識技術、移動互聯網、大數據等技術；未來，旅客出行的需求更加速機場數位化趨勢，進而提升旅客機場體驗。本次論壇邀請大陸機場以及國際機場代表分享有關智慧機場的建設規劃，以下將會議演講者重點摘要如次。

一、上海機場集團有限公司教授級高級工程師王曉鴻

(一)衛星廊廳與主體航廈間之聯繫，穿越跑道、滑行道之工程技術，於虹橋機場兩條地鐵及浦東機場經驗之後，已稱純熟。

(二)專案管理：機場大型工程一般由多家專業設計單位同步開展各項目的規劃及設計，除了各單位的專業規劃設計外，必須進行總體的協調和管理。

- 確定設計總包單位，使業主的協調管制對象單一，明確責任。
- 單一測量負責單位，使各項工程之基礎資訊一致。
- 訂定設計標準。
- 利用 BIM(建築信息模型)為工程全程進行動態控制。

(三)專案組織：

1. 指揮部

- 總指揮：由政府部門的副首長擔任，負責政策、策略與推動方向之正確並與與國家政策相符。

暢通各政府部門和機場建設運行。

運用公權力，順暢與航空業者間的協調。

- 副總指揮：由機場集團公司高階主管（非部門主管）擔任，實際管控工程計畫、預算、進度事宜。
- 專案小組：由機場管理當局之計畫、工程、營運、維護、環境等部門、航空公司及其他相關單位具有經驗之人員組成負責計畫之執行。

2. 工程部：

- 組織：3+3+3 模式

   由有經驗的工程管理人員（工程部門）+運行單位人員（使用管理部門）+新招聘人員（未來操作部門）各約 1/3 人員共同組成，負責工程之發包、施工、驗收及轉移，兼顧工程、營運及培訓。

- 實務管理：

   現場管理以區域劃分，而非以專業領域劃分，每個人的管理範圍以半天能夠完成一次全面巡檢為限（200,000 ㎡），協調窗口單純化，減少工程間之介面困擾。建設項目繁多，應整體規劃，再以其必須性，分為保障、影響及配套等三大類，按資源之可支援狀況推動之。

(四)介面管理

機場工程均為大型且複雜之工程，一般由多家設計單位同步開展各項目的規劃及設計工作，為了確保工程的系統性、統一性和完整性，必須進行總體協調、管理和系統整合。

- 確定設計總包單位：使業主的管制、協調對象單一，明確責任

- 單一測量負責單位：使各項工程之基礎資訊一致

- 訂定設計標準：各個項目在實際推進過程中，每個項目的設計單位會有落差，建議訂定標準或是簽署《合作設計備忘錄》供各案技術介接之依據。

(五)BIM 技術

自設計之始即引進 BIM，完整建立資料，動態控制全部過程

運用 BIM 技術，控制品質：設計檢查、施工控制、營運管理（訓練、營運、維護）。

二、香港機場管理局智慧機場部門總經理歐陽顯宏

(一) 香港機場之智慧化：

強調旅客體驗(Digital experience)的重要：技術為創新之基礎，創新永遠比技術重要。

(二) 香港機場 APP「我的航班」功能：

- 利用 APP 掌握停車場與停車位狀況、可線上預訂停車位、付停車費。

- 提供聯外交通情形（Traffic congestion alert）：

  對於出境或送機者：出發前 4 小時之路況。

  對於入境或接機者：到站後 2 小時之路況。

- iBeacon：結合 AR 技術，可進行路徑指引（Self-navigation the journey）。

- 利用 APP 掌握登機門即時資訊。

(三) 服務機器人：答詢旅客問題、提供航班、餐飲、航廈服務及設施資訊。

(四) 行李通：旅客購買行李牌，透過 APP 註冊航班資訊，抵達香港機場後，開啟手機網路連線，行李上來前 1 分鐘即可接收到通知。

(五) 利用大數據分析旅客流，例如 Retail landside、Food landside、Food + Retail landside，了解旅客在不同區域停留的時間，識別弱點，加以改進。

(六) 與大學合作，管理追蹤 13,000 部手推車；可以自動偵測行李手推車數量，視使用狀況補充手推車，行李手推車的缺乏率改善了 93%。

(七) 巡場機器人：利用機器人檢視航線內異常狀況，比如地面乾濕狀況、檢查 FIDS 螢幕、偵測 WIFI 連線速度，以及機場設施設備的巡檢。

(八) 跑道燈光狀況檢查：利用高速相機取代人眼檢測道面燈光狀態。

(九) 無人車：於北京 UIC 合作，以行李與貨物為運送對象，已進行測試超
　　過 1 年。

(十) 機場 ICT 基礎設施：

　　設有 15 個高速 WiFi 區，加快使用者下載速度。

▲香港機場免費高速 WiFi 區

(十一)　香港機場行李追蹤之發展

　　香港機場之行李追蹤曾使用 RFID 技術，現在則採用結合條碼、影像及旅客
身份之整合性做法。

　　RFID 之優點在於精確掌握行李動態與擁有更多行李資訊，至於整合性做
法，優點在於不再受限於 Tag，全部行李均可在其掌握之下，惟成本及僅有
本站行李為其所控制。考量目前每一件托運行李必有條碼，普及性無虞。影
像為使用攝影機，於行李進入系統之最初期即攝取影像行李，並結合行李條
碼，以為行李之識別。而旅客身份，對於出發旅客，於其報到、行李托運時
讀取，並無困難；而對於入境旅客，則可取得自其出發站，亦即出發站須將
此訊息透過 SITA 送出。

　　RFID 及前述整合性做法均可達到掌握行李動態之方式，建議本公司可就技
術、資料獲得、成本及連帶效益等綜合評估及決定。

三、土耳其機場管理公司首席規劃官 Ismail H Polat

(一)介紹伊斯坦堡機場的總體規劃到運營

伊斯坦堡新機場設計目標成為全世界最大的機場，整個計畫總共雇用了 22.5 萬

員工，整體工程完成後，目標每年可容納 1.5 億人次，共有 6 條獨立跑道。

Airport	Area	PAX
Istanbul Airport	76 million m² Phase 1: 41.5 million m²	150 MPPA (up to 200 MPPA) Phase 1: 90 MPPA
Atlanta	19 million m²	104 MPPA
Beijing	23 million m²	96 MPPA
London Heathrow	12 million m²	78 MPPA
Amsterdam Schiphol	20 million m²	68 MPPA
Frankfurt	21 million m²	64 MPPA
Istanbul Ataturk	12 million m²	68 MPPA

▲伊斯坦堡新機場與其他國際機場容量比較

(二)Master layout & phasing plan
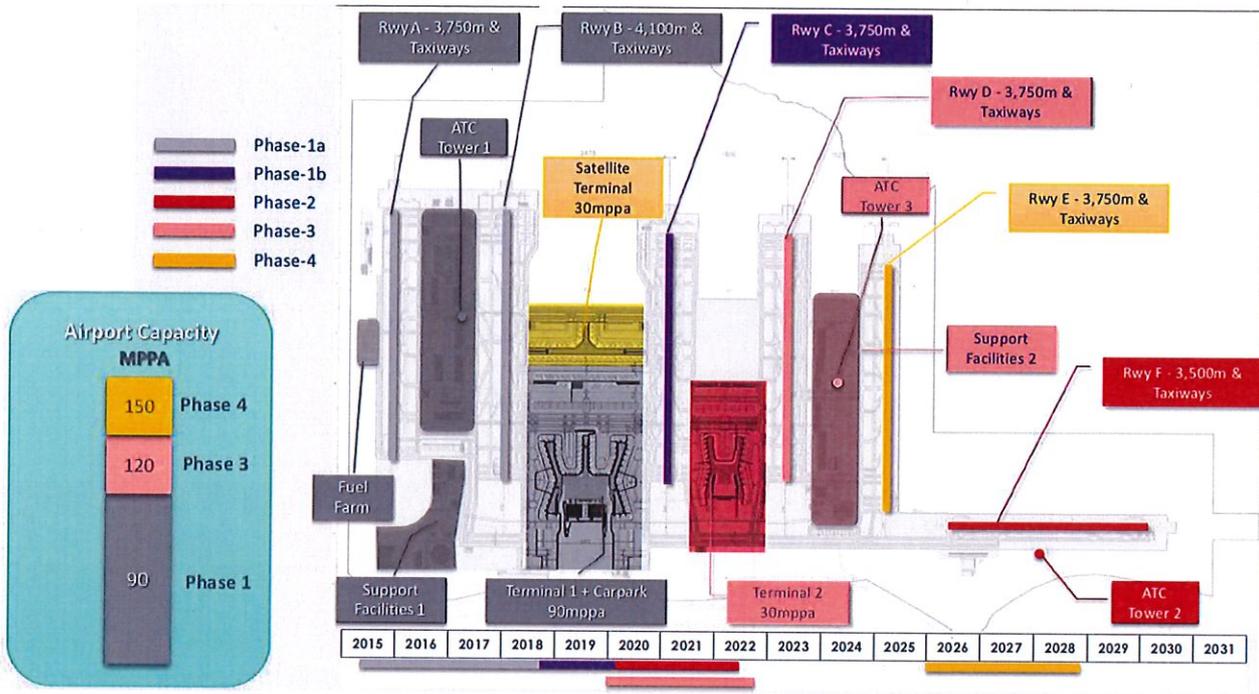
第一階段：Phase 1 Construction Area	總計 3,164 平方公尺
機場航廈建築	1,370 平方公尺
多層停車場（5 區、7 層樓：共計容納 18,000 車輛）	624 平方公尺
其他周邊設施	1,170 平方公尺

伊斯坦堡機場建設規劃將每一個階段工程範圍以時間軸（甘特圖）的方式呈現，
利用色塊標明每個階段(phasing)，讓閱讀者更明瞭易懂。

(三)BIM (building information modelling)

建設規劃階段結合 BIM 軟體的分享如下：

(四)塔台及航管系統 A-SMGCS

▲伊斯坦堡機場塔台配有 16 個管制席位

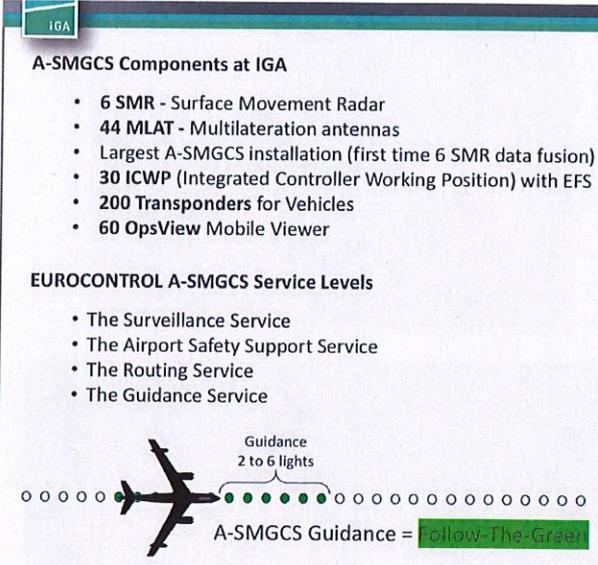操作介面：ICWP 系統搭配 A-SMGCS Level 2（最後目標為達成 Level 4 等級）
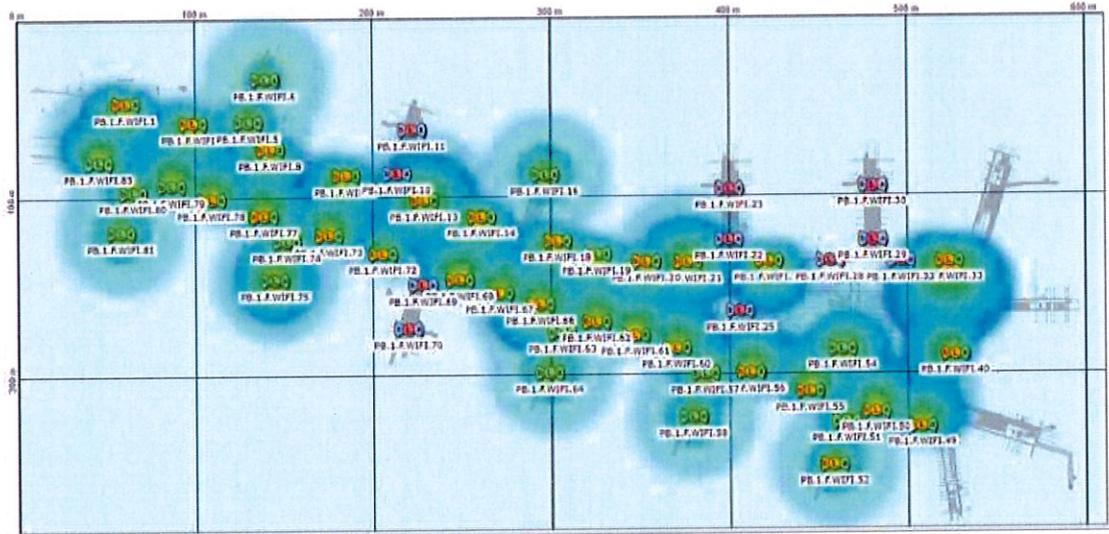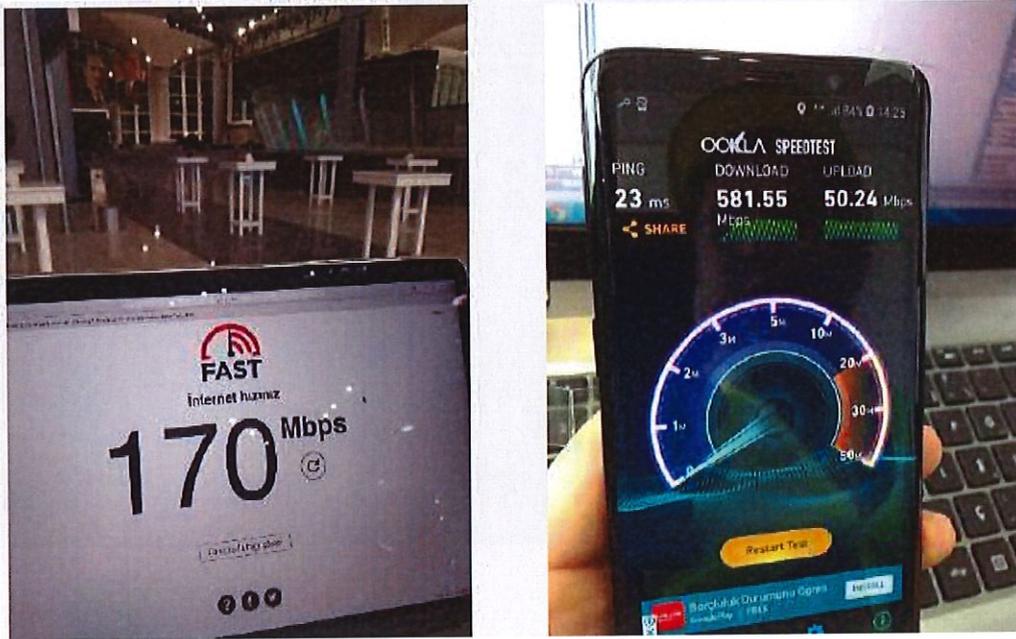
▲伊斯坦堡機場的 A-SMGCS

(五)營運控制中心 AOCC

伊斯坦堡機場的 AOCC 內容：監控及調度中心、技術與維護服務人員、專業營運及協調中心、計畫及非計畫內的資源配置。遇到緊急狀況可直接成立緊急小組進行應變計畫。

▲伊斯坦堡機場提供之 AOCC 照片

(六)機場 IT 基礎建設及相關服務：

● 全面 Wi-Fi 覆蓋網絡；土耳其第一、歐洲使用 H-VPLS 技術最大之網絡

- 動態等候管理系統（Dynamic Queue Management Systems）

  旅客可以查看電子螢幕顯示的建議等候時間，找出最適合他們前往安

  檢、證照查驗以及登機門的最佳路徑。此管理系統同時整合了公共運輸

  資訊。

- 互動式旅客諮詢系統（Interactive Passenger information system）

(七)ORAT － Operational Readiness & Transfer 測試營運以及移轉作業

伊斯坦堡機場的 ORAT 由仁川機場以及哥本哈根機場於 2015 年承攬。

▲伊斯坦堡機場 ORAT 開展流程圖

(八)ORAT 測試營運內容

- 共準備了 99 個試營運場景（46 個營運狀況、53 個緊急情況）

- 總計有 27,873 名員工進行課堂訓練

- 總計有 21,452 名員工進行場內訓練

- 2018 年 6 月至 10 月共有 45 個部分區域試營運

- 2018 年 9 月完成 1000 個旅客試營運。

- 2018 年 10 月完成 3000 名旅客試營運。

- 共有 65 個航空公司以及 3 家地勤業者參與。

- 土耳其航空自 2018 年 10 月 30 日進行首航，共營運 5 個航點。

- 自 2019 年 1 月 1 日起，共有 19 個航點服務開始營運。

- 伊斯坦堡機場在 2019 年 4 月 5 日及 6 日完成移轉，自 4 月 6 日開始正式全面營運。

四、貴州省機場集團有限公司信息工程公司總工程師李曉峰

分享關於智慧技術引領機場服務之發展，介紹貴陽機場發展大數據之平台建設。

(1) 基礎支撐平台建設：大數據平台解決數據的互聯互通、數據應用開發，數據可視化問題。雲端可提供統一建設，集中管理，按需求分配，具彈性擴充，敏捷響應，降低成本的 IT 基礎設施。

- 貴州省機場集團雲端，簡稱貴州機場雲，共部屬 3 個管理節點，7 各計算節點，1 個存儲節點以及 5 個網絡交換節點。可提供 410 個 vCPU、2143GB 內存和 28TB 存儲的能力。貴州機場雲可以為貴州機場集團以及省內其他機場提供雲端資源服務。


(2) 加大信息建設投入：建設「黔程在握」(A-CDM)系統

- 整合機場 AOC 數據、飛常準(VariFlight)數據、ADS-B 及移動 APP 錄入進程數據；以實現如下：
  1. 航班資訊透明
  2. 航班 ETA 精準優化
  3. 進程節點管控
  4. 機位可視化管理
- 對接空管 CDM 系統和民航運行監控中心 FDSS 系統、對接航油系統和部分航空公司系統，實現數據共享交換。
- 通過航站機坪調度模塊，以實現任務包含自動排班、任務派發、任務追蹤、數據採集和工作量統計計算等功能。

(3) 自行研發：設立智慧黔程（旅客服務平台）、旅客中轉系統、數據分析系統

- 建設開發微信服務官方帳號：提供機場消息推送、機場服務設施查詢、商業設施查詢、機場交通、失物招領等功能。
- 主行研發中轉服務系統：為中轉旅客提供登記、休息、餐飲及住宿等「一站式」服務的訊息平台，系統通過獲取旅客中轉資訊，可對旅客進行身分確認，並且對旅客服務內容進行提前預訂。
- 開發市場數據分析系統：結合大數據圖像展示技術，對機場每日航班架次、旅客運量、座位供給數、乘載比率(Load factor)及貨運量可進行統計分析。可產出周、月、季度和年度數據，並可依據管理階層需求進行不同維度的數據分析。
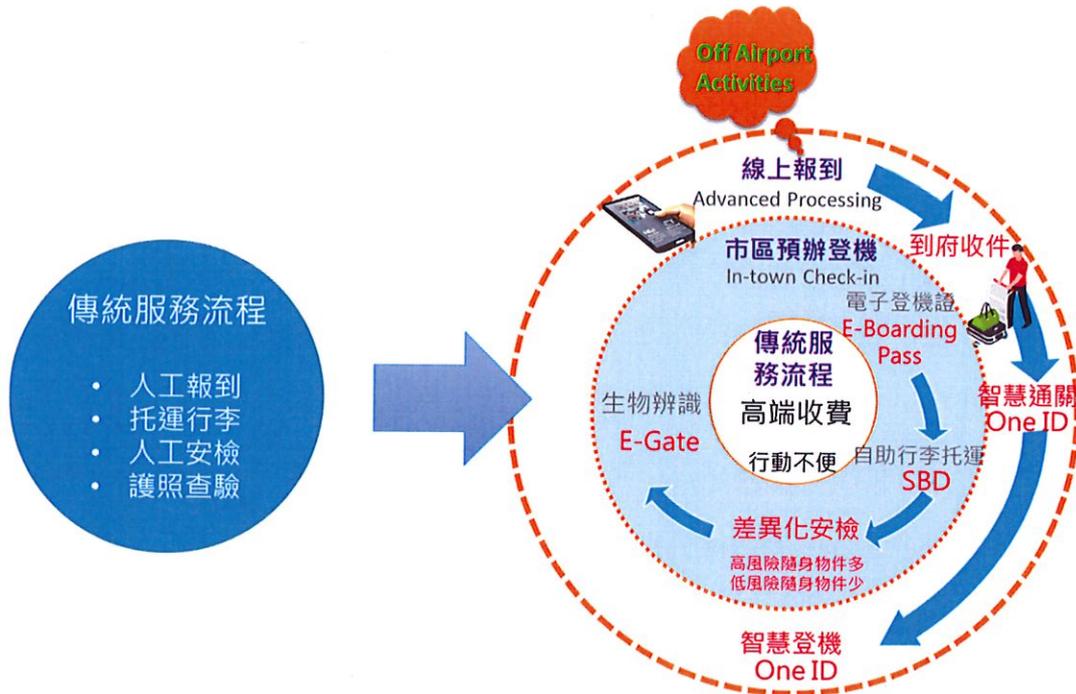
五、桃園國際機場公司副總經理但昭璧

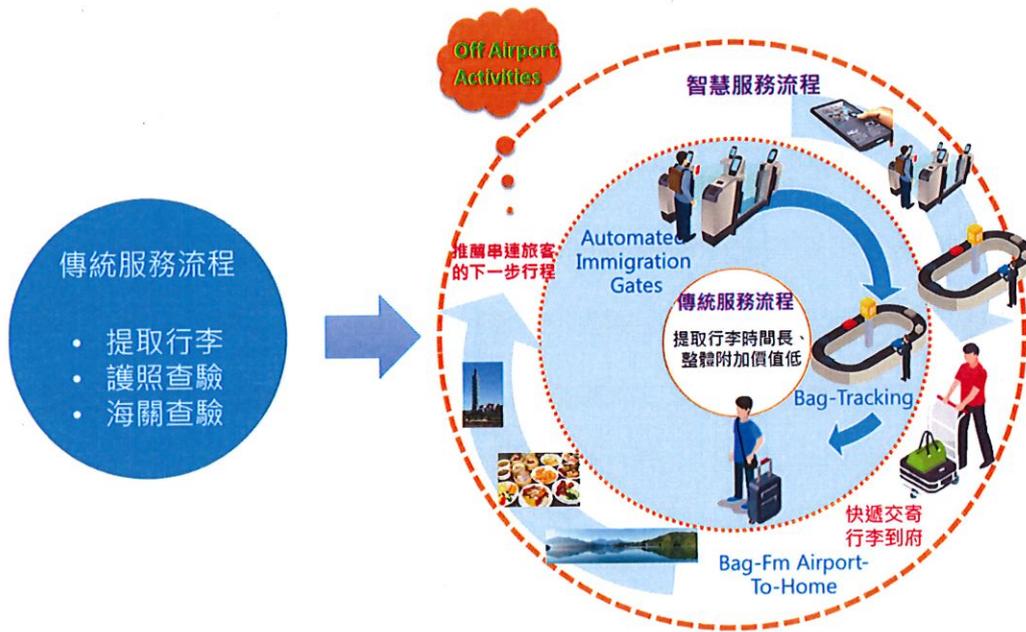(1) 桃園國際機場客運量逐年增長，過去 7 年的複合成長率為 8.43%，面對航廈設施飽和，航班與旅客持增長，桃園機場公司致力於打造智慧機場提升旅客機場智慧化服務來幫助機場營運。

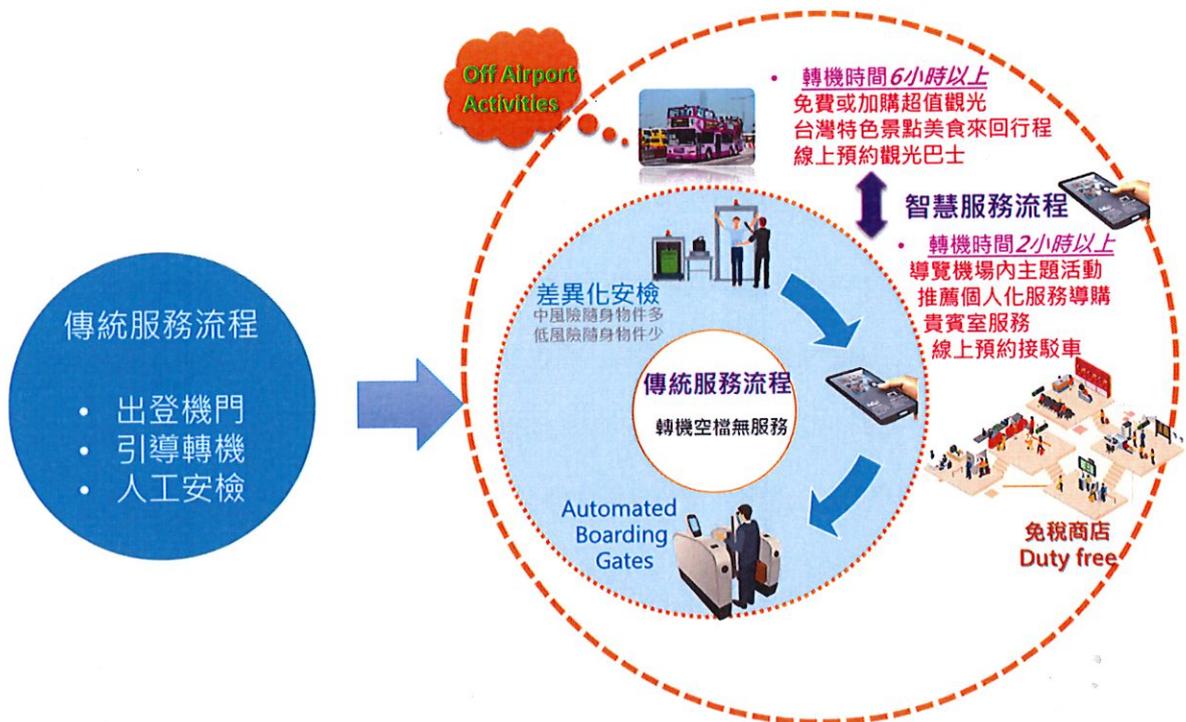(2) 旅客服務智慧化：對於不同需求旅客客製化服務以達到精準行銷，從顧客的需求思考，發展桃園機場的五導：「導資、導航、導覽、導購及導流」。
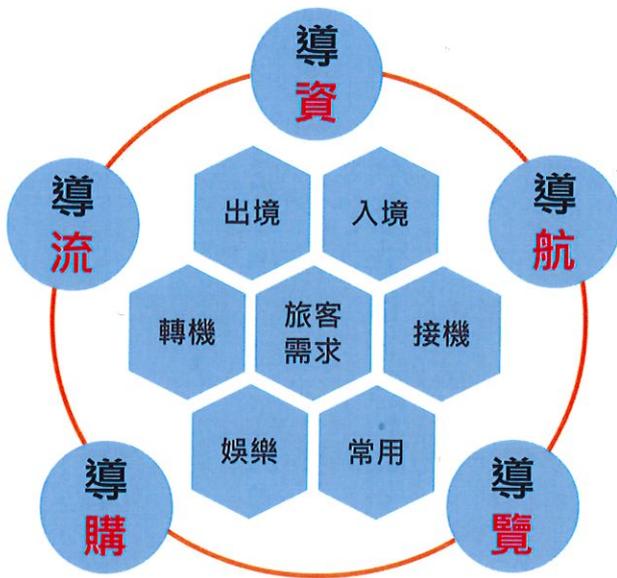
(3) 改變旅客出境流程：

（4）改變旅客入境流程：

（5）改變旅客轉機流程：

肆、 心得與建議

（一）、訂定策略發展智慧機場之重要：「智慧機場發展趨勢」座談會中香港機場代表歐陽顯宏先生分享，機場在規劃有關智慧機場發展相關專案時，首要先訂定策略，並且讓組織所有人都有參與感；歐陽先生也分享香港機場為其目標成立「智慧機場」部門統合相關資源。但副總經理也於頭腦風暴中分享，機場追求智慧機場發展的同時，首要評估機場本身規模與資源，依據每個機場的運量及資源，進行適宜的規劃。

（二）、發展大數據之利用：大數據蒐集對於發展智慧機場有很大的助益，比如旅客在商業服務設施使用的相關數據，或是旅客人流在不同時間的聚集趨勢，都可以幫助機場業務單位進行營運改善計畫。

（三）、參考上海機場公司專案管理之設計：上海機場公司於其工程專案的組織規劃採用（3+3+3）模式，三分之一由有經驗的工程管理人員加上三分之一有運行管理經驗的年輕人員，另外加上三分之一新招聘人員（以工程相關專業背景為主），兼顧工程、營運及培訓。本公司目前有多項大型建設專案進行，人力的配置也可以朝此方向進行調整，屆時第三航廈落成之後接手的管理人員也能更快上手。

(四)、本公司未來重大建設亦可參考伊斯坦堡機場之核心設施（如 ICT、AOCC、空側管理系統）及 ORAT 項目規劃，越早開始進行營運準備，並且將 ORAT master plan 的資訊與所有相關單位分享，資訊完全流通，建立部門之間流暢的橫向連結，才能持續優化 ORAT 計畫中的每個活動項目。

(五)、大陸地區的機場數量眾多、經驗豐富，建議加強與大陸機場橫向連結，參考大陸機場在機場建設規劃中對於「智慧機場」的扶持政策，比如機器人的自動辨識技術(AI)為未來發展的趨勢，利用機器人於航廈內巡場，或是空側的道面檢視，皆可以提高管理的效率。

（六）、持續積極參與國際交流及論壇活動，與外國機場代表交換意見，交流智慧機場經營及重大建設經驗，深化與其他國際機場之互動程度：本次與香港機場、上海機場公司、土耳其伊斯坦堡機場、瑞士蘇黎士機場、荷蘭史基浦代表皆有所交流，藉由這樣的場合，瞭解不同機場營運經驗，並建立與維繫友誼，促進未來合作之機會。

ISTANBUL AIRPORT

From Planning to Operation

Ismail H POLAT
Chief Planning Officer

IST

Innovation

iGA

SİVİL HAVACILIK GENEL MÜDÜRLÜĞÜ
SHGM DGCA

DEVLET HAVA MEYDANLARI İŞLETMESİ

T.C. Ulaştırma Denizcilik ve Haberleşme Bakanlığı

Istanbul in Aviation

Atatürk Airport + Sabiha Gökçen Airport

Legend: IST | SAW | Total

ANNUAL PASSENGER NUMBER (MILLION)
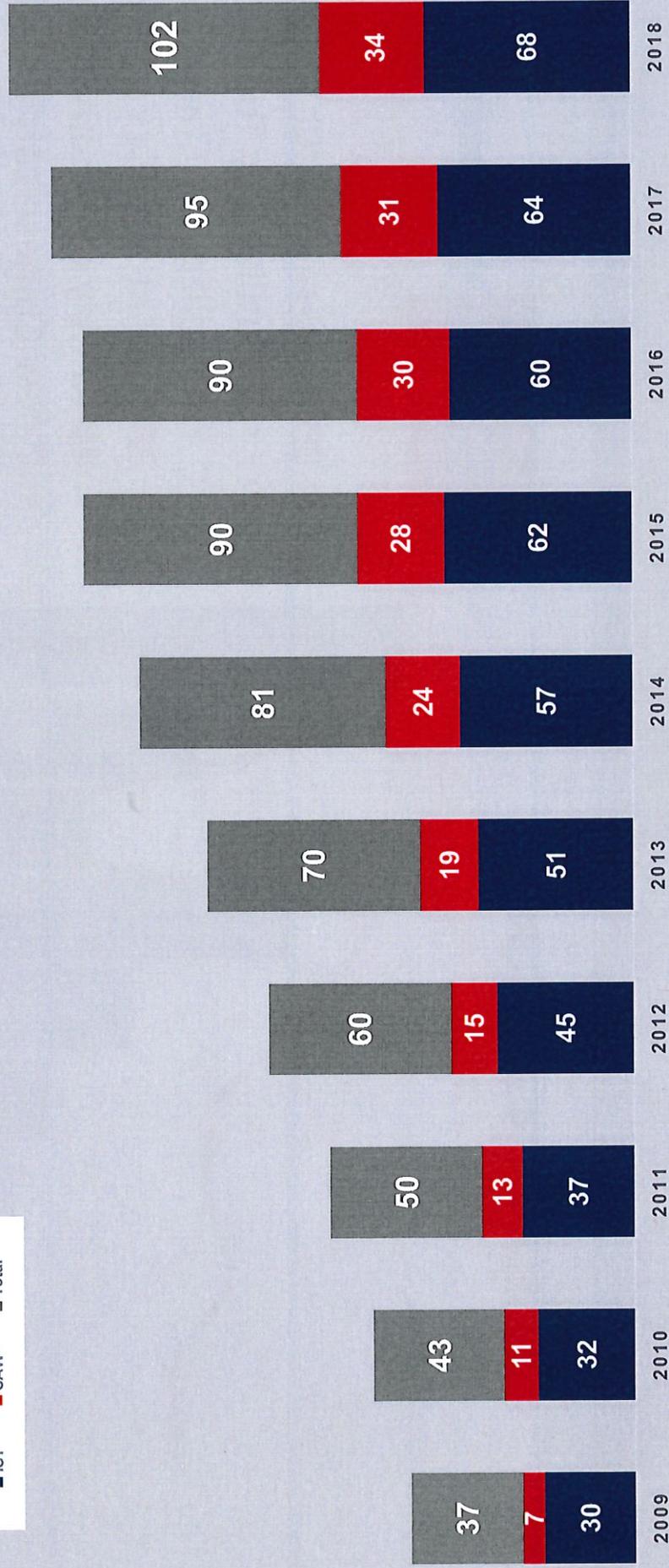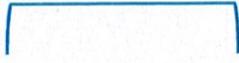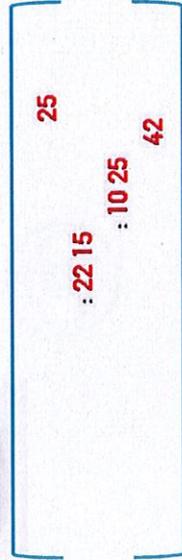
Year	IST	SAW	Total
2009	30	7	37
2010	32	11	43
2011	37	13	50
2012	45	15	60
2013	51	19	70
2014	57	24	81
2015	62	28	90
2016	60	30	90
2017	64	31	95
2018	68	34	102

Project Timeline

07.04.2044
End of
Consession
Period

TENDER
3 MAY
2013

CONTRACT
SIGNED
19 NOV
2013

SITE
DELIVERY
1 MAY
2015

FINANCIAL
CLOSURE
19 OCT
2015

LIVE
29 OCT
2018

FULL OPERATION
07 APR
2019

CENGİZ
İNŞAAT

mapa
inşaat ve ticaret a.ş.

Limak

kalyon

iGA

The Challenge:

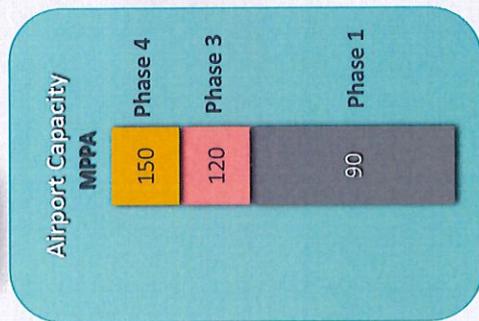Achieving quality at unprecedented construction speed

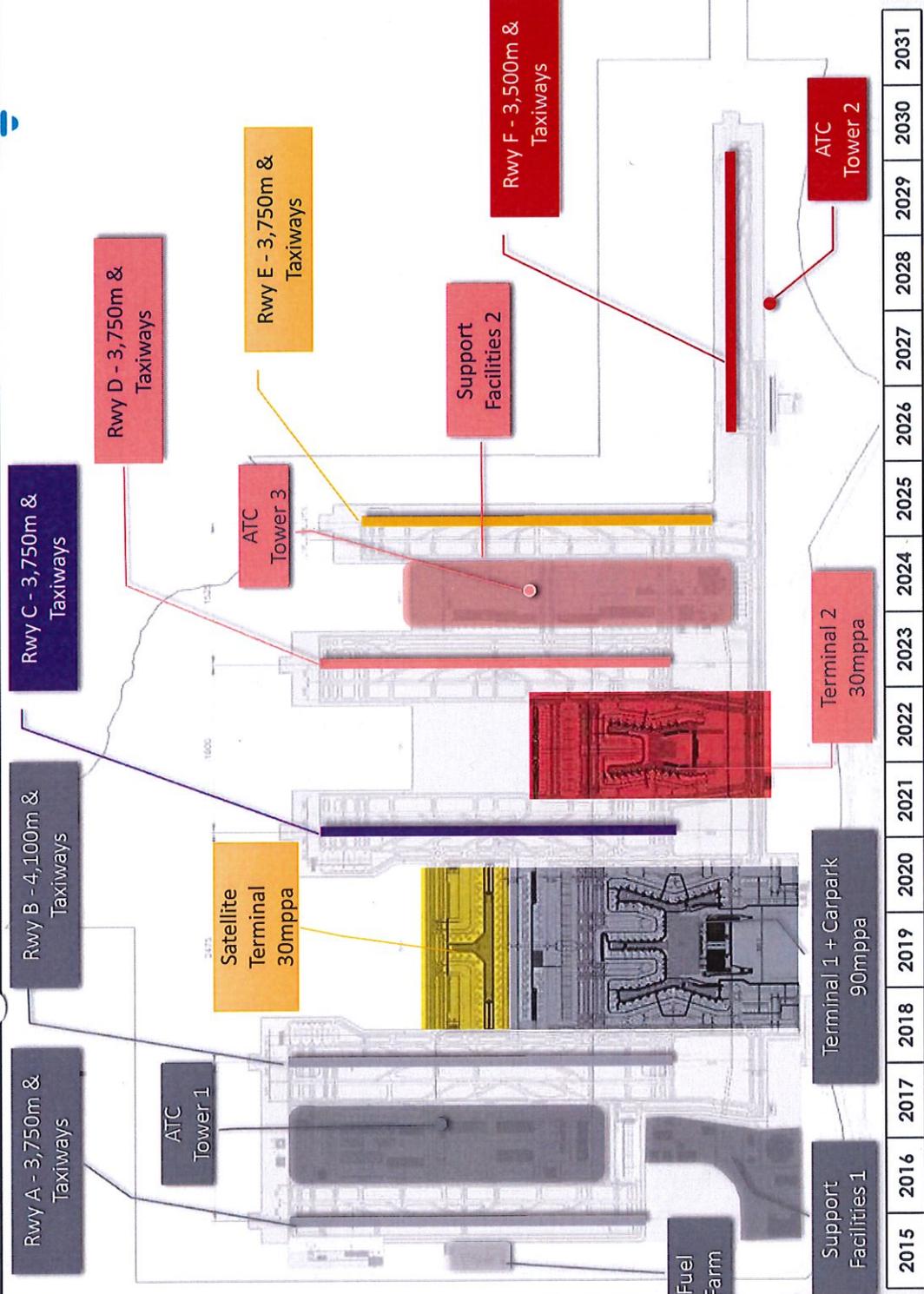Creating great passenger experience in a building of such epic size

Establishing an identity that befits Turkey and Istanbul

Master Layout & Phasing Plan

Innovation - IST

iGA

Rwy A - 3,750m & Taxiways
Rwy B - 4,100m & Taxiways
Rwy C - 3,750m & Taxiways
Rwy D - 3,750m & Taxiways
Rwy E - 3,750m & Taxiways
Rwy F - 3,500m & Taxiways

ATC Tower 1
ATC Tower 3
ATC Tower 2

Satellite Terminal 30mppa
Support Facilities 2
Support Facilities 1

Terminal 1 + Carpark 90mppa
Terminal 2 30mppa
Fuel Farm

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031

Phase-1a
Phase-1b
Phase-2
Phase-3
Phase-4

Airport Capacity MPPA

Phase 4	150
Phase 3	120
Phase 1	90

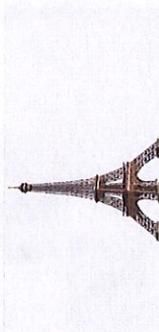| Facilities	Area
Terminal Building (90 Milyon passenger/year)	1.370.000 m²
Multistorey Carpark (5 blocks, 7 floor, 18.000 cars)	624.000 m²
Other Support Facilities	1.170.000 m²
Phase-1 Construction Area	3.164.000 m²

Construction Facts

MAIN TERMINAL FLOOR AREA

1.370.000 M²

= **x 2.5** Shanghai Tower
(540,000 m²)

STEEL (Structural + Reinforcement)

645.000 TONS

= **x 80** Eiffel Tower Metal Structure
(7,300 tons)

CONCRETE (1.250 Apron, 5.450 structural)

6.700.000 M³

= **x 2** Hoover Dam
(3,330,000 m³)

TERMINAL ROOF

450.000 M²

= **x 2** Beijing Olympic Stadium
(258,000 m²)

AMOUNT OF EXCAVATION

717.000.000 M²

= **x 3.5** Panama Canal
(205,000,000 m³)

AMOUNT OF FILL

350.000.000 M³

= **x 135** Great Pyramid of Giza
(2,600,000 m³)

ASPHALT PAVEMENT

6.150.000 TONS

= **x 10,700** A380
(575 ton)

TOTAL LENGTH OF DUCTBANKS

550 KM

> **From London to Paris**
(apprx. 450 km)

iGA

Resources for Construction

| Type of Equipment	# of Units
Heavy Duty Trucks	2.200
Excavators	252
Graders	57
Rollers	124
Dozers	101
Articulated Trucks	60
Wheel Loader	57
Concrete Mixer Trucks	100
Concrete Pump Trucks	40
Tower Cranes	95
Mobile Cranes	93
TOTAL Heavy Equipment	**3.179**
Concrete Plants (7 set)	1.250 m³/s
Asphalt Plants (6 set)	1.600 t/s
Stone Crusher Plants (8 set)	3.400 t/s
Mechanical Plants (14 set)	7.000 t/s

PEAK PERSONNEL

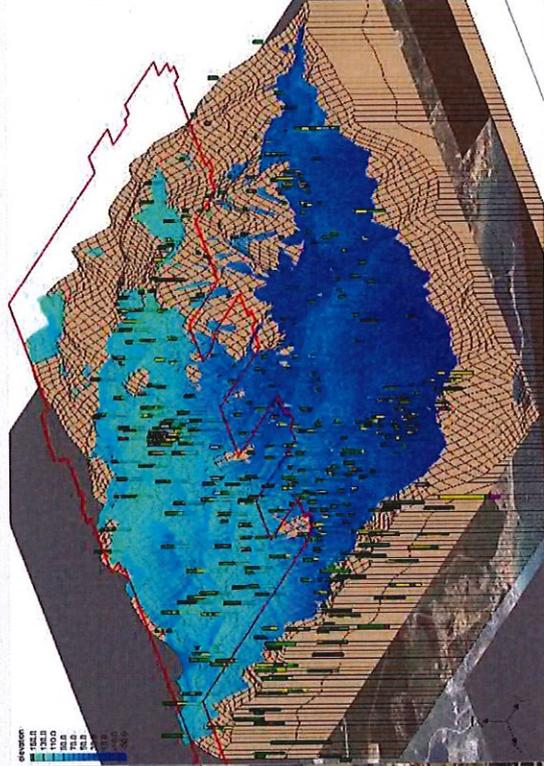|	
Engineers / Architects / Admin	**3.300**
Workers "REAL HEROS"	**29.700**
TOTAL (16 different nationalities)	**33.000**

iGA

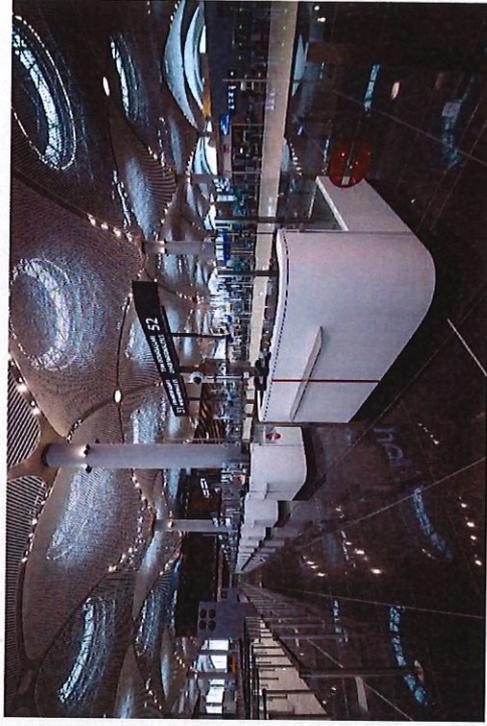Equipment Planning & Management
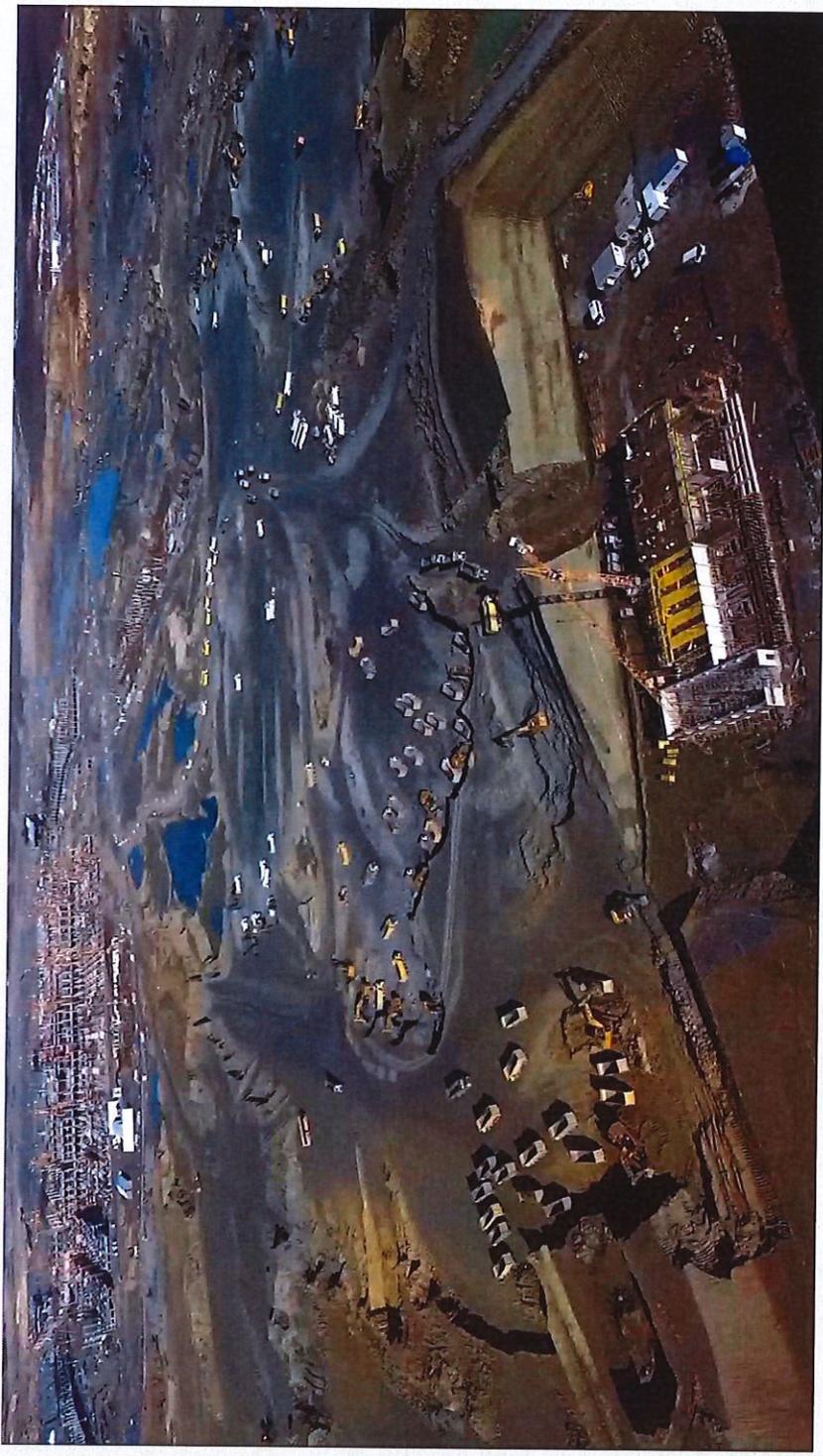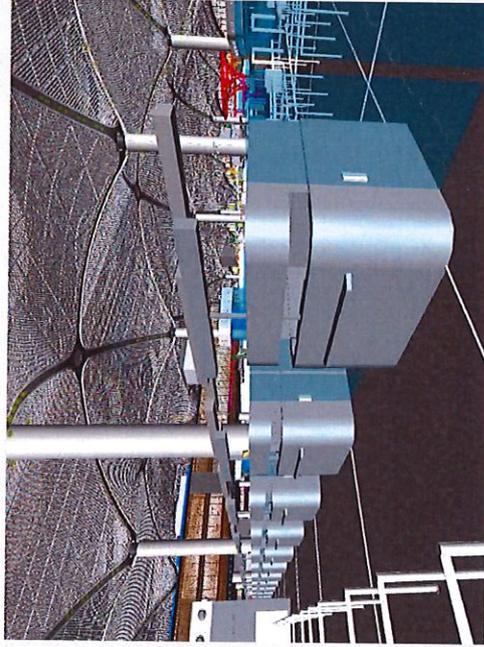
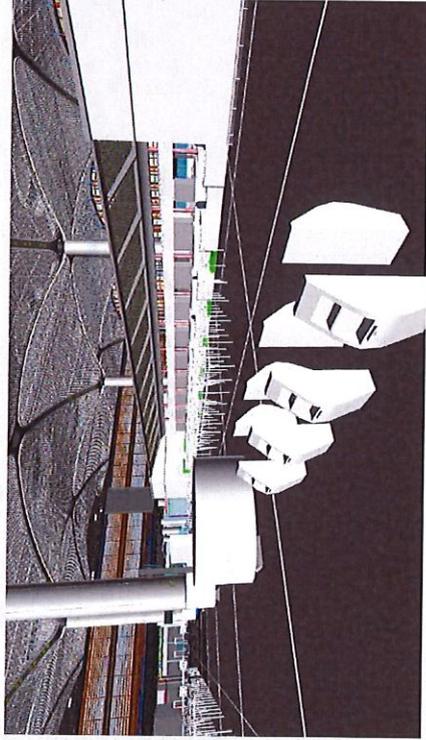# Earthworks & Geotechnical Works

- Deep piling
- Diaphragm walls
- Jet-Grout
- Wick Drain
- Surcharging
- Engineered Fills
- Dynamic Compaction
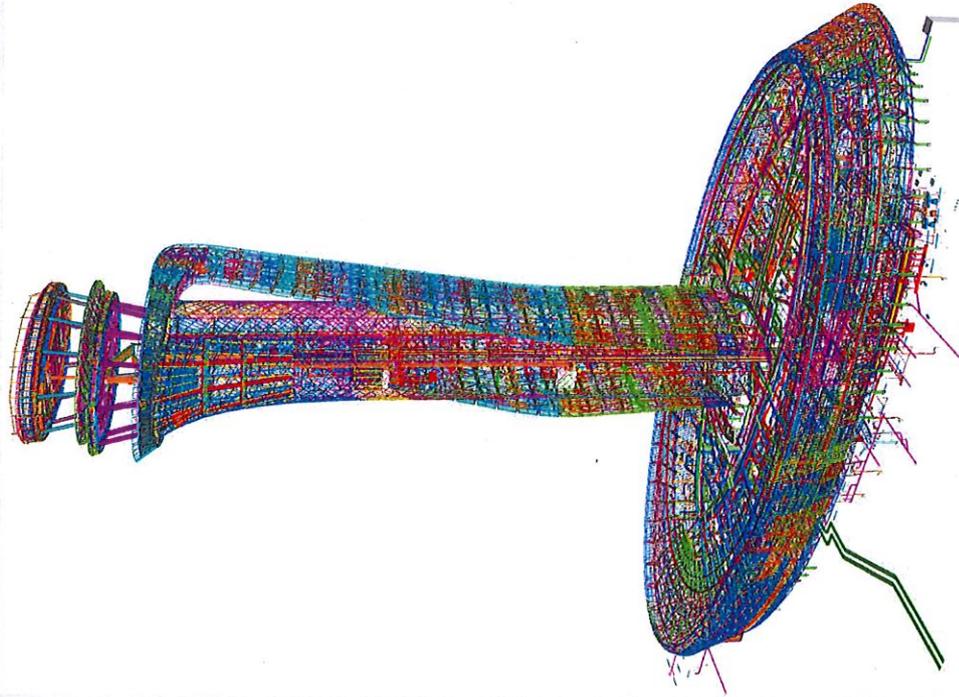- Cement Stabilization
- Concrete Columns

Building Information Modelling (BIM)

Innovation — IST

iGA

IMPACT of BIM for IGA

- **48,848** drawings incorporated into BIM.

- **601,918** major clashes were resolved during BIM coordination.

- **240,000** of them were critical to stop the actual work.

- **8,527** shop drawings were approved based on model comparison.

- **30,000** schedule activity were incorporated for 4D BIM work schedule and tracked for execution.

- **150** tablets were distributed to key site personel for up-to-datr BIM Access.

- **45,271** Notice For Inspection and Site Acceptance Tests were done via BIM360 using tablets on site.

- **1,300** site clash issues were resolved on site via BIM Site Teams.

- **435,030'** den equipment from all disciplines were incorporated into BIM with all critical attributes.

- **4 TB** information produced via BIM & **18 GB** actual BIM Mastermodel size (Largest model in the world in Autodesk BIM 360 system).

IGA Airside

- 5 RWYs with independent parallel approach capabilities (Total of 6 RWYs)
- High Intensity RWY Operations with 3 ATC Towers
- Full CAT IIIb operations
- RWY/TWY/Apron system supporting Code F (A380-800) operations
- Aux RWY for main Primary RWYs
- End-Around TWY preventing RWY incursions
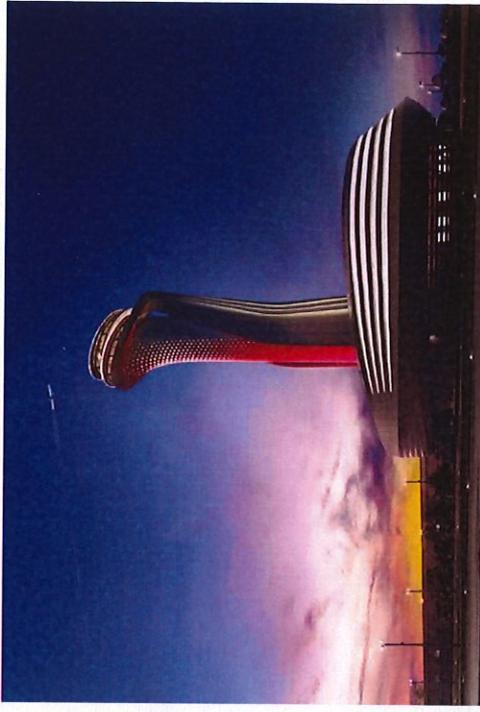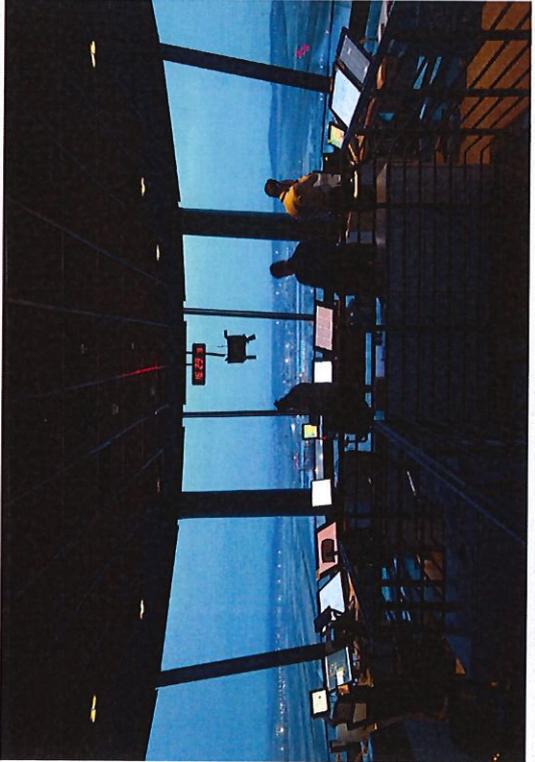- A-SMGCS Level 4 & Follow-The-Green capabilities

Innovation

iGA
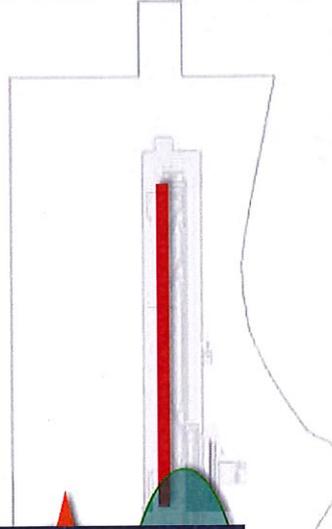
ATC Tower

Design by Pininfarina & AECOM

- H=90m
- 16 positions with ICWP & A-SMGCS Level 2
  (Planned for Level 4 by Summer 2019)
- 2 levels ATC cab
- DFAC, sports facilities, resting facilities, meeting rooms
 and offices

IGA A-SMGCS

Innovation

A-SMGCS Components at IGA

- 6 SMR - Surface Movement Radar
- 44 MLAT - Multilateration antennas
- Largest A-SMGCS installation (first time 6 SMR data fusion)
- 30 ICWP (Integrated Controller Working Position) with EFS
- 200 Transponders for Vehicles
- 60 OpsView Mobile Viewer

EUROCONTROL A-SMGCS Service Levels

- The Surveillance Service
- The Airport Safety Support Service
- The Routing Service
- The Guidance Service

Guidance 2 to 6 lights

A-SMGCS Guidance = Follow-The-Green
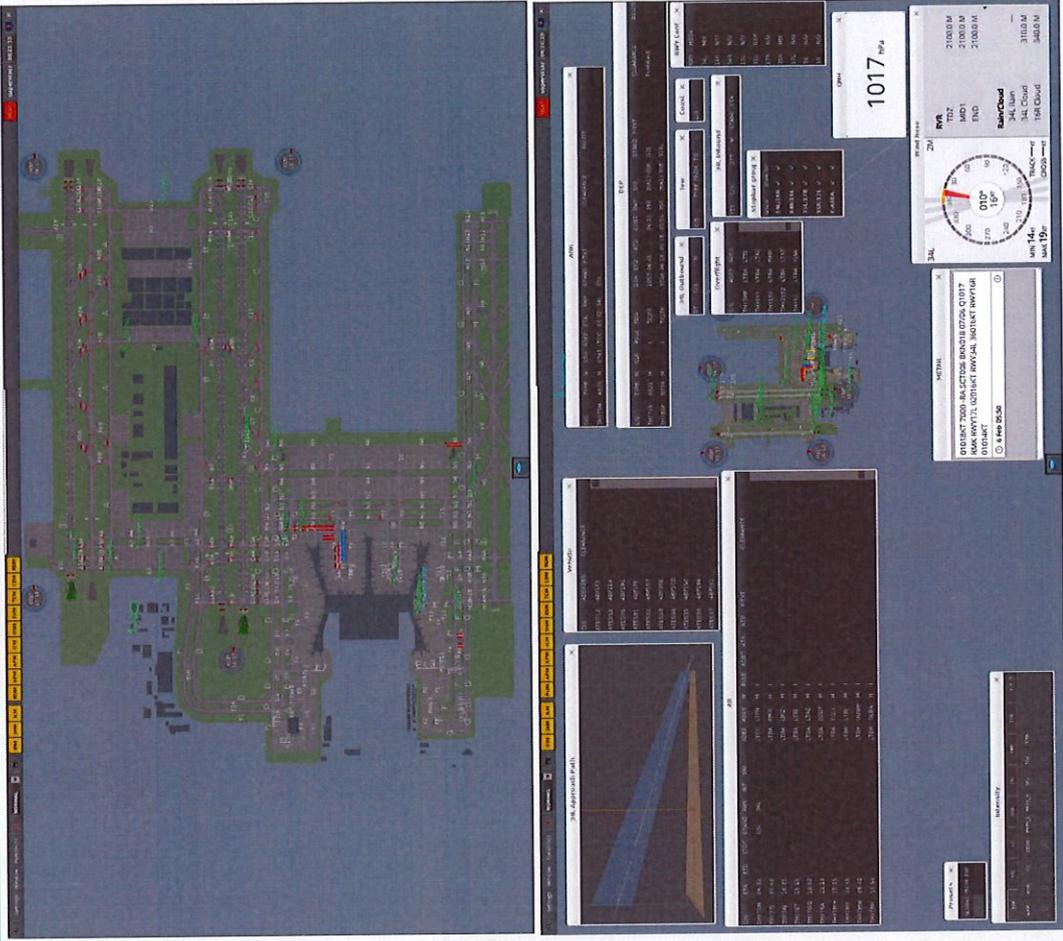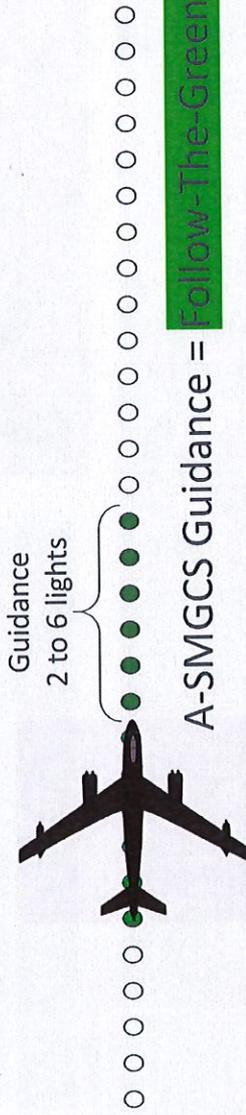
Terminal Building – AOCC

Airport Operations Control Center (AOCC) is the HQ of daily operations.

- Monitoring & dispatch
- Technical & maintenance services
- Special operations coordination center
- Planned or unplanned resource allocation
- Only Point of Contact

iGA

Innovation IST

Terminal Building – AOCC & Ramp C.

AOCC houses the Ramp Control Unit, designed as a remote tower with 180° multi-view screen.

Ramp and active airside is monitored by A-SMGCS Level 2 and high-resolution special cameras located on the aprons.
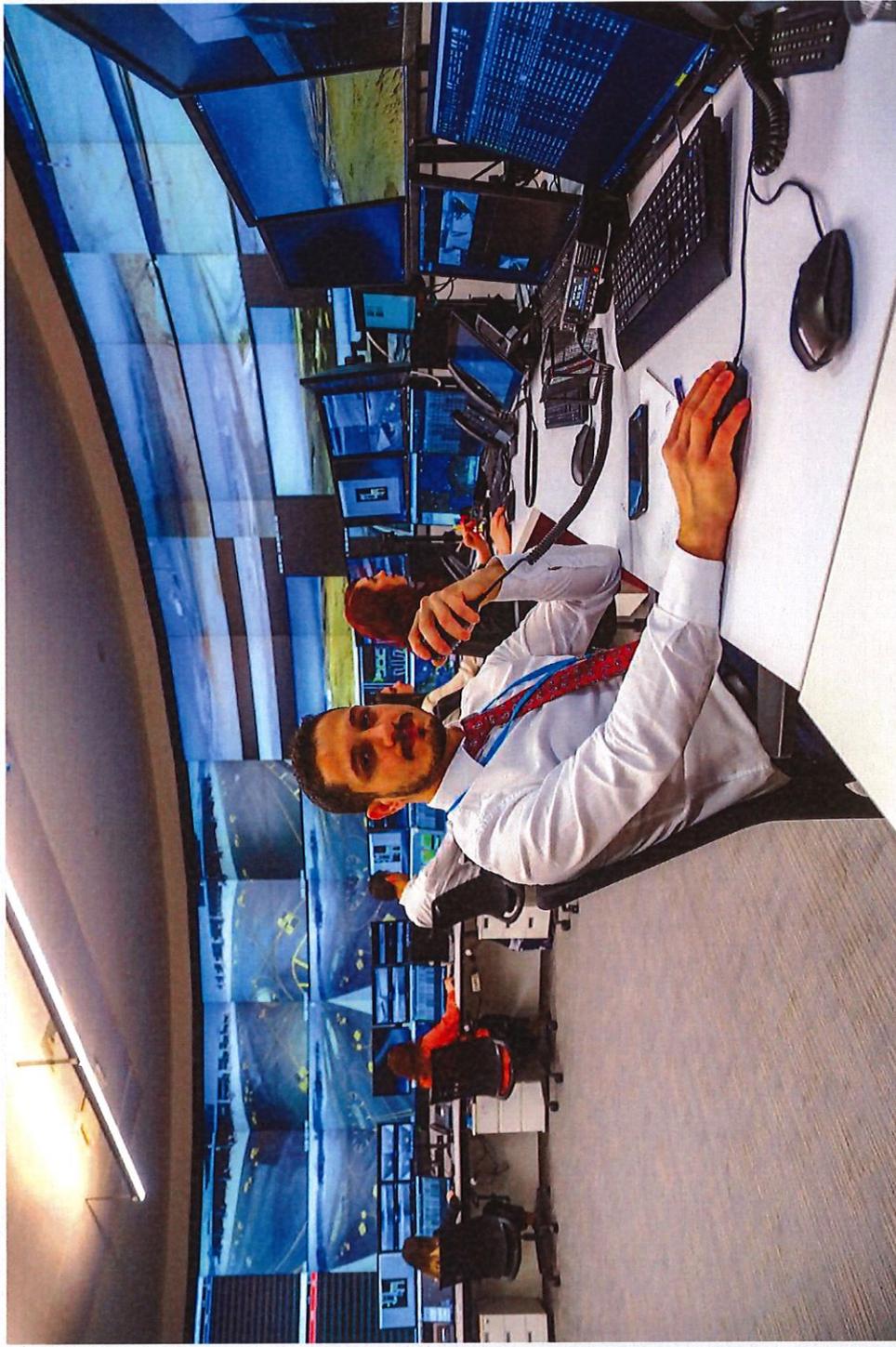
Airside Emergency Operational Resources

129 pieces of snow cleaning and pavement maintenance equipment

Aircraft recovery equipment and trained staff for A380 or B747-8 recovery operations.

As of today 492 Airside Staff completed CAA mandatory certification trainings.

30 Follow Me vehicles, 3 friction testers, top level trained staff

25 pieces of ARFF vehicles, top level trained staff, CAT 10 at both runways independently
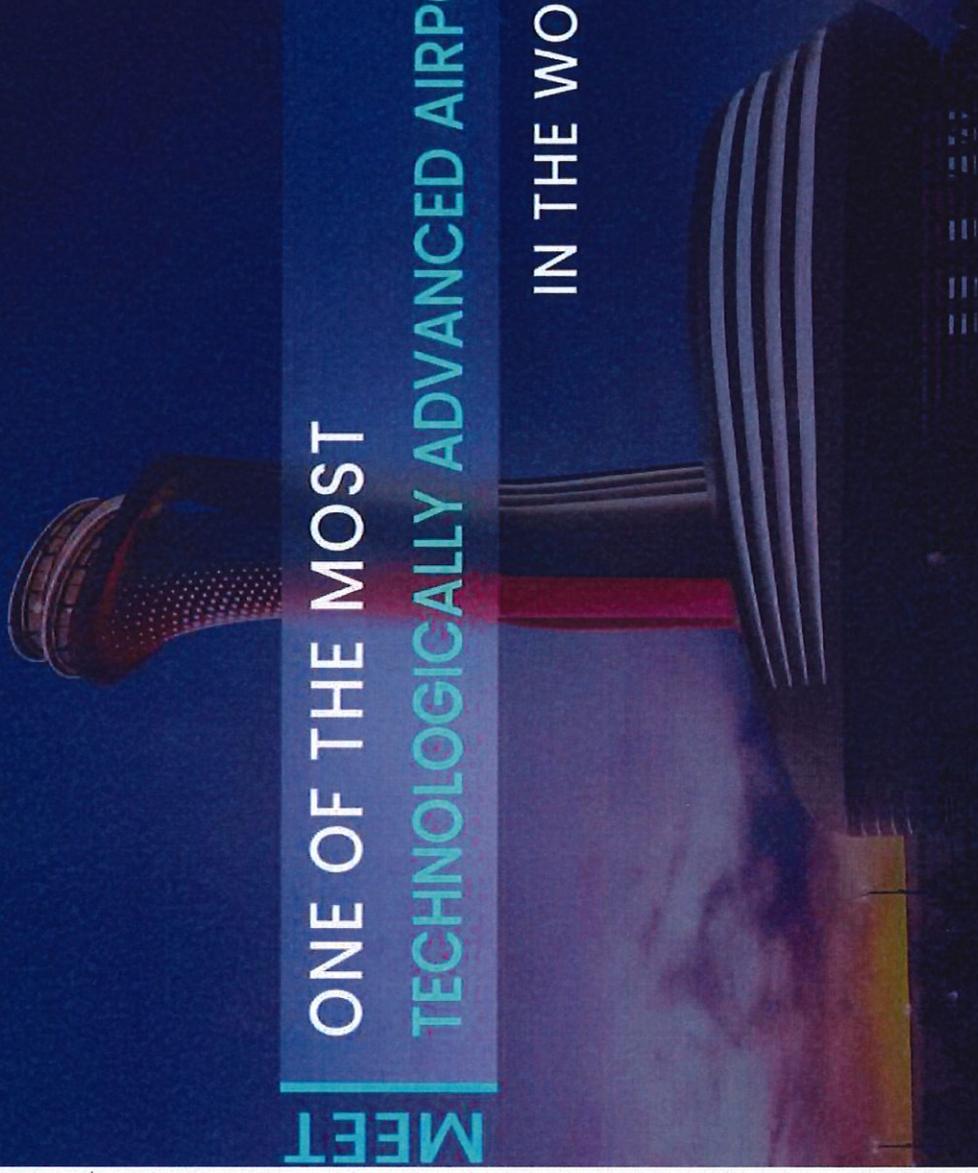
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IT – Disruptive Technologies

- Big Data
- AI
- Machine Learning
- AR/VR
- Autonomous Vehicles
- IoT
- LoRA WAN
- Digitalization
- Mobility
- Edge Processing
- Cloud Computing
- Smart Spaces
- Advanced Analytics
- TIER III certified Data Center

MEET
ONE OF THE MOST
TECHNOLOGICALLY ADVANCED AIRPORT
IN THE WORLD

iGA

Istanbul Airport ICT Numbers

TIER III FACILITY
IGA Havalimanı İşletmesi A.Ş
IGA DC, Phase-1
15 August 2018
UPTIME INSTITUTE CERTIFIED

3 Data Center

102 Integrated System

467 Server

780 ICT Room

2.500 km (istanbul-Berlin) Fiber Optic Wiring

105.000 ea (Avarage of a city) Network Port

3.257 Card Access Point

3.267 Flight Information Display

14.549 Support Provided User

10.500 CCTV

6.500 km (istanbul-New Delhi) Copper Wiring

209.715.017 GB Data Capacity

Equipment Monitoring using IoT
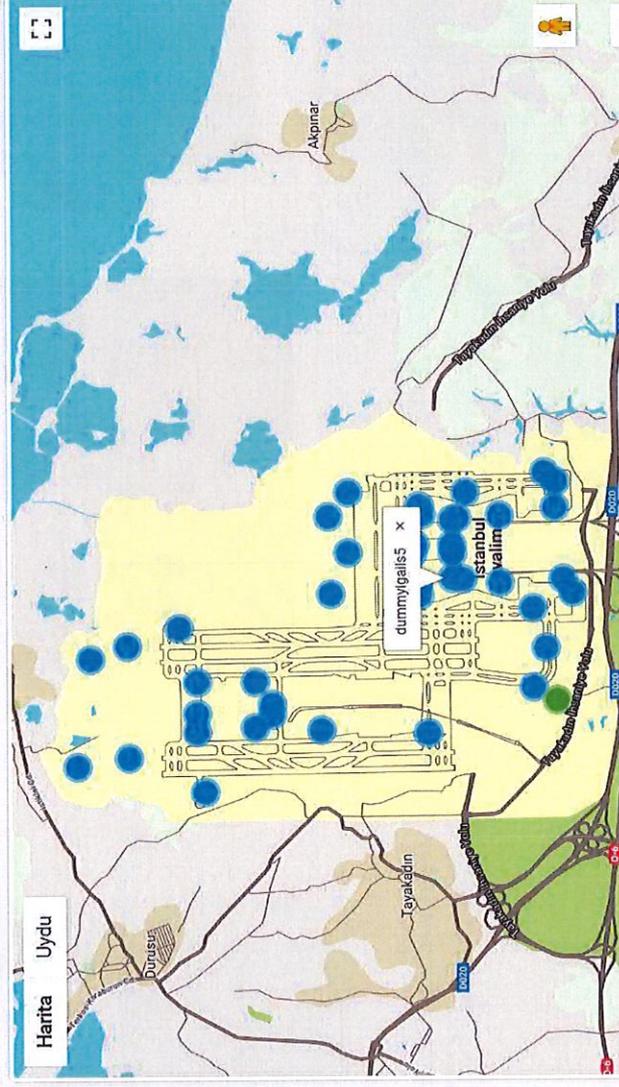

IoT based monitoring:

- CNS/ATM components
  - PSR/SSR
  - ASMGCS (SMR & MLAT)
  - NAVAIDS (ILS, VOR, DME)
  - Comm. (Radios)
- AWOS Components
- Power Supply (Generators, UPS)
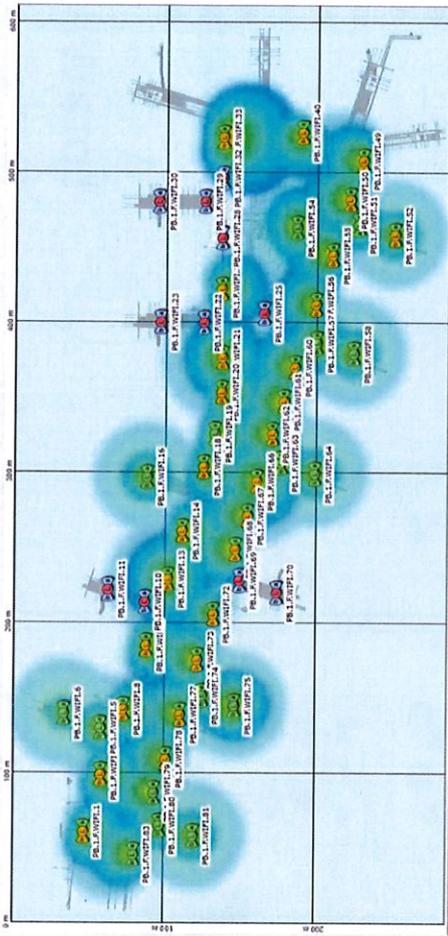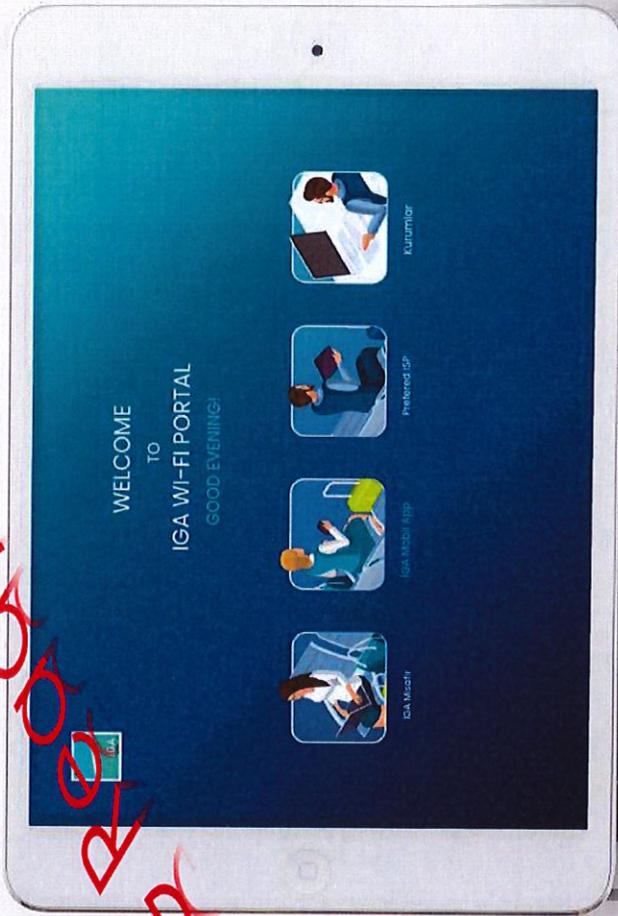- Remote Equipment (drainage pumps)
- Utility meters

LoraWAN

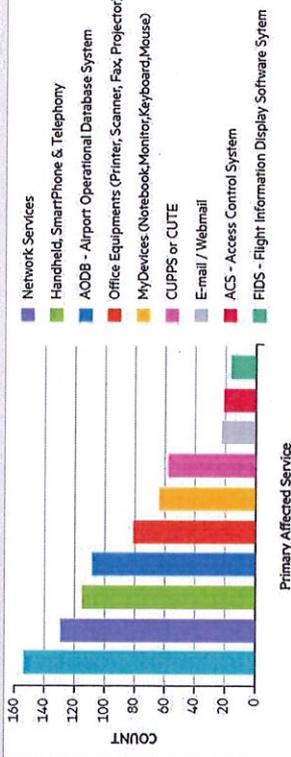(Long Range Wide Area Network)

Airport IT Infrastructure

- Full Coverage Wi-Fi
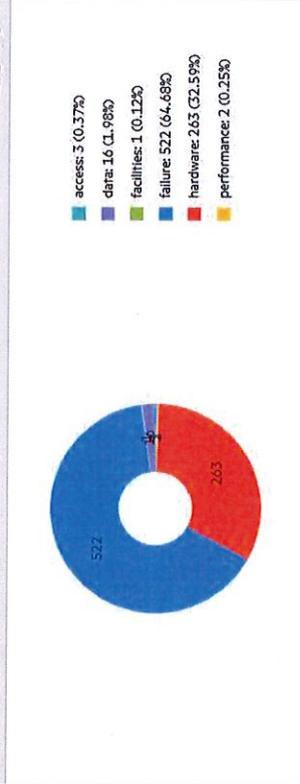
- Turkey's First,
  Europe's Largest H-VPLS Network
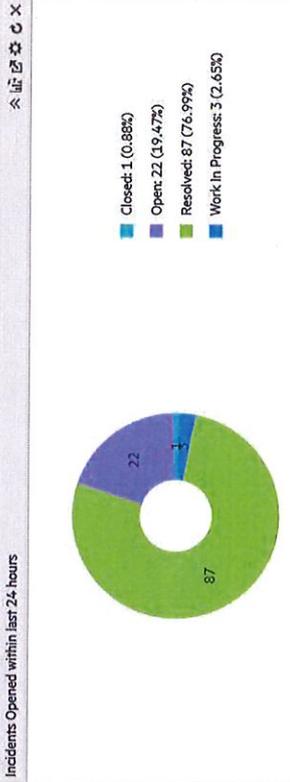
Airport Service Management

iGA

Top 5 Affected Services with Open Incidents assigned to iGA

Primary Affected Service
COUNT

- Network Services
- Handheld, SmartPhone & Telephony
- AODB - Airport Operational Database System
- Office Equipments (Printer, Scanner, Fax, Projector)
- MyDevices (Notebook,Monitor,Keyboard,Mouse)
- CUPPS or CUTE
- E-mail / Webmail
- ACS - Access Control System
- FIDS - Flight Information Display Software System

All Opened Incidents by Subcategory

522
263

- access: 3 (0.37%)
- data: 16 (1.98%)
- facilities: 1 (0.12%)
- failure: 522 (64.68%)
- hardware: 263 (32.59%)
- performance: 2 (0.25%)

Incidents Opened within last 24 hours

22
87

- Closed: 1 (0.88%)
- Open: 22 (19.47%)
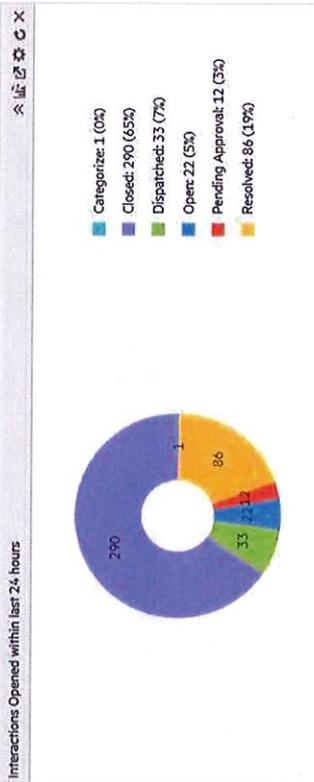- Resolved: 87 (76.99%)
- Work In Progress: 3 (2.65%)

Incidents Opened within last 24 hours - List

Incident ID	Status	Open Time	Category	Assignmen	Assignee	Title	Primary A	Priority	Impact	Urgency
IM206...	Work In...	27/05/...	incident	L3 - Ph...	taner e...	PT121...	Physic...	4 - Low	4 - User	4 - Low
IM206...	Work In...	27/05/...	incident	L3 - Ph...	osman...	Transfe...	Physic...	4 - Low	4 - User	4 - Low
IM206...	Work In...	27/05/...	incident	L2 - Ph...	bilal.sa...	D Katı...	Physic...	4 - Low	4 - User	4 - Low
IM206...	Open	27/05/...	incident	L1 - Ph...		LO104 ...		4 - Low	4 - User	4 - Low
IM206...	Open	27/05/...	incident	L1 - He...		AOCC ...	Office ...	4 - Low	4 - User	4 - Low
IM206...	Open	27/05/...	incident	L1 - He...		Geliş k...	Office ...	4 - Low	4 - User	4 - Low

12 records displayed.

List All

Interactions Opened within last 24 hours

290
86
33
22
1

- Categorize: 1 (0%)
- Closed: 290 (65%)
- Dispatched: 33 (7%)
- Open: 22 (5%)
- Pending Approval: 12 (3%)
- Resolved: 86 (19%)

Interactions Opened within last 24 hours - List

Interaction ID	Status	Affected Service	Open Time	Close	Title	Service Recipie	Assign
SD12417	Dispatched	Handheld, Sm...	01/02/2019 1...		PT00753 Ech...	ELIF YAMAN	
SD12418	Dispatched	Handheld, Sm...	01/02/2019 1...		PT00754 Gol...	ELIF YAMAN	
SD12419	Dispatched	Handheld, Sm...	01/02/2019 1...		PT00755 Del...	ELIF YAMAN	
SD12440	Dispatched	MyDevices (N...	02/02/2019 1...		PT01013 PT...	SINAN BAR...	
SD12450	Dispatched	Office Equipm...	03/02/2019 1...		PT00978 UÇ...	SELMAN BL...	
SD12465	Dispatched	Office Equipm...	04/02/2019 0...		PT01011 PT...	SELMAN BL...	

50 records displayed.

List All

Terminal Building – PAX Services

FAST TRACK – Seamless Passenger Experience

CHECK-IN   BAG DROP   BAG DROP   I-GATE   E-GATE

BOOKING   CHECK-IN   BAG DROP   SECURITY   BORDER CONTROL   BOARDING

Innovation – IST
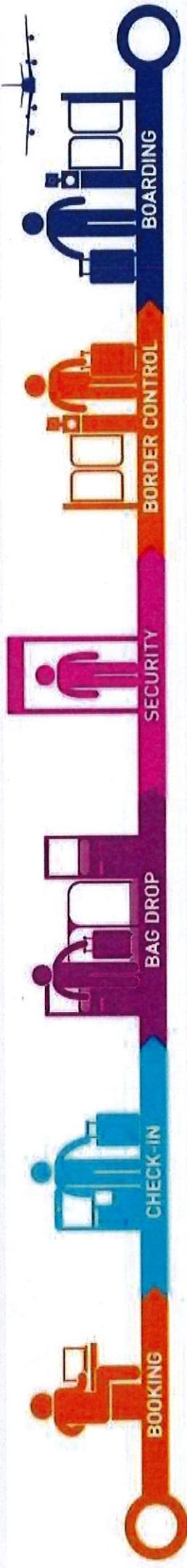
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Queue Management System

Dynamic Queue Management System

meeting with passenger at front of Terminal and helping them to find best way for entrance security, passport and gates.

Integration with public transport system

Personnel Tracking with IoT
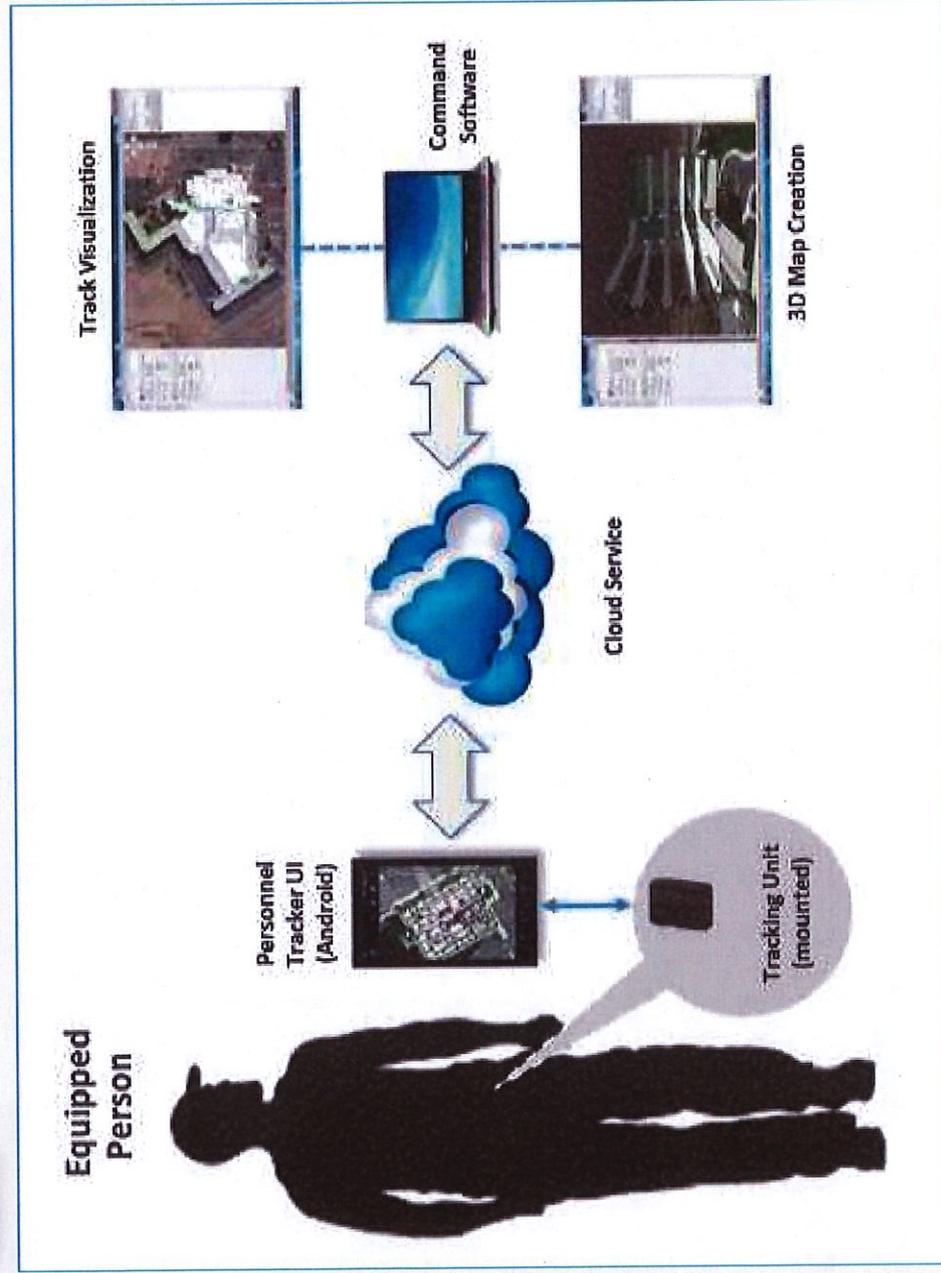
Real-time Personnel
Tracking wit IOT

Robots

Robot Use Cases;

- **Greeting / Information :** In the designated areas, the robot's to perform virtual assistance in multiple languages to passengers

- **Security :** To benefit from robots face-scanning technology and protection of specific zones

- **Navigate :** Which of directing or accompanying passengers between different regions

iGA

Interactive Passenger Information System
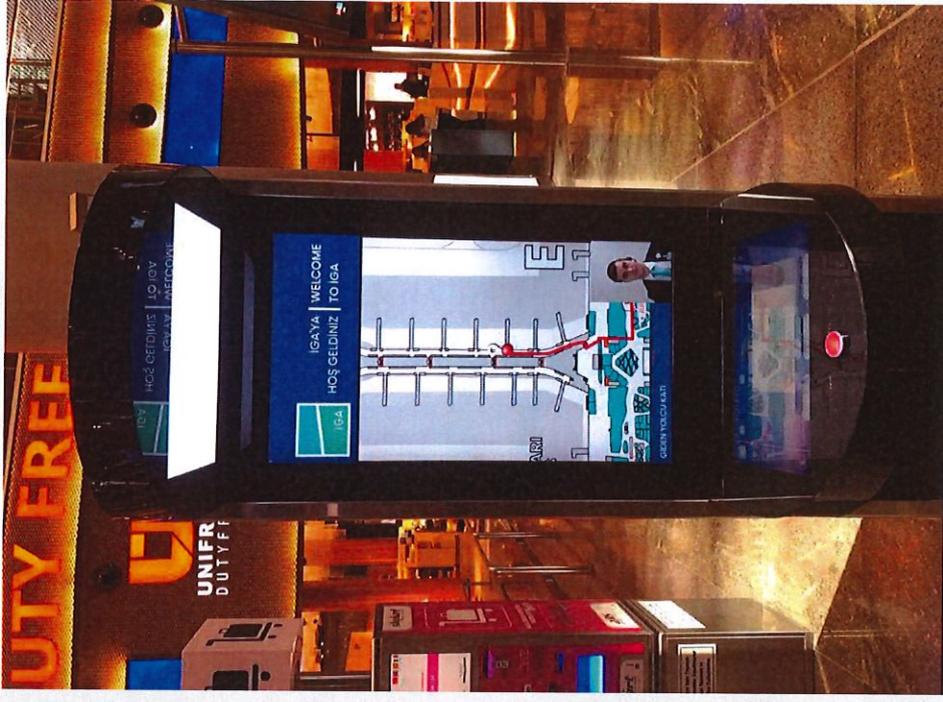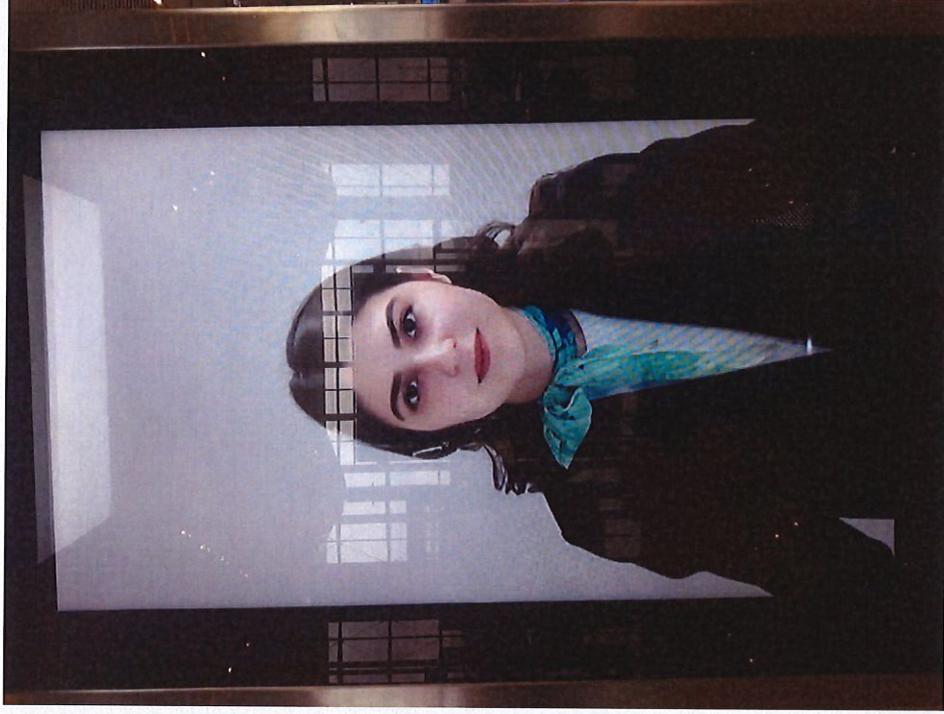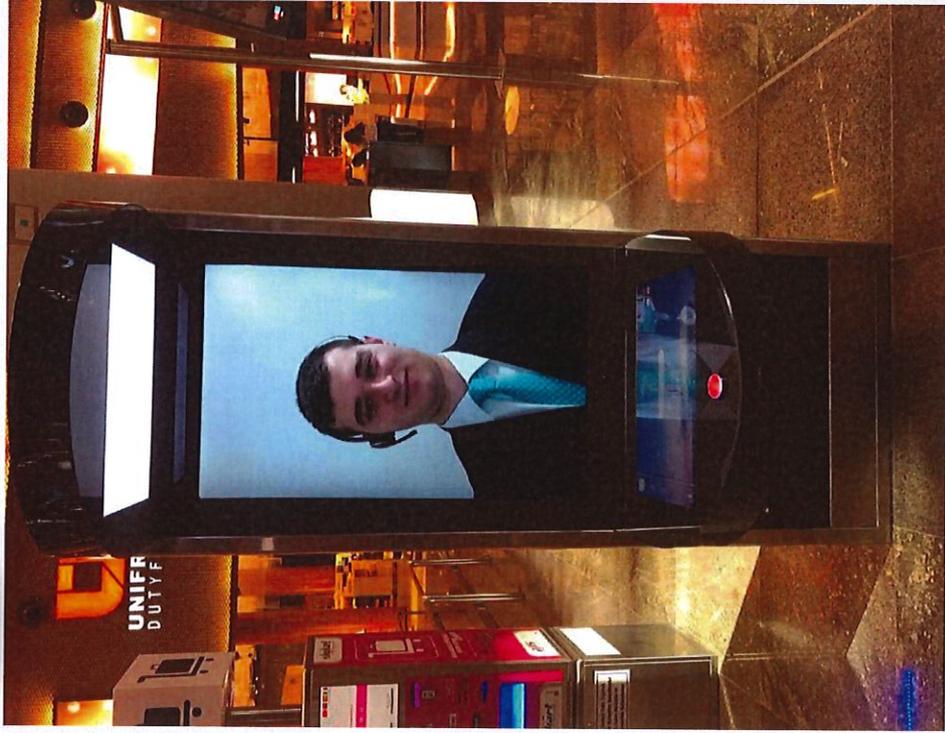
Autonomous Vehicles
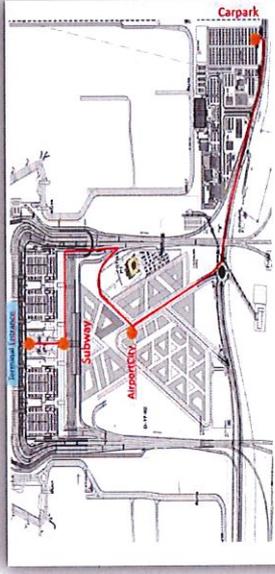
Autonomous Vehicle Routes from Carpark & Airportcity to the Terminal
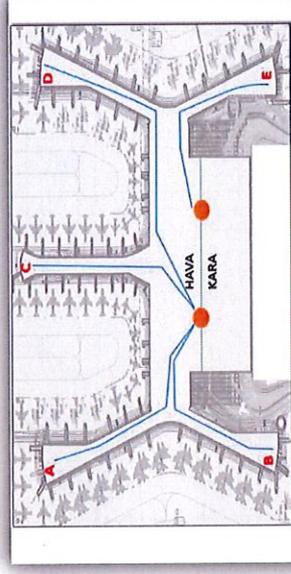
Potential Autonomous Vehicle Routes at IGA

iGA

IT Services Provided

- Full Wi-Fi Coverage including airside aprons
- Turkey's First, Europe's Largest H-VPLS Network
- Dynamic Queue Management System to find the best way for entrance security, passport and gates.
- Interactive Passenger Information System

Digital Airport

iGA

IGA Mobile App integrated with your ticket, will help you **From Your Home to Your Gate.**

- Time Management & Guidance
- Live Flight & BHS Information
- Virtual Shopping concept
- Information about services
- Airport parking information

- Make a mention to @ISTflight
- Put your flight number with # and send a tweet
- Get all notifications about your flight.

NFC AKILLI UÇUŞLAR
Smart Flights

TELEFONUNUZU BURAYA YAKLAŞTIRIN
BRING YOUR PHONE CLOSER

Innovation -ﬕ- IST

IT New Technologies

iGA

Potential Autonomous Vehicle Routes at IGA

Autonomous Vehicle Routes from Carpark & Airportcity to the Terminal

Smart Carpark
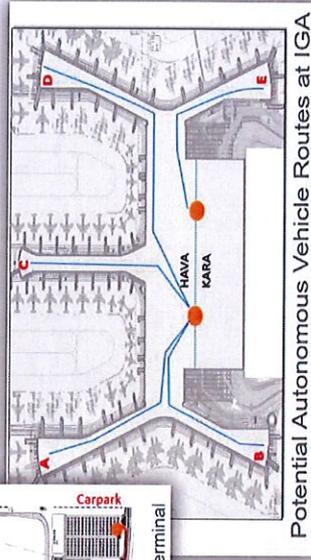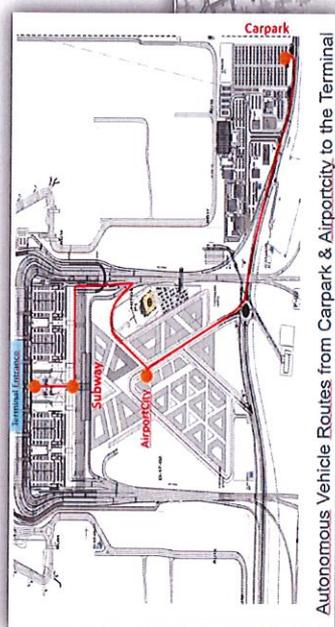
Multistory Carpark

18.000 Cars

Area: 624.000 m²

Open Space Carpark

22.000 Cars

Area: 500.000 m²

Total Carpark Capacity

40.000 Cars

Area: 1.127.000 m²

34rku91

Not my Car / My Car

Carpark Capacity (Multistory + Open)

Istanbul Airport	40.000 cars
Ataturk	8.500 cars
Munich	15.000 cars
Frankfurt	15.000 cars
Copenhagen	10.500 cars
Dubai	2.600 cars
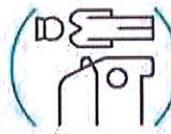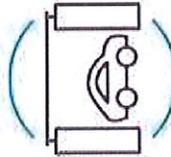
Valet	Fuel	Car Wash
Vehicle Help	Disabled Parking	Charge for Elec Vehicles
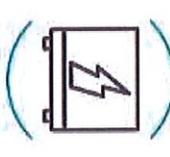
- Efficient traffic circulation
- Improved parking IT systems
- Extended services at Carpark
- Passenger Comfort with LET systems

Cargo Area

iGA
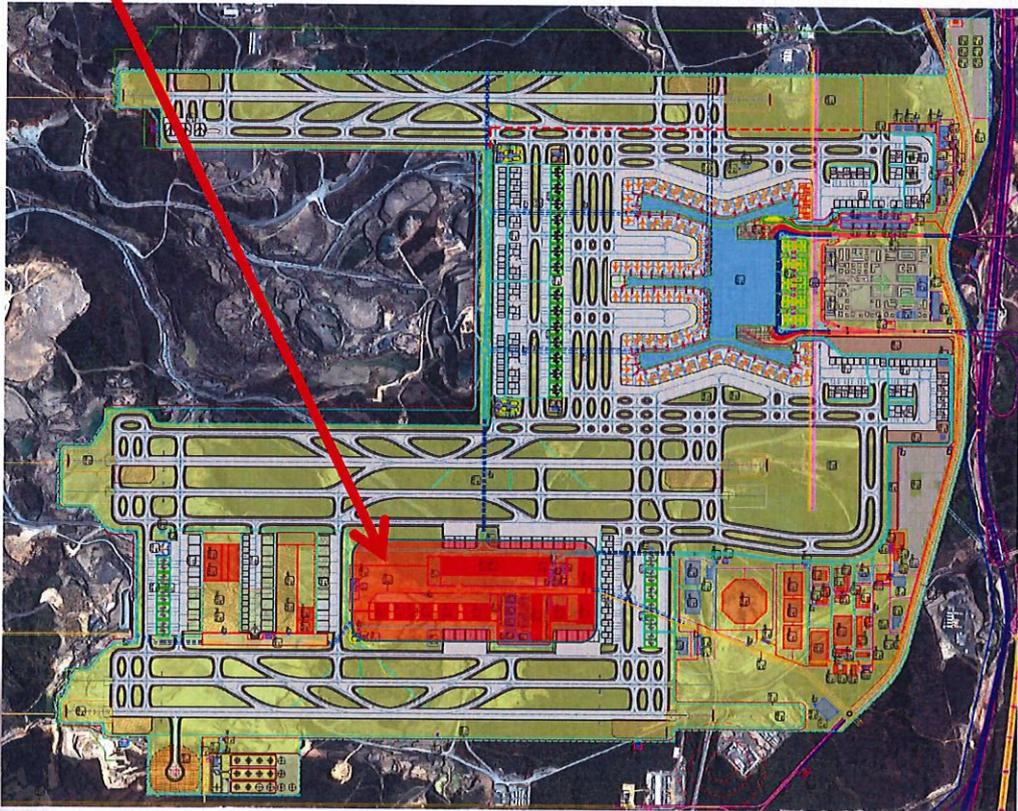
Cargo Area Facts	ATATURK AIRPORT		ISTANBUL AIRPORT
Annual Cargo Capacity	1,2 mn. tons	→	4,5 mn. tons
Total Cargo Space	300.000 m²	→	1.400.000 m²
Aircraft Parking	16 aircrafts	→	29 aircrafts
Leasable Area	-	→	340.000 m²
Expansion Area	-	→	60.000 m²
Temporary Storage Area	65.000 m²	→	195.000 m²
Carpark Capacity	750 cars	→	6.000 cars

Comparison	HONG KONG	FRANKFURT	DUBAI	MEMPHIS
Total Cargo Space	500.000 m²	1.500.000 m²	110.000 m²	5.000.000 m²
Annual Cargo (2017)	4.9 mn. tons	2.1 mn. tons	2.6 mn. tons	4.5 mn. tons
Aircraft Parking	43 aircraft	20 aircraft	23 aircraft	120 aircraft

Airport City

Airport Total Area : 76 Mn m²

Reserved for Airport City : 10.5 Mn m² (approx. 14%)

Airport City planned to include:

- hotels,
- commercial zones,
- free trade zone,
- shopping & social zones,
- park & recreational zones,
- serviced residential apartments
- hospital,
- exhibition facilities,
- mosque
- educational facilities.

Infrastructure works have already started and commercial negotiations with potential partners are on going.

CORE ZONE	T2 ZONE	LOGISTICS CENTER	EAST ZONE
750,000 m²	750,000 m²	5,000,000 m²	4,000,000 m²

Environmental and Sustainability Directorate

Environmental Management

Operation and Sustainability

Ecology Management

Wildlife Management

Social Management

Sustainability Initiatives & Schemes

Energy Efficiency

- Terminal Building 21% Energy saving.
- ATC Tower 20 % Energy Saving
- We provide 30,700 tons / year Carbon Dioxide reduction
- Equivalent to the annual energy consumption of 3,700 households

Green Airport Project

- LEED Certificate for Terminal, Carpark & Facilities
- ISO 14001 Environmental Management System
- ISO 14064 Greenhouse Gas Calculation and Control
- All 3rd parties receive the «Green Enterprise Certificate»

Water Efficiency

- The terminal building saves 40% water according to the standards.
  - Stormwater storage
  - Grey Water reuse
- 2 million cubic meters / year savings
- Equivalent to the annual water consumption of 6,750 households

Waste Management

- 240 tons / day waste management
- Zero Waste Target: Maximum recycling by segregating waste at source
- Biggest Auto Separation Plant in Turkey
- Compost production from organic waste
- Monitoring Water & Wastewater Treatment
- Environmental Pollution Prevention Program

Social Management

Community Support & Social Investment Programs:

- 2 community healthcare facilities
- School for 1250 students
- Employment for 3,000 workers from neighboring villages
- Support for 15 local woman entrepreneurships

LEED CERTIFICATION

**22 LEED Buildings
2.000.000 m2**

LEED Certified Terminal and Carpark
- %21 Energy Efficiency
- %40 Waster Efficiency

LEED Certified 3rd Party Buildings
- THY -10
- Çelebi – 2
- Havaş – 2
- UPS – 1
- DHL – 1
- Sistem Logistic – 1
- Gözen Security – 1

LEED Certified ATC Tower
- %20.5 Energy Efficiency
- %30 Water Efficiency

LEED Certified Mosque
- %24 Energy Efficiency
- %30 Water Efficiency

LEED Certified Presidential Guest House
- %21 Energy Efficiency
- %30 Water Efficiency

TERMINAL AND CARPARK LEED HIGHLIGHTS

WATER

Rainwater Collection
Reduction in Natural Resource Consumption

Greywater System
Reuse for Low Consumption

ENERGY

Skylights
Maximum Sunlight

A++ MEP Eq.
Low Energy Consumption

Carpark Atriums
Natural Airflow without MEP Equipment

LED Lighting
Low Energy – Long Lifespan

Double Layered Insulated Windows
Low Energy Consumption due to increased insulation

Material Selection
Low environmental impact through Material Sourcing

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ORAT – Operational Readiness & Transfer

June 2015:
Inceon Int. Airport & Copenhagen int. Airport are selected as our ORAT Consultants.

Sept 2016:
ORAT planning started with DHMI

June 2017:
Full-time ORAT activities started together with IIAC & CPH

Jan 2018:
Operational Scenarios, Trial Scenarios & Transfer Plans have been prepared.

June 2018:
ORAT Site activities commenced.

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ORAT – Master Plan

ORAT Master Plan

The ORAT master plan developed and shared with all parties. Upon review, all the task need to be optimized.

Istanbul New Airport Operational Readiness and Airport Transfer Master Schedule (Rev.A)

Opening Day

Legend:
- ORAT Activities
- Test & Commissioning
- Trial Operation
- Airport Transfer
- Operational Readiness

- o Lisance
- o Procedures
- o Training and Familiarization
- o Miscellaneous Operation
- o Readiness Items
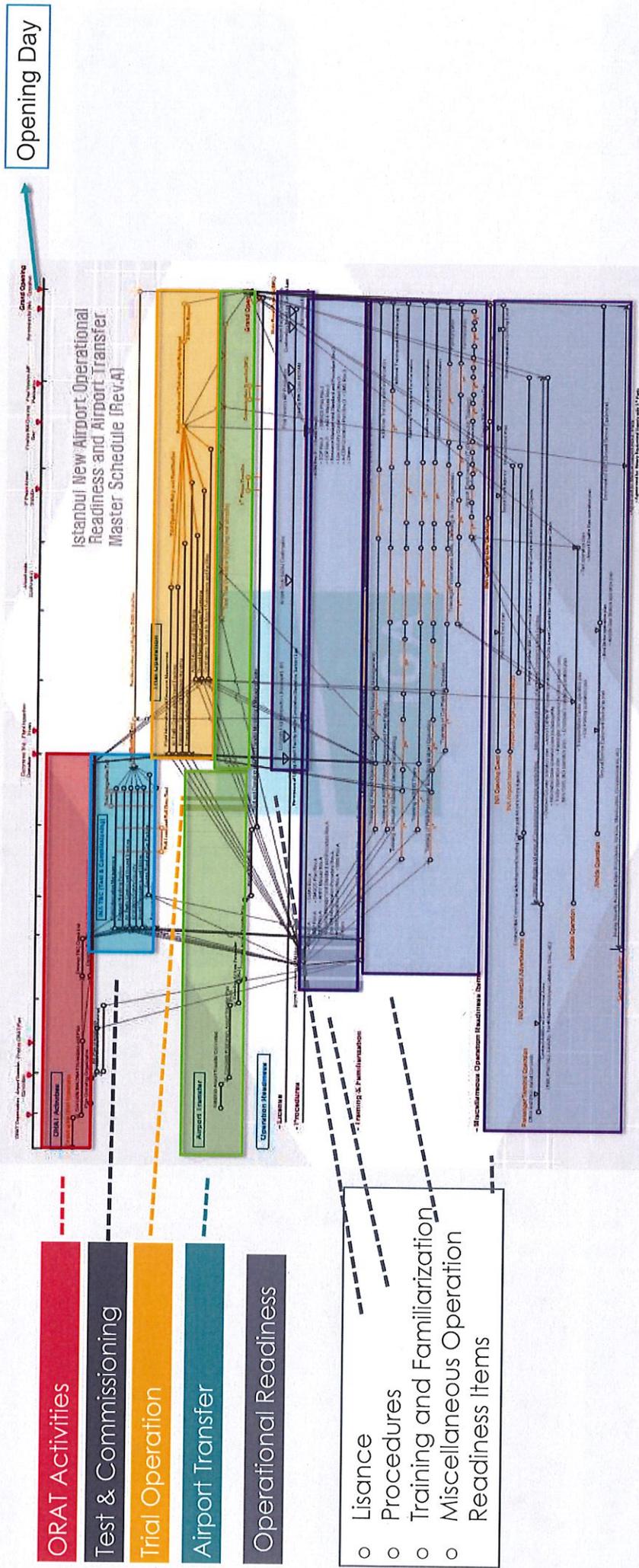
ORAT – Trials

99 trial scenarios prepared (46 operational and 53 emergency)

5 Manuals and 380 Procedures were prepared

27.873 person trained in classrooms

21.452 person trained on-site

45 partial trials between June – October 2018

1000-pax live full operational trial done on September 2018.

3000-pax live full operational trial done on October 2018.

65 airlines and 3 ground handlers participated.

First flight (w/ 5 destinations) by THY on October 30, 2018.

Flights to 19 destinations started on January 1, 2019.

Airport Transfer completed between April 5th and 6th.

Full operations started on April 6, 2019.
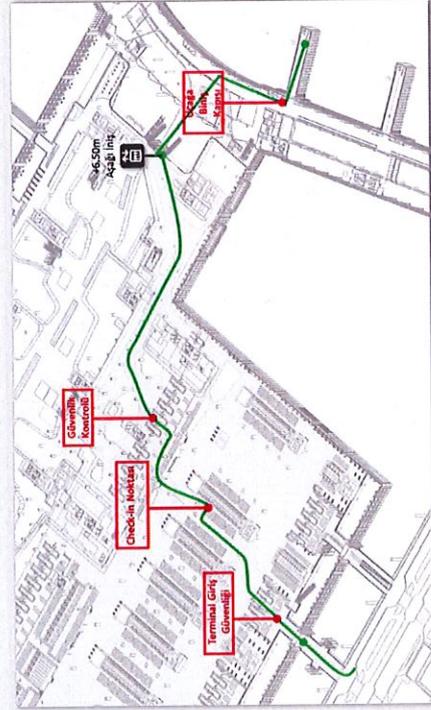
BİZ SADECE BİR HAVALİMANI DEĞİL, ASLINDA BİR ZAFER ANITI İNŞA EDİYORUZ.

WE BUILD NOT ONLY AN AIRPORT BUT ALSO A MONUMENT OF (AVIATION) VICTORY.

Recep Tayyip ERDOĞAN

On October 29, 2018, IGA has been inaugurated by our President and distinguished international and local Guests, naming the new airport as

ISTANBUL AIRPORT.

Operations – From October 30, 2018 to April 4, 2019

iGA

PAX
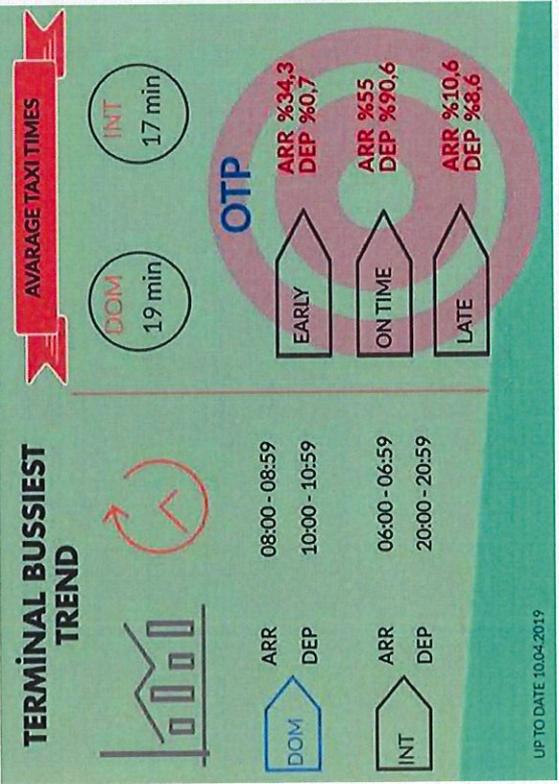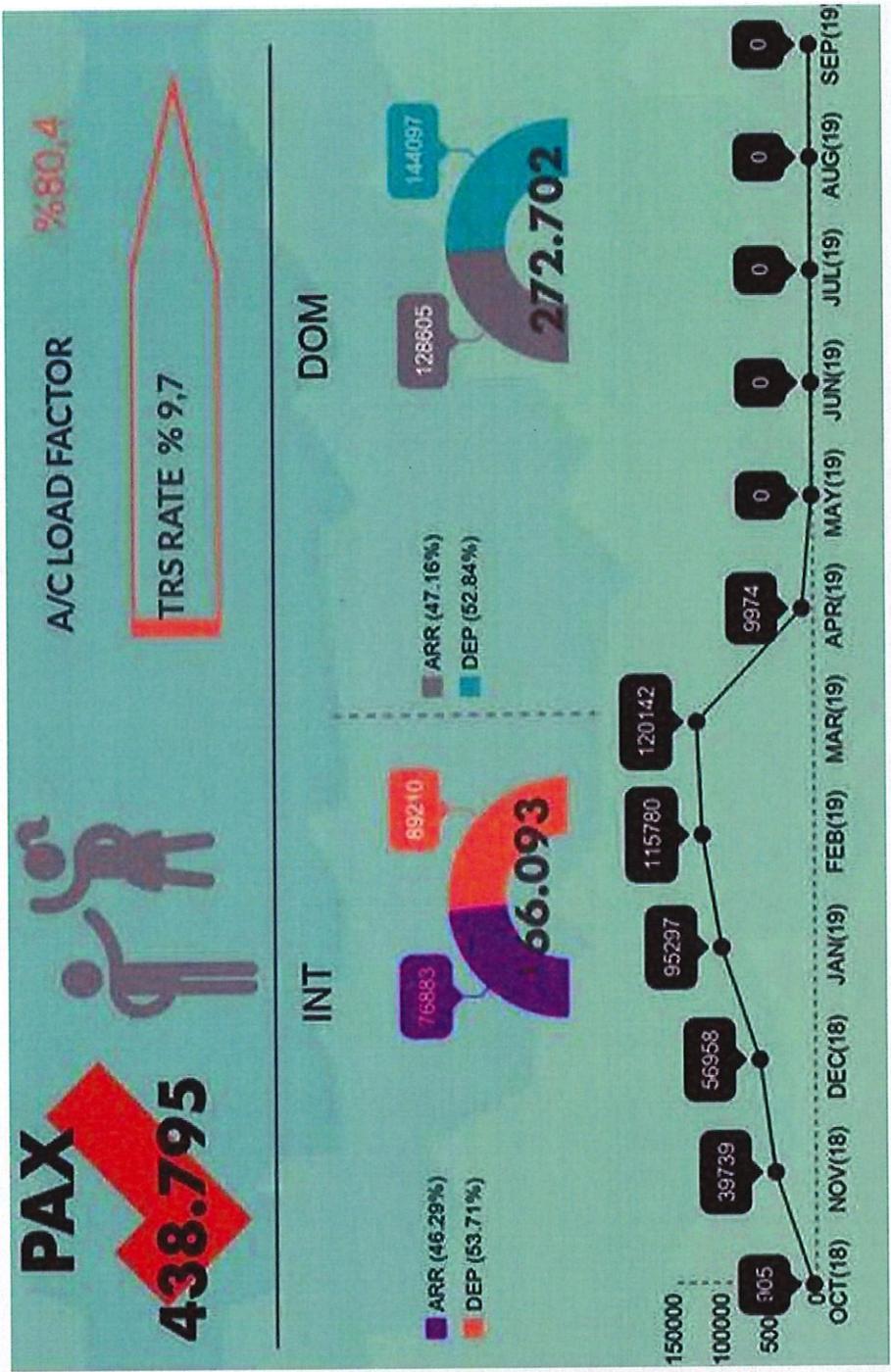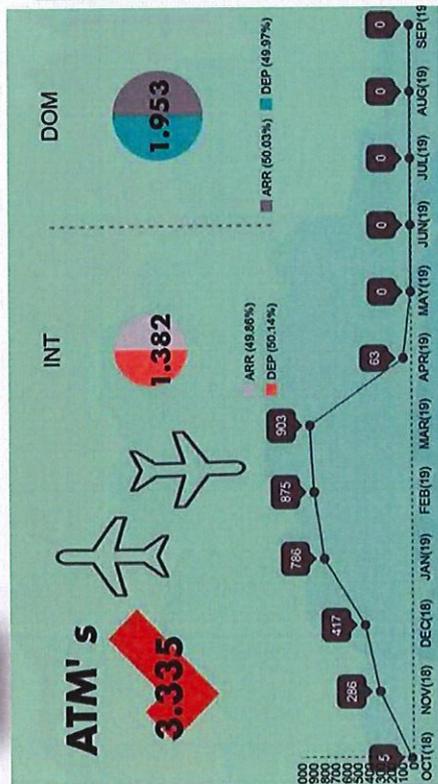**438.795**

A/C LOAD FACTOR
%80,4

TRS RATE % 9,7

INT
166.093
- 89210
- 76883
- ARR (46.29%)
- DEP (53.71%)

DOM
272.702
- 144097
- 128605
- ARR (47.16%)
- DEP (52.84%)

150000
100000
500

OCT(18) 905 | NOV(18) 39739 | DEC(18) 56958 | JAN(19) 95297 | FEB(19) 115780 | MAR(19) 120142 | APR(19) 9974 | MAY(19) 0 | JUN(19) 0 | JUL(19) 0 | AUG(19) 0 | SEP(19) 0

ATM's
3.335

INT
1.382
- ARR (49.86%)
- DEP (50.14%)

DOM
1.953
- ARR (50.03%)
- DEP (49.97%)

OCT(18) 5 | NOV(18) 286 | DEC(18) 417 | JAN(19) 786 | FEB(19) 875 | MAR(19) 903 | APR(19) 63 | MAY(19) 0 | JUN(19) 0 | JUL(19) 0 | AUG(19) 0 | SEP(19) 0

TERMINAL BUSSIEST TREND

AVARAGE TAXI TIMES
- DOM 19 min
- INT 17 min

ARR
- 08:00 - 08:59
DEP
- 10:00 - 10:59

ARR
- 06:00 - 06:59
DEP
- 20:00 - 20:59

DOM
INT

OTP
- EARLY — ARR %34,3 / DEP %0,7
- ON TIME — ARR %55 / DEP %90,6
- LATE — ARR %10,6 / DEP %8,6

UP TO DATE 10.04.2019

ORAT – Airport Transfer

- Transfer route is approx. 45 km between Ataturk Airport and Istanbul Airport.

- 12,780 equipment transferred from Ataturk Airport to Istanbul Airport

- About 5,000 of them transferred before the big move.

- During the big move, approx. 7,750 equipment transferred to Istanbul Airport.

- Once Ataturk Airport is closed (during the 8 hours in the middle of big move), IATA Code for Istanbul Airport (ISL) changed to IST.

- All airspace and ATM operations switched according to Istanbul Airport during the same time.

- Original time table was 45 hours but all operation is completed in 29 hours.
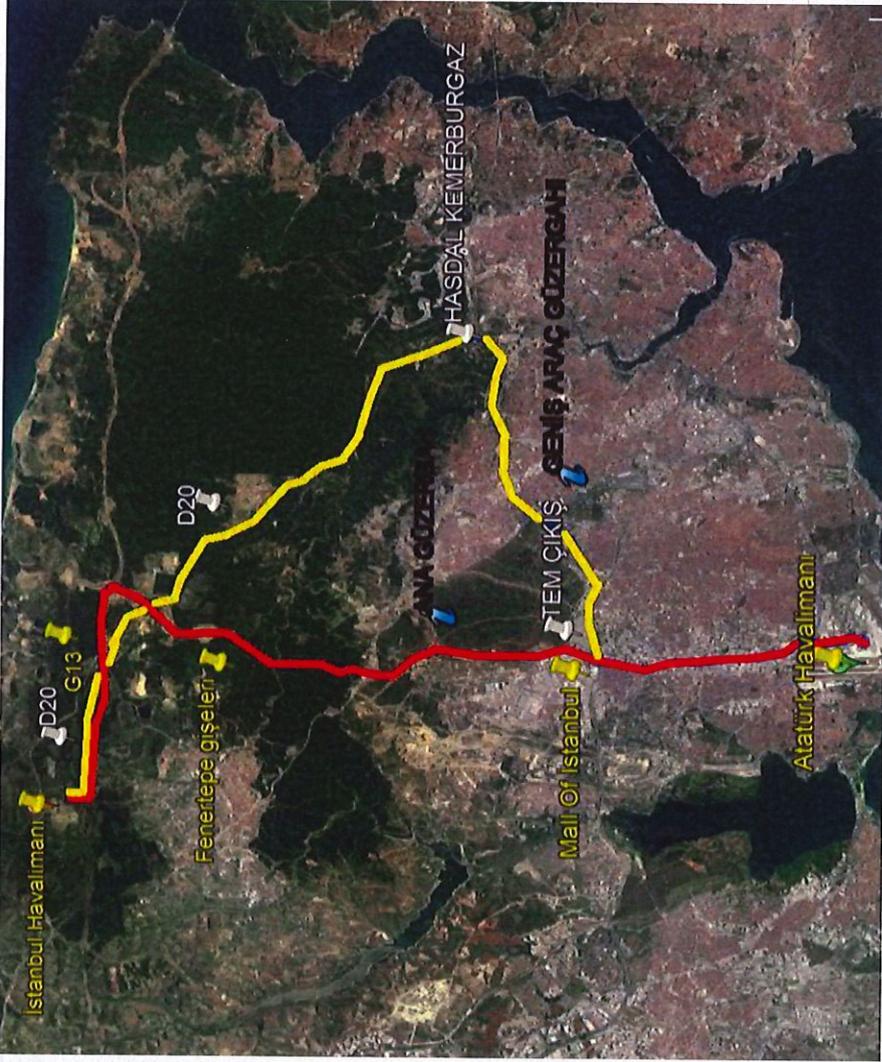
ORAT – Airport Transfer (April 5-6, 2019)

Transfer route is approx. 45 km

12,780 equipment transferred.

Planned for 45 hours but completed in 33 hours.

IDs, Vehicle Cards & Information Documents

Operations – From April 6 to September 1, 2019

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ATM increase following April 6th

■ Arrival ■ Departure

	5.Nis	6.Nis	7.Nis	8.Nis	9.Nis	10.Nis	11.Nis	12.Nis	13.Nis	14.Nis	15.Nis	16.Nis	17.Nis	18.Nis	19.Nis	20.Nis	21.Nis	22.Nis
Arrival	59	233	313	450	475	546	576	585	580	575	578	579	583	579	583	62	635	
Departure		107	268	337	408	481	547	678	578	574	572	568	579	575	585	652	633	
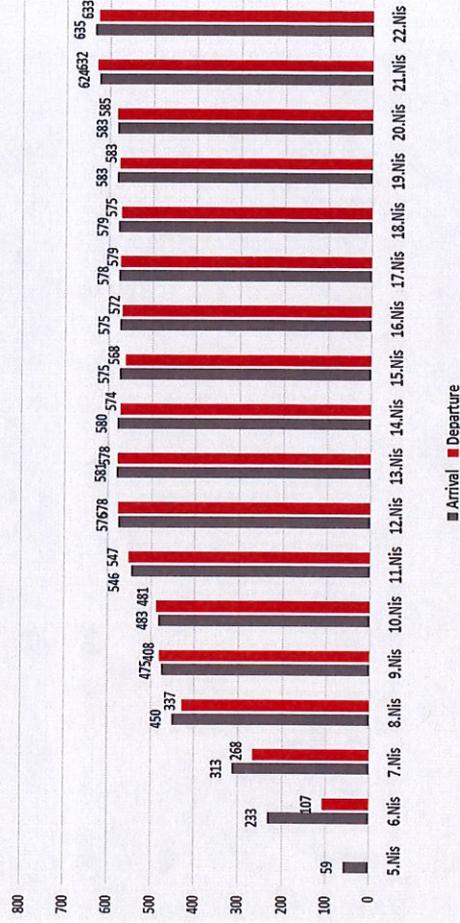
By April 12th, THY reached to **100%**.

By April 22nd, total ATM surpassed **1200+**.

Parallel approach/departures started on April 6th and continues regularly.

Already reached **82 ATM/hr** and **1300+ ATM per day**

GELİŞ

91.535

90.053 YOLCU UÇAĞI
514 KARGO UÇAĞI
968 DİĞER

14.471.740

ZAMANINDA VARIŞ ORANI

%68

6.367.239

GİDİŞ

91.268

89.861 YOLCU UÇAĞI
516 KARGO UÇAĞI
891 DİĞER

14.189.087

ZAMANINDA KALKIŞ ORANI

%76

(0-15 dk tehir dahil)

14.175.246

TRANSFER 7.456.443
LOKAL 6.718.803

(ORT) GİDİŞ TAKSİ SÜRESİ 24 dk

(ORT) GELİŞ TAKSİ SÜRESİ 15 dk

KÖPRÜ KULLANIM ORANI
%96

ORT. BGJ. TESLİM SÜRESİ

GİDEN BGJ

TRANSİT 13 DK
CHECK-IN 9 DK

GELEN BGJ 11 DK