منتدى دبي العالمي لإدارة المشاريع
DUBAI INTERNATIONAL PROJECT MANAGEMENT FORUM

RTA

Enterprise Command and Control Centre (EC^3)

Case study and lessons learnt

dipmf.ae

Index

01 - Case Study

02 - Lessons learnt

01

Case study

1.1 About Dubai

Dubai is located on the eastern coast of the Arabian Peninsula, in the south west corner of the Arabian Gulf. It is well known for its warm hospitality and rich cultural heritage, and the Emirati people are welcoming and generous in their approach to visitors. With year round sunshine, intriguing deserts, beautiful beaches, luxurious hotels and shopping malls, fascinating heritage attractions and a thriving business community, Dubai receives millions of leisure and business visitors every year from around the world.

1.2 Dubai's history

Around 800 members of the Bani Yas tribe, led by the Al Maktoum family, settled at the mouth of the creek in 1833. The creek was a natural harbour and Dubai soon became a centre for fishing and pearl trading.

By the turn of the 20th century Dubai was a successful port.
The souk (Arabic for market) on the Deira side of the creek was the largest on the coast with 350 shops and a steady throng of visitors and businessmen. When oil was discovered in 1966, the late Sheikh Rashid bin Saeed Al Maktoum utilised the oil revenues to spur infrastructure development in Dubai.

1.3 Dubai city and its attractions

Dubai is now a city that boasts unmatchable hotels, remarkable architecture and world-class entertainment and sporting events.

The beautiful Burj Al Arab hotel presiding over the coastline of Jumeirah Beach is the world's only hotel which offers seven star services. The Burj Khalifa is the world's tallest structure and reminds us of the commercial confidence in a city that expands at a remarkable rate. From the timeless tranquility of the desert to the lively bustle of the souk, Dubai offers a kaleidoscope of attractions for visitors. The Emirate embraces a wide variety of scenery in a very small area. In a single day, a tourist can experience everything from rugged mountains and awe-inspiring sand dunes to sandy beaches and lush green parks, from dusty villages to luxurious residential districts and from ancient houses with wind towers to ultra-modern shopping malls.

The Emirate is both a dynamic international business centre and a laid-back tourist escape; a city where the sophistication of the 21st century walks hand in hand with the simplicity of a bygone era. But these contrasts give Dubai its unique flavour and personality; a cosmopolitan society with an international lifestyle.

1.4 About RTA

The Roads and Transport Authority (RTA) emerged in November 2005 as a public entity with an independent corporate body and a full legal capacity to perform all business and actions needed to achieve its objectives. RTA is a government-owned entity and based in Dubai.

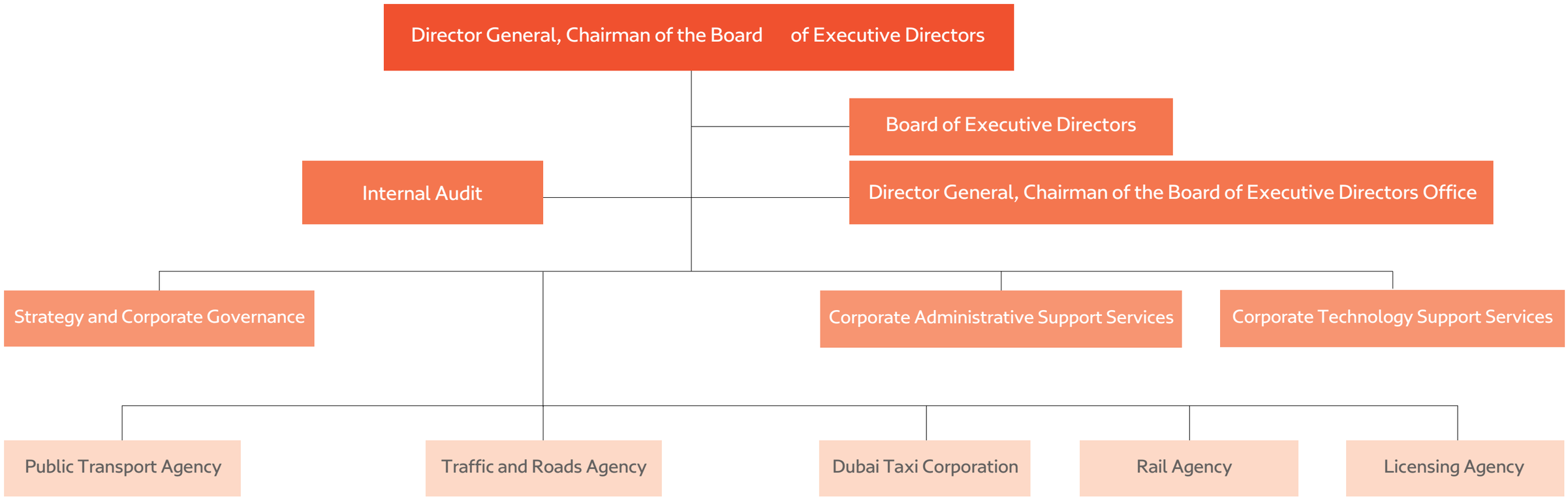
RTA plans and constructs transportation and road projects within Dubai, or between Dubai and neighboring emirates. It enacts rules and regulations and draws up comprehensive strategic plans for road systems, and land and marine transit networks to keep pace with Dubai's economic development plans according to highest international standards. Its roles include developing and implementing policies necessary for achieving optimal utilisation of existing transport and traffic elements. It attends to studying and endorsing the privatisation of related businesses, and establishing, managing and commissioning an integrated transport system that provides services customised to community needs. It sets up regulations, and administrative and operational systems relating to its core business.

It compiles and implements findings of studies conducted for fixing and implementing fees to traffic and roads including proposing fares for using roads network, licensing drivers and vehicles, and setting fare structure for mass transit routes. It attends to upgrading legislations and procedures of drivers and vehicles registration and licensing to realise the strategic objectives of transport system in Dubai, conducts licensing of mass transit routes and all RTA business-related activities.

Its Board of Directors oversees administrative, technical and financial affairs, develops the overall policy and project programs, prepares budget proposals for onward submission to Dubai's Executive Council for endorsement, sets up Organisation Charts, endorses fare structure for transportation, and appoints auditors.

RTA comprises five agencies: the Traffic and Roads, Public Transport, Licensing, Rail and Dubai Taxi Corporation and three support sectors: Strategy and Corporate Governance, Administrative Corporate Support Services and Technology Corporate Support Services.

1.5 RTA's organisational structure



RTA consists of three sectors and four agencies

Sectors include:

Corporate Administrative Support Services (CASS)

Corporate Technology Support Services (CTSS)

Strategy and Corporate Governance (S&CG)

Public Transport Agency

Traffic & Roads Agency

Rail Agency

Licensing Agency

1.6 Introduction

The Enterprise Command and Control Centre (EC³) is a cornerstone of the Dubai Government's Smart City initiative and an enabler for Dubai plans for hosting Expo 2020.

RTA has made a considerable investment into the establishment and operation of its existing Operational Control Centres (OCCs). The goal of EC³ is to supplement existing OCC operations at an enterprise level with new methods of collaboration and innovative technologies.

1.7 Project objectives and scope

EC³ is a centralized facility where all the operational agencies and sectors within RTA collaborate, cooperate and coordinate transportation operations across all of Dubai and with other Emirates.

The RTA aims for an enterprise level view of its transportation network in a facility where representatives from each OCC, Agency and Sector gather to make decisions and increase the efficiency and safety of the transportation system in Dubai.

It operates under varying conditions including normal everyday operations, special events, and crisis and emergency situations.

1.8 Overall project implementation methodology

Start-up Maturity:

This is where RTA was on Day 1 of EC³ operations. The Centre is staffed by representatives of all Agencies and the ability to see the entire transportation network and coordinate operations within Dubai is present. All the specified systems are available but with some limitations regarding operational data/CCTV interfaces.

Partial Maturity:

This is an enhancement stage to EC³ where additional functionality was added to EC³ as other associated Agency and Sector functions, full back-up capabilities, and external stakeholders were into the operational environment.

Full Maturity:

This is envisioned as the end stage, with full functionality, integration of operations with external agencies, and true ability to perform crises and special event management all from one location. This level of operations is expected to be in place as Expo 2020 commences.

1.9 EC³ operational objectives

EC³ is a highly resilient facility that provides the environment for the RTA's enterprise operations. In effect, it is a collaboration mechanism between the various agencies within RTA to open the lines of communication and enable greater coordination within RTA and with external stakeholders.

EC³ integrates data from the various Agency-level OCCs, and transforms the data into meaningful information, trends, indicators and knowledge that is relevant for enterprise level decision making and coordinated transportation operations. The key to this vision is the blending of the processes, procedures, capable staff, technologies, information, key decision makers into a world-class facility to create EC³.

The EC³ therefore has 5 modes of operations. Whilst rooted in conventional emergency planning methodology, this model is tailored to Dubai's unique place in the world, and the RTA's essential roles in delivering the City's vision.

1.10 The 5 modes of EC³ operations

01 Normal

02 Incident

03 Emergency

04 Planned Event

05 Crisis

It may be that in the life cycle of an incident or event, EC³ will go through more than one mode of operation as the incident develops and/or more facts become known. The scenarios described in the Incident Classification Table give an indication of the response level required per incident, whilst the procedural requirements for each mode are described on the next page.

01. Normal Operations

The transport infrastructure of Dubai is working efficiently and within capable limits. There are no apparent disruptions to travel. EC³ is responsible for stressing individual messages to public via each agency and encouraging collaboration and coordination for each agency. EC³ provides pertinent information to the RTA, partner organisations and to the public. EC³ also provides the control, transparency, and give confidence to RTA's Strategic Leadership.

02. Incident Operations

There is disruption to the activity of one or more Agencies of the RTA caused by regular or unexceptional incidents requiring additional or compensatory actions by RTA resources in other Agencies. This could also have an impact on other Agencies. EC³ functions are similar to "business as usual" however in this mode, the facility provides additional benefits, including co-ordination of compensatory actions by RTA agencies. EC³ assists the affected Agency in notifying others of issues and where appropriate lead on the assessment of disruption and the preparation of reports for RTA leadership to understand issues and create media messages from an RTA perspective. EC³ also provides organisational awareness, a greater visibility for organisational leadership to better understand the operational landscape and better support the preparation for the return to normality. EC³ also initiates changes to improve the future operations, whilst offering the oversight of preventative action following the disruption.

03. Emergency Operations

This is an event disrupting the activity of the RTA which not only requires additional or compensatory actions by RTA resources, but which requires action from other organisations. EC³ delivers support as in the 'Incident Operations' Mode above, but in addition also delivers the command, control and coordination of all RTA resources via the relevant Agency OCCs. EC³ is responsible for the notification of such an incident to senior management, the Crises Management Team, and other organisations. EC³ ensures the creation of the RTA response to media enquiries and those from other public bodies. Finally, EC³ oversees delivery of the Incident Management Strategy to guide each OCC involved, and any other RTA activity.

04. Planned Event Operations

An event which is of a scale or duration large enough to require specific planning and additional resources to facilitate it, or to prevent significant disruption to the activities of the RTA, or to the communities of Dubai.

05. Crisis Operations

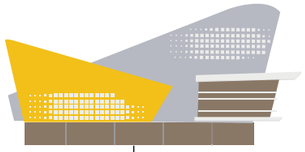
The Crisis Operations mode is similar to the 'Emergency Mode' above, with the difference being that a major incident will have been declared. This is an event disrupting the activity of the RTA which not only requires additional or compensatory actions by RTA resources, but which requires action from other organisations and is additionally declared by RTA or a partner organisation as a major incident.

1.11 Failure and extreme operations

In addition to the modes, EC³ is prepared to respond to a 'once in a lifetime event' in which procedures and structures may be overwhelmed by the scale of the crisis, and in which staff may fail to respond; facilities be unavailable or compromised, and where there will be a need for action and initiative beyond any planned responses. Responsibilities include establishing the scale and likely duration of the emergency; facilitating planning and coordination with other organisations; identifying, tracking and supporting the RTA resources available; re-allocation of tasks if OCCs are unable to operate. EC³ offers support to RTA assets engaged in recovery tasks through providing accommodation, communications, and welfare assistance over an extended period. This will require strong leadership and pooling of available resources in order to provide higher authority with the best possible and available response.

1.12 EC³ enabling functions

EC³ provides an environment where people, process and technology work in conjunction to solve the transportation challenges of Dubai. The high-level functions provided by EC³ enable the RTA to continuously improve its core business functions and act as a driver for change within RTA. EC³ is designed to provide enterprise-level transportation management to ensure that the different modes of transportation in Dubai work seamlessly to increase journey time reliability, whilst reducing cost, accidents and environmental impact, and to promote public access to transportation-related information and the use of public transport services.



1.13 Enterprise transportation management

EC³ acts as an umbrella organization providing coordination of RTA's transportation assets when needed and ensuring the lines of communication remain open across the agency. EC³ is connected to, and integrates with, the OCCs of each agency to gather and monitor relevant data, providing the EC³ personnel with an enterprise level view of the multi-modal transportation operations within RTA.

Although EC³ has the capability to control some devices operated by the various OCCs due to having workstation mimics or software links within EC³, that is neither the intention nor the function of EC³.

Event Planning and Management

Whether it is for small, medium or large scale events, EC³'s Event Planning and Management function is designed to ensure that transportation operations at these events run smoothly and efficiently, leaving the public satisfied and with a positive opinion about attending the event with respect to the transportation system, logistics, and the RTA.

It is the intention of RTA to be able to analyse the effect of large-scale public events on the transport system including the road and other networks, and then to take preemptive measures, in terms of allocating RTA resources and directing traffic flow, crowd management and managing passenger ridership, to ensure smooth flow of traffic, people and quick access to emergency services.

Crises Management Centre

The RTA Crisis Management Centre handles a variety of issues, incidents, emergencies and disaster scenarios affecting the Emirate of Dubai and, at times, which may also affect other Emirates. EC³ functions as the new location for the RTA Crisis Management Centre and enhances the ability of RTA to manage major emergencies and any crisis that arises.

The new facility includes Gold and Silver Level Command rooms with access to transportation system data for informed and enhanced decision making ability and coordinated communications with all RTA operational agencies as well as external agencies responsible for crises management, such as Dubai Police and Civil Defence.

EC³ Public Information Management

EC³ includes media facilities that can be used to hold press conferences and individual interviews with the media. The media facilities includes connection points for media equipment that enable satellite broadcasts and provide some working space for journalists, including access to telephones, fax, and the internet. The facility is built with large scale events in mind such as those occurring as part of Dubai Expo 2020, and the extensive media coordination that will be required during these times.

The design of the media facilities take into consideration security issues, so that the journalists and other external parties are sufficiently isolated from the restricted zones. The media facilities include provision for communicating to media remotely. In addition, making traveller information available to the public through a variety of sources is a key function of EC³.

Data Acquisition & Strategic Reporting

EC³ provides the means for multi-modal transportation planning and forecasting, which include all modes of transport e.g. taxis, cars, metro, bus and marine. Using the ITIC platform for data acquisition, planning and forecasting, and transport business intelligence, RTA is able to estimate many parameters including the number of travellers that will use specific transport facilities in the future.

These assessments are based on historical trends, real-time data, social media and other state of the art transport planning and forecasting methods. RTA has the ability to forecast the demands for specific transportation modes and segments.

Security Operations Centre (SOC)

The SOC function within EC³ comprises of two distinct but related aspects of security for the RTA. One is physical security of buildings and grounds that are under the control of the RTA or that host RTA offices. The other is IT-related security and is intended to prevent attacks to the network infrastructure and information systems that are the backbone of RTA's information technology function.

Physical Security Operations include the monitoring of RTA facilities for non-compliant or unapproved access by employees or the public and monitoring of building perimeters for suspicious or threatening activity.

Coordination with the Dubai Police or military authorities for action is a duty as well. IT Security Operations is a new function for RTA and is still under development internally. It is intended to provide enterprise wide IT security for the RTA, monitor the data network for threats and optimize operation, coordinate with other agencies to assess IT threats and coordinate responses, and analyse security within RTA and implement security policies. An essential part of this function will be a group IT Security Policy Management System to monitor and detect changes to individual machine security policies.

Centre of Excellence (CoE)

The EC³ CoE has many functions to support the overall mission of the RTA and provide for international recognition. With the development of EC³, the RTA staff is now highly knowledgeable and experienced in the areas of designing, building and operating such complex command centre type facilities.

It is RTA's intent to build, design and operate the EC³ in such a way that it is perceived by external organizations in the MENA region and elsewhere in the world as a Centre of Excellence, within the road and transport industry, focusing in the areas of multimodal transport as well as the design and management of operation command centres and crises management centre.

In addition, EC³ is a showcase for VVIPs and VIPs, a training academy for RTA staff and young Emirati engineers, set and measure performance KPIs for transportation operations within RTA, and develop and test new technologies through pilot projects to provide proof of concept for new ideas and equipment, ensuring continuous quality improvement and engendering the culture of exploiting innovation.

OCC Support and Monitoring

EC³ has the capability to provide back-up services to the selected OCCs currently within RTA. The purpose of this function is to provide a facility where, in case of failure at the primary OCC, an agency such as TRA or PTA can move staff quickly to EC³ and provide continuity of service to their customers.

EC³ does not seek to backup all functions, but just the most business-critical functions of the various OCCs. This functionality ties in well with the Enterprise Transportation Management function as data connections and systems from the various OCCs are already be available within EC³. This function features various levels of backup infrastructure dependent on RTA existing facilities.

For example, (as mentioned above), full Metro backup exists at Jebel Ali hence EC³ hosts a mimic of Metro information only; however, Tram, TRA, PTA all do not currently host a redundant building for OCC backup, so EC³ can provide systems and space for these elements.

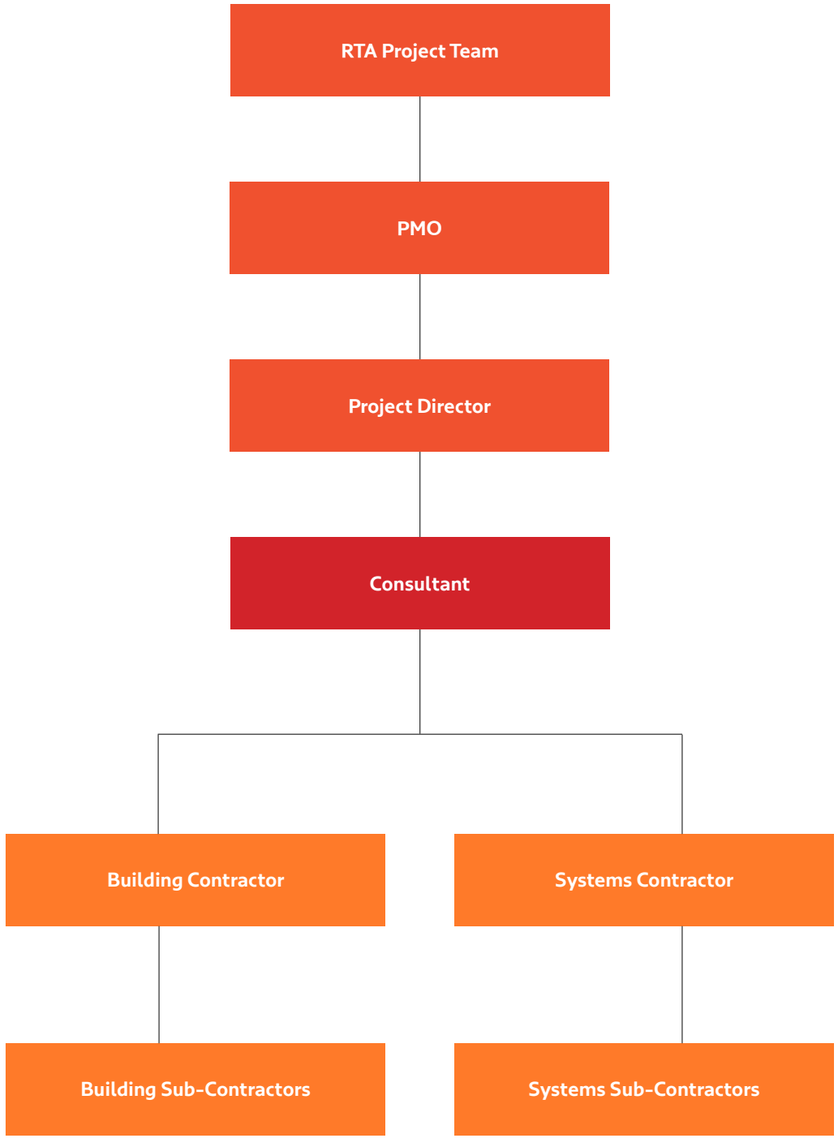
1.14 Linkage to the entity strategy

Benefits analysis

Following are the benefits to RTA as EC³ links to the RTA strategic objectives and RTA values:

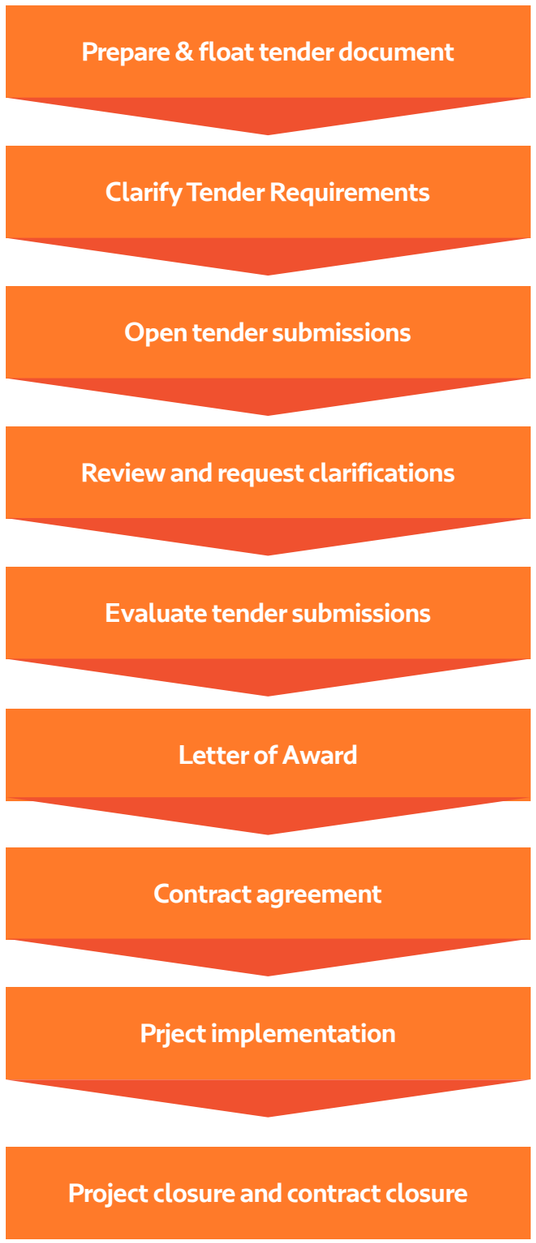
- Become a world-renowned centre of excellence showcasing enterprise wide multi modal transport command and control under one roof
- Manage safe and smooth transport planning and monitoring
- Improve quality of life in Dubai
- State-of-the-art centre contributing to smarter city planning and sustenance
- Efficiently plan, manage and control major events of Dubai
- Agile in responding to incidents and crises with advance remote surveillance of emergency services
- Close coordination with Dubai agencies/departments within EC³ to improve transport and other common services to Dubai citizens and residents
- Facilitates tourism travel to heritage sites
- Compliments RTA customer service centre
- Streamline multimodal journeys with seamless modal interchange to achieve 30% modal share by 2020
- Data platform capable to ingest more than 60million data records per day
- Provides dynamic real time travel information to operational control centres and public
- Facilitates identification of inter-modal transport issues and resolutions
- State-of-the-art facility allows sharing of assets, infrastructure and services for all modes of transport
- Introduction of disruptive technologies to gather and process information from all modes of transport and sensors

1.15 Project team structure



1.16 Procurement methodology

International FIDIC system, Design and Build of Building and Systems for EC[3], was selected as the most appropriate procurement methodology as depicted below:



1.17 Implementation roadmap

EC³ Design and Build – 2014 - 2017

- Project planning and detailed design by the concerned team of RTA's Agencies and the stakeholders
- The constructed EC³ centre of excellence building with its developed and tested ecosystems
- The EC³ was fully operated and functional by July 2017

EC³ Operational Start up – 2017 – 2018

- EC³ coordinates RTA Transportation Operation Agency wide
- External agencies begin to utilize EC³ as a valuable support tool for the Dubai Smart City initiative
- Major Events and emergencies are managed from EC³
- Traveller information is disseminated to the public in real-time

EC³ achieves greater operational maturity 2018 - 2020

- All RTA agencies and sector utilizing EC³
- External stakeholders such as Dubai Police using EC³ Greater transportation systems efficiently gained
- Gaps in RTA's ITS infrastructure are identified and resolved
- EC³ becomes the main source of transportation information to the public

EC³ Fully Integrated 2020+

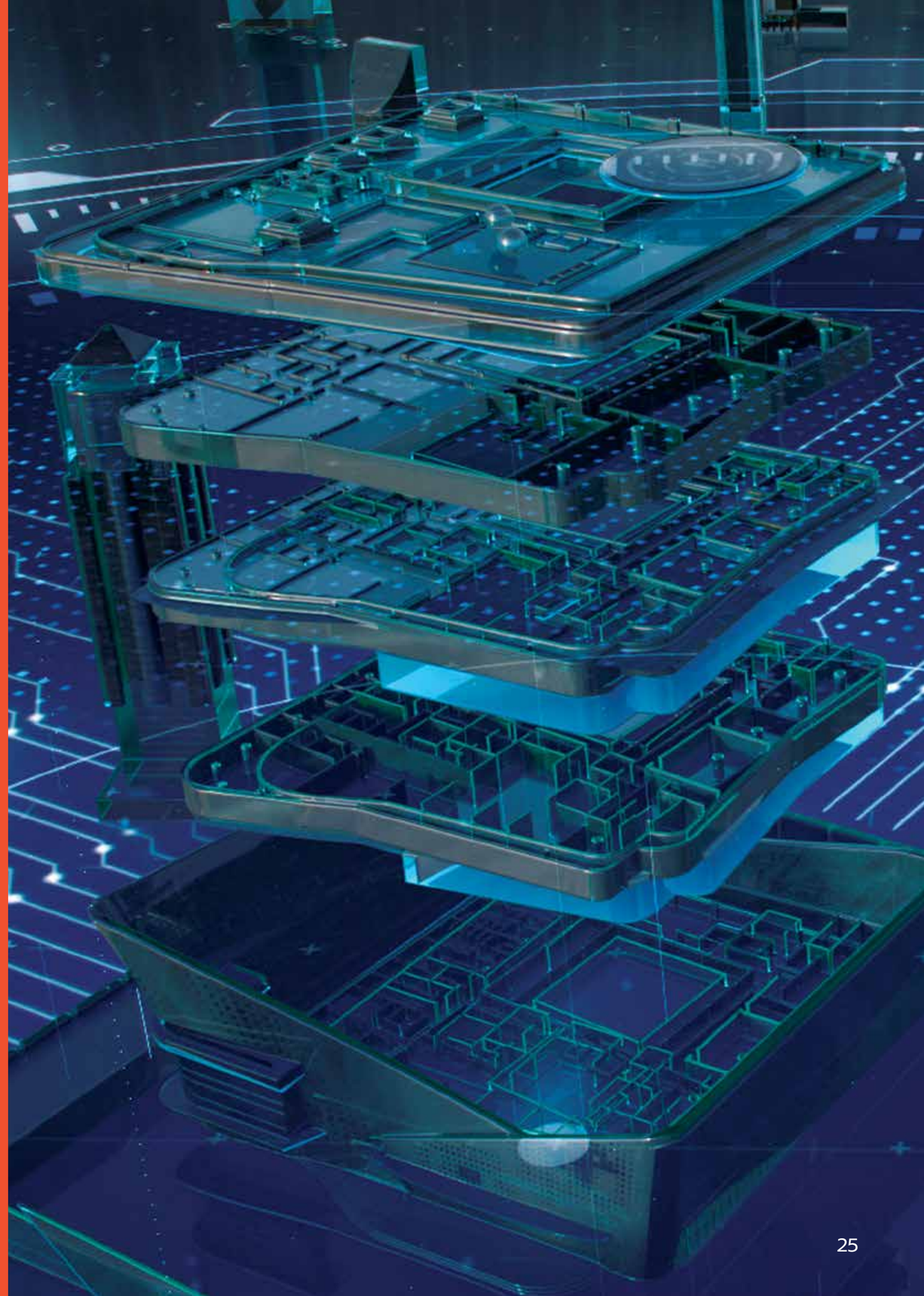
- Full integration into Dubai Transportation Operations and key aspects of Dubai 2020 Expo Operational plans
- Agencies within RTA cooperate and collaborate with each other and with external agencies to provide an efficient and safe transportation system for those that live, work and visit Dubai
- EC³ becomes a showcase for the region and worldwide

1.18 EC³ enabling functions

The high-level benefits provided by the RTA EC³ include:

EC³ acts as an umbrella facility providing improved coordination of RTA's transportation assets when needed and ensuring the lines of communication remain open across all agencies.

- **EC³ connects to and integrates with the OCCs of each agency to gather and monitor relevant data, providing the EC³ personnel with an enterprise level view of the multimodal transportation operations within RTA**
- **The RTA EC³ integrates the LIVE data captured from the Agency level Operational Command Centres (OCC) and external organizations, and transforms the data into meaningful information, knowledge and trends that is relevant for enterprise level decision making. The information is then shared with individual OCCs, who could otherwise be operating in isolation during a major incident**
- **Planning and forecasting of transportation requirements, integrated management and operation of transport systems**
- **Managing transportation needs for large-scale events to ensure smooth access and security**
- **Analysing enterprise-level transport to ensure that the different modes of transportation in Dubai work in unison to minimise trip duration, cost, accidents and environmental pollution and promoting public access to transportation-related information**
- **EC³ is integrated with the OCCs of each agency, providing the RTA EC³ personnel with an enterprise level view of the operations of RTA**
- **RTA EC³ leverages its central position for interagency coordination and control. RTA EC³ provides seamless integration between the data collected from different Agency's OCCs and makes the integrated data available for the relevant stakeholders**
- **The data collected by the RTA EC³ is transformed into information, trends, indicators, KPI's and knowledge which is relevant to the stakeholders of RTA services**
- **EC³ also has the capability to monitor key information of all Agency OCCs to deliver a SLA report of the OCCs and automatically process information from OCC dynamic interfaces**
- **Represent information on EC³ real time ITS platform GUI Represent information on EC³ Intranet/Internet portal**
- **Alert EC³ operators of abnormal changing/forecasted conditions and pass alerts onto OCCs through communication channels**
- **Provide EC³ staff with detailed OCC information through replica / backup OCC workstations and multi-agency backup OCC facility as and when required**



1.19 Project milestones

Project name: Enterprise command & control centre (EC³)

Consultant: Transpo group

System D&B vendor: Thales

Start date: 25/02/2014

End date: 30/06/2017

Building vendor: ASGC

Project kicked off with meeting 2 Mar 2014

Systems Award Jul 2015

Design & Build tender completion 20 Dec 2015

Detailed design of systems Jun 16 estimated mid June 2017 for 1 iFAT

SL Systems integrations Oct - Nov 2016 SL system version commissioned

EC³ inauguration 22 May 2017

Mar 14 | Apr 14 | Jul 15 | Aug 15 | Dec 15 | Jan 16 | Jun 16 | Oct 16 | Nov 16 | Dec 16 | May 17 | Jun 17

Initiation & planning Apr 2014

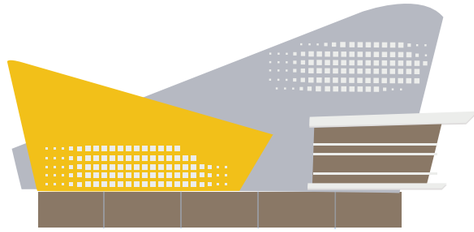
Building pre-requisite Aug 2015

EC³ System SOW Jan 2016

Ops staffing need & JDs finalized Aug 2016

Go live soft launch Dec 2016 limited SL achieved in BOCC

Handover (Day 1) completion 30 Jun 2017



02

Lessons learnt

2.1 Key challenges

At this time, the EC³ project is still being implemented, owing to the phased nature of the delivery. However, there are still a number of key challenges that have arisen, and are summarised below:

Systems and Building Contracts were split:

Originally, both the systems and building elements of the EC³ project were tendered as a single contract. However, for various reasons it was decided to split these two elements into separate RFP's and Contracts. This caused additional delays to the project, and effort on behalf of the project team, as now two tenders had to be written, floated, evaluated and awarded. In particular the building construction was subjected to additional delay because of this.

Careful consideration needs to be given to the project approach methodology prior to RFP production. Consideration also needs to be given to ensuring that the two separate contracts are synchronised, as they are co-dependent, and delays on one contract can often cause delays on the other contract.

Late provision of Building Permit:

Building permits in Dubai are subject to Municipality approval, this is not something that RTA have direct control over. As such there was significant delay to the start of construction owing to these external factors.

The project program needs to allow sufficient time for all external approvals, which cannot be guaranteed. In addition, the resource planning needs to allow for additional resources after external approvals, on the basis that these elements are likely to be subject to delay.
A flexible contractor is also ideal.

Building Construction had to be re-worked:

Owing to fast-tracked timescales, the building construction had to take place before the final detailed system design was completed. Several system requirements (such as a cabling, storage requirements etc.) were only estimated, and subsequently had to be re-worked for the final design. In many cases requiring deconstruction and revised construction, causing additional cost and delay to opening. The interior designer approval was also delayed, which meant construction work had to be revised.

Care needs to be taken to ensure that separate work-streams synchronised so as not to cause delays owing to inter-dependencies.

Late provision of Security Approvals:

As the EC^3 is of a secure and sensitive nature, external approvals were required.
The delay in the provision of these approvals lead to significant delays in construction.

Care needs to be taken to allow for external approvals, and the resource plan needs to allow for concentrated efforts of work in order to make-up this time.

Internal Approvals:

As the EC^3 solution integrates with many existing internal systems, there is a need to get approvals from agencies and sectors outside of the project team. Additionally, there is a need to install equipment in existing OCC's and within other internal department areas. It is not the responsibility of the supplier to gain these approvals, instead it is the internal RTA EC^3 project teams' responsibility, it is also a significant challenge.

Sufficient time needs to be allocated to internal approvals, and consideration that escalations will probably be required in many cases. This needs to be factored into the project program.

High Quality Demands of Best in Class Project:

EC^3 is a first of its kind project in the GCC, and as such the normal / usual standard of construction and finishing is not sufficient for a centre of this kind. Significnat time was lost of the construction program owing to poor/lacking worksmanship and crafting.

Care needs to be taken to ensure that suppliers of sufficient skill and proven capability are selected, even if this is not the most cost-effective solution.

Scope of Works Clarity:

The systems definition, as detailed in the Scope of the Works and Statement of Works, in the contract documents, are crucial to the final end-product that is delivered. However, owing to the highly technical nature of bespoke software delivery, many scope elements are subject to interpretation. This can lead to scenarios of disagreement of scope between the Client (RTA) and the supplier.

Care needs to be taken to ensure that all parties have a common understanding and agreement of the product functionality that needs to be delivered.

System Access:

Phased project delivery, such as is being used for EC^3, means that there are multiple phases of testing and several operation milestones, which rely on the Client (RTA) having full access to the software platform, before providing any type of hand-over certificate. Some suppliers are not comfortable with providing access to an incomplete system, which is still being developed.

Care needs to be taken in developing a partnership approach between all parties, such that open access to the system is recognised as a benefit to the project, and not a threat.

System Integration:

The EC^3 project, both in terms of systems and process, integrates with existing external systems.
The integration effort required to undertake such interfacing is difficult to estimate, without a full access and understanding of the external systems. In addition, great care must be taken to ensure that the interfacing does not cause any harm to the external systems, which are often public facing and contain security sensitive data.Care needs to be taken to gather as much detailed information about external systems and their use, prior to creation of the project schedule and resourcing plan.

2.2 Lessons learnt from the EC³ project

To overcome the challenges faced on the EC³ Project, RTA had to adapt innovative project management techniques as well as utilize all the resources available for it.

From these management techniques and their adaptation, RTA could draw several lessons learnt. The following section summarizes the lessons learnt from this mega project classified into five categories:

- Managerial
- Technical
- Administrative
- Financial
- Contractual

2.3 Managerial lessons learnt

These managerial lessons learnt apply to the top management of the owner organization and can be useful to any governmental agency and/or private developer who plans to undertake a technical "first" project.

Leadership

- Maintain consistent Senior Management staff
- Adequately resource key positions
- Recruit insufficient time for operations roles
- Have clear role and responsibilities within RTA for Project Management
- Empower Individual Team Leaders

Planning

- Client must develop its own Project Management Plan covering all aspects of the project, they cannot rely
- Purely on the Consultant and Supplier
- Selection of Supplier is crucial, cheapest is not always best
- Review the Functional Requirements with the Supplier at the start of the project, not after the first delivery of the product close ambiguity
- If splitting contracts, make sure the contracts stay synchronised
- Get internal stakeholder buy-in at project design stage, do not try to secure it at the implementation phase, its too late

Organisational

- Ensure that the right team members are paired together, there is no point trying to make people like each other for 3 years if they cannot see eye-to-eye
- Play to peoples' strengths, do not force people to do a job that they do not relish Recognise individual improvements, promote internally if warranted
- Client must develop its own complete project organization chart at the project inception, and fill the required roles Multiple year projects take significant time for new staff to catch-up with the history
- The Client's project staff must focus 100% of their time and effort on the delivery of the project, they should not be given multiple projects, or the flagship project will suffer

Monitoring and Control

- Client must develop and use strong reporting systems to monitor progress
- Senior Management need to be informed on important issues immediately
- Management should always cross-reference multiple sources of information, and not assume one source is valid There are different sides to every story
- Client must make the right decisions at the right time Delaying decisions will only result in problems getting larger
- Client must ensure a balanced work distribution between all parties – including their own teams

Risk Management

- The client must have a robust risk management process of their own, not always relying on the consultant / contractor
- There needs to be a separate internal Client Risk Management Plan, made and maintained by the Client
- The client should always have alternative Plan A, Plan B and Plan C, to work around potential problems

2.4 Technical lessons learnt

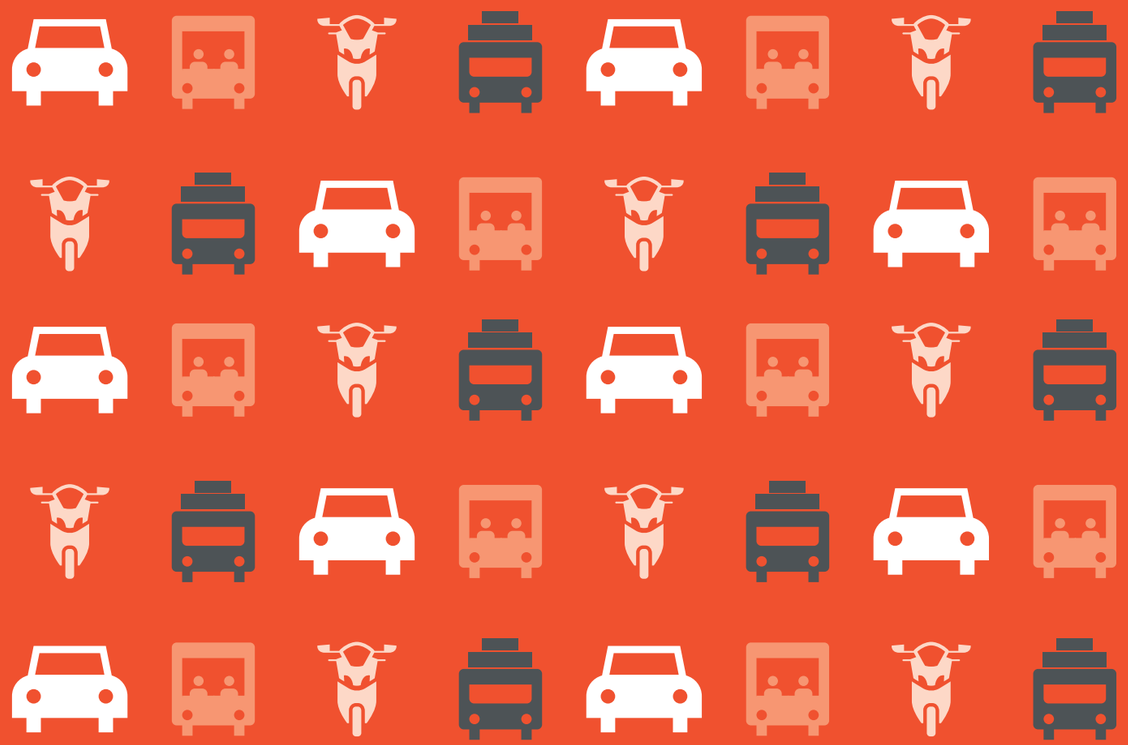
The technical lessons learnt apply to the technical aspects of project management. Although these lessons learnt are drawn from the EC³ project, they actually apply across most disciplines with the construction industry.

Systems

- There needs to be absolute clarity of functional requirements between Client, Consultant and Supplier
- Functional requirements should be agreed at a very high level of detail, through the Final System Design Documents
- There must be absolute clarity on the timescale and conditions for system handover, particularly for phased software delivery
- There must be absolute clarity on what is a “bug fix” and what is a failure to supply a “functional requirement”
- Client must take responsibility for decisions which result in delays, in the same way the supplier does
- Detailed design must be fully delivered, in terms of “must have” requirements, before testing begins
- Functional requirements need to be captured from all primary use cases, such as the Crisis Response Team

Planning

- Client management should use site visits to ensure accuracy of reports – do not wait until the last 6 months of the project to check on status
- Client must have direct control over time management – overtime and additional working will be required
- Client must be given read access to the system, to verify progress, and not rely on reporting only
- Additional budget should be allocated to the allow the Client to use the opinions of experts (to ensure they are getting the right information)
- All parties, clients, consultants and suppliers must not pretend to know it all, “If you do not know something, ask about it and seek advice”



2.5 Conclusion

EC³ is a first of its kind project in the GCC, and demonstrates RTA's commitment to the people of Dubai, whether residents or visitors. It continues to grow and develop functionality and use cases as it becomes more mature and embedded in the transport landscape of the UAE, setting a strong example of Dubai's capability on the worldwide stage.

The rapidly growing transport network

1.49 million

Passengers transported daily whilst planning forecasts for future demands

500,000,000

Rail passengers by 2020

25,000,000

Expo 2020 visitors expected in 2020

292,000,000

Taxi passengers by 2020

5,300,000

Vehicle registrations by 2020

354%

Growth in roadways from 1991 till date