

Smart Dubai - Rashid - City Concierge

Case study of the U4SSC City Science Application Framework



**11 SUSTAINABLE CITIES
AND COMMUNITIES**



Case study: Smart Dubai - Rashid - City Concierge

Dubai - UAE

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Foreword

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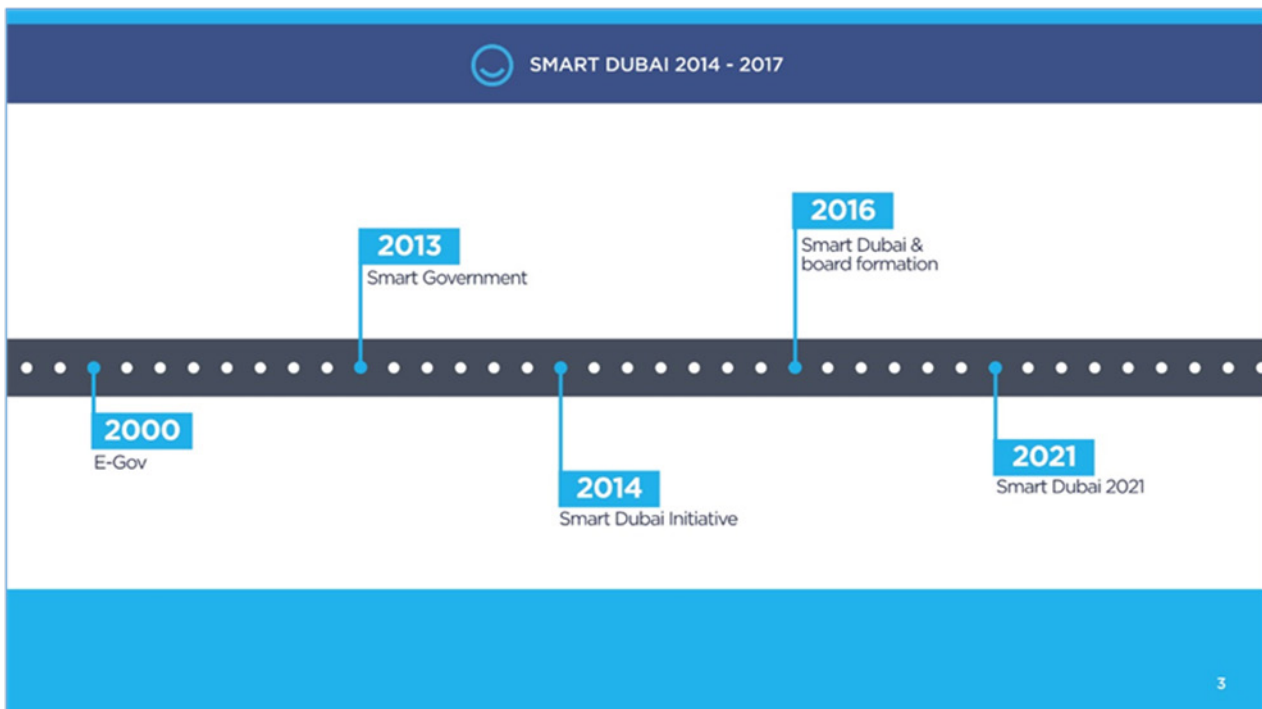
1. Introduction

1.1. Background

Dubai is one of the seven Emirates in United Arab Emirates (UAE) and a highly vibrant city with a population of over 3 million people in the Arabic Gulf region. Dubai has set itself on an ambitious course through a rapid and successful transformation in both economic and social sectors. Over the span of last 40 years, Dubai has witnessed a major transformation to become one of the most visited global cities and home to the world’s busiest airport; the 9th largest port in the world; and the world’s tallest building.

Dubai has established itself as a robust economy maintaining significant economic growth over the years. It acts as the leading economic hub in the region with successful economic diversification. Sectors such as trade and logistics, tourism, financial services, retail, and real estate have played critical roles in Dubai’s economic achievements and they are complemented by a highly modern city infrastructure. Dubai is currently in its third generation of digital transformation and the city already drove public acceptance and adoption of ICTs in all aspects of life.

Figure 1: Digital Transformation Journey of Dubai



In this context, Smart Dubai initiative was born in 2014 out of the visionary approach of His Highness Sheikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and The Ruler of Dubai to **focus the city’s unified efforts towards its most valued asset - its people.**

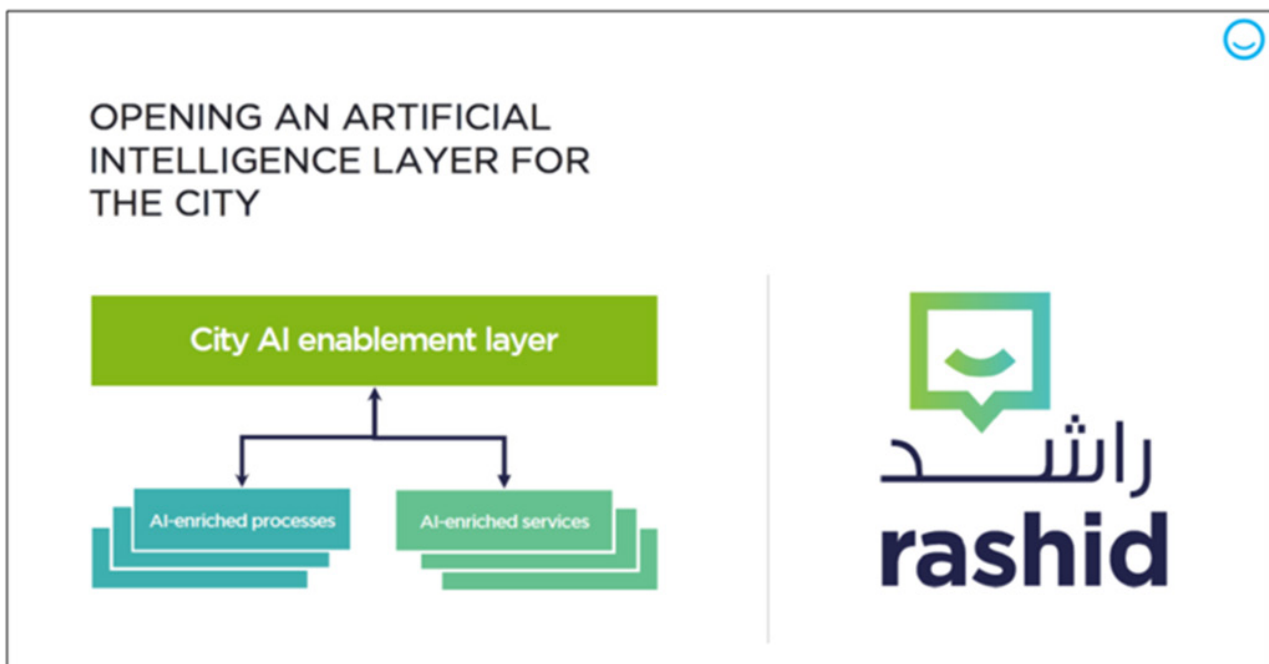
The vision of Smart Dubai is to become the happiest city on earth. In line with its vision, the Smart Dubai initiative has structured its strategic approach to embrace the latest technology innovation that will make the city experiences seamless, safe, personalized and efficient, delivering enhanced quality of life and business experiences to contribute in making Dubai the happiest city on earth. The Smart Dubai initiative plays a key role in guiding and enabling the city’s ongoing digital transformation across all sectors.

1.2. Challenge and response

The ambitious vision of making Dubai the happiest city on earth has mobilized Dubai entities, both public and private sector, to undertake strategic initiatives under the leadership of Smart Dubai Office. Happiness is not just a slogan in Dubai but it is at the core of its smart transformation (UAE is the only country in the world with a Ministry of State for Happiness).

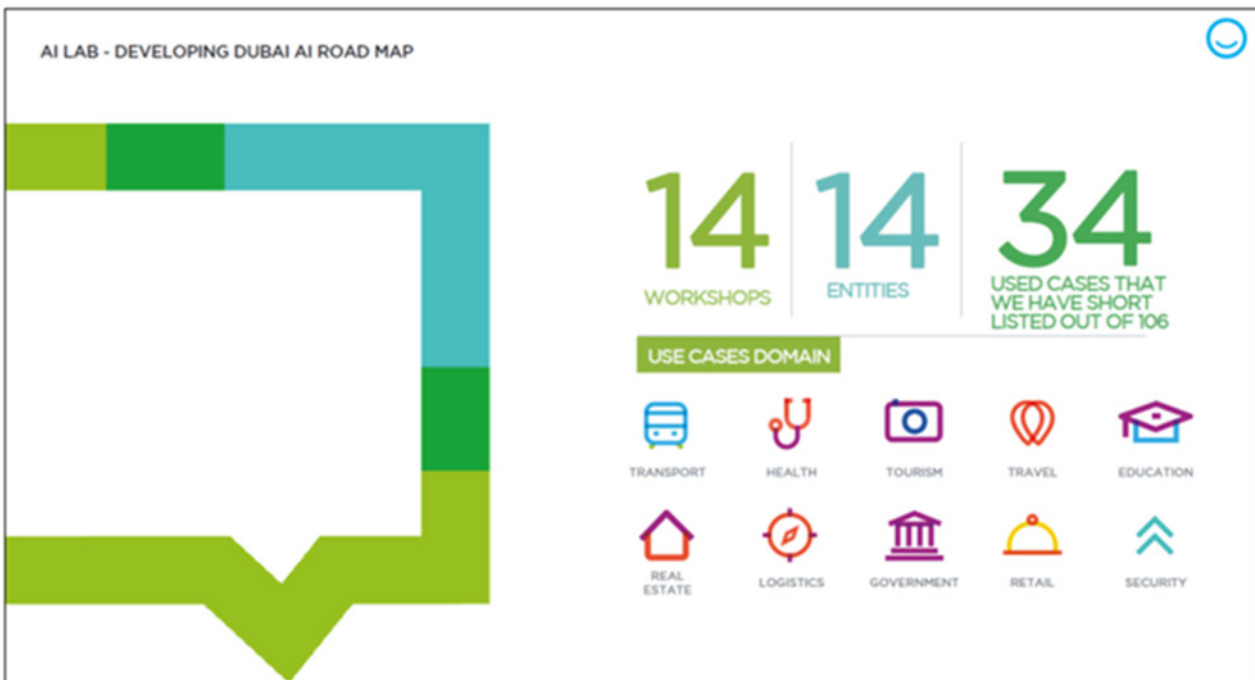
Smart Dubai has strategically embraced Fourth Industrial Revolution (4IR) and launched three emerging technology related comprehensive strategies to enable and complement its smart city transformation; namely Artificial Intelligence (AI), Blockchain and Internet of Things (IoT) strategies.

Figure 2: Smart Dubai AI Approach



Smart Dubai created a city AI enablement layer to utilize AI for city happiness. Hence, Smart Dubai has capitalized on various aspects of AI including Cognitive Computing, Machine Learning, Deep Learning, Natural Language Processing, etc. Smart Dubai AI strategy encompasses an implementation roadmap developed by the Smart Dubai AI Lab which consists of more than 30 use cases identified for implementation (the number was growing during the time this case was being written).

Figure 3: Smart Dubai AI Lab Overview



One of the major initiatives undertaken by Dubai as part of its AI strategy is called Rashid (it literally means Guide in Arabic) which combines Cognitive Computing and Natural Language Processing to help residents, visitors and businessmen in Dubai to answer their queries about doing business in Dubai, living in Dubai and also visiting Dubai. Hence, Rashid acts as a City Concierge and guides and helps its users for any inquiries they might have about Dubai. In other words, it acts as a virtual assistant and intends to make living and visiting Dubai easier which in turn promotes the happiness of Dubai residents and visitors.

This case study specifically discusses Rashid and its implementation highlighting data aspects and problem solving techniques utilized.

2. The smart project(s)

2.1. Vision and content

Rashid is designed as a digital city concierge to address various issues and needs for living in Dubai, visiting Dubai and doing business in Dubai. Initially, it is designed to answer queries about Dubai and help people. However, the long term vision is to also conduct transactions and hence obtain various city services in addition to helping people for their inquiries.

Figure 4: Rashid as a City Concierge



It is designed as an intelligent chatbot to perform the city concierge function. Figure 6 includes some of the initial topics included in Rashid by early 2019. The long term scope of Rashid is to incorporate an extensive list of topics covering various aspects of city living. It will be developed gradually by incorporating new domains and topics along with a long list of potential inquiries (questions).

It is designed in an adaptive and decentralized manner to incorporate flexibility in expansion. That is, new domains and topics can be added over time and hence Rashid will be enhanced to handle new needs of Dubai residents and visitors. Also, it is designed so that new domains and topics can be added by different entities in Dubai (both public sector and eventually private sector) to enhance and enrich it.

Rashid is intended to contribute to Smart Dubai's vision of becoming the happiest city on earth by making people's city experiences seamless, personalized, and efficient as well as enabling to meet their demands on the spot. Hence, it constitutes an important building block.

2.2. Implementation

Smart Dubai established a long term partnership with IBM Watson to implement Rashid by using the latest cognitive computing technologies available in it. Rashid is worldwide one of the novel concepts for implementation as it encompasses a large number of topics spanning various city experiences. Smart Dubai designed and implemented Rashid in various phases as explained below briefly.

Rashid Initial Proof of Concept and Pilot Phase: Rashid in its early pilot phase in the fourth quarter of 2016 (Q4'2016) included information about only Starting a Business. Smart Dubai partnered with Dubai Economic Development Department to implement this initial pilot. Hence, the target audience was entrepreneurs who want to start their own business. Entrepreneurs were able to ask questions to Rashid to determine various legal and procedural requirements for starting a business in Dubai. Rashid, by asking things like the business type, number of partners, etc. advised entrepreneurs the business type(s) they can choose from (e.g. sole establishment, limited liability company, corporation, etc.). Subsequently, Rashid also guided entrepreneurs for the required documents as well as requisite steps for opening their business (most of these services are digitally enabled in Dubai).

Figure 5: Rashid Simplifying Business Licensing for Entrepreneurs



This simple initial pilot was highly successful and the uptake was quite significant. It provided on the spot information for aspiring entrepreneurs, and also encouraged them to start their own business by easing their lives.

City-Wide Implementation of Rashid: Upon its initial success, Smart Dubai has enlarged Rashid implementation to several other topics and entities in the city.

- Several additional government entities were added to enrich the list of topics they were responsible for,
- Rashid is implemented through digital channels including website and mobile app,
- Rashid has gone through several extensive user tests with the heavy involvement of city residents and visitors,
- The rapid success and uptake enabled Smart Dubai to extend it to pilot private sector entities at the city level in addition to a wide coverage in the public sector entities,
- Rashid is still under intensive development for new releases capitalizing on its success over a short period of time.

Design of Rashid and Data collected: As indicated in Figure 6, Rashid includes several topics.

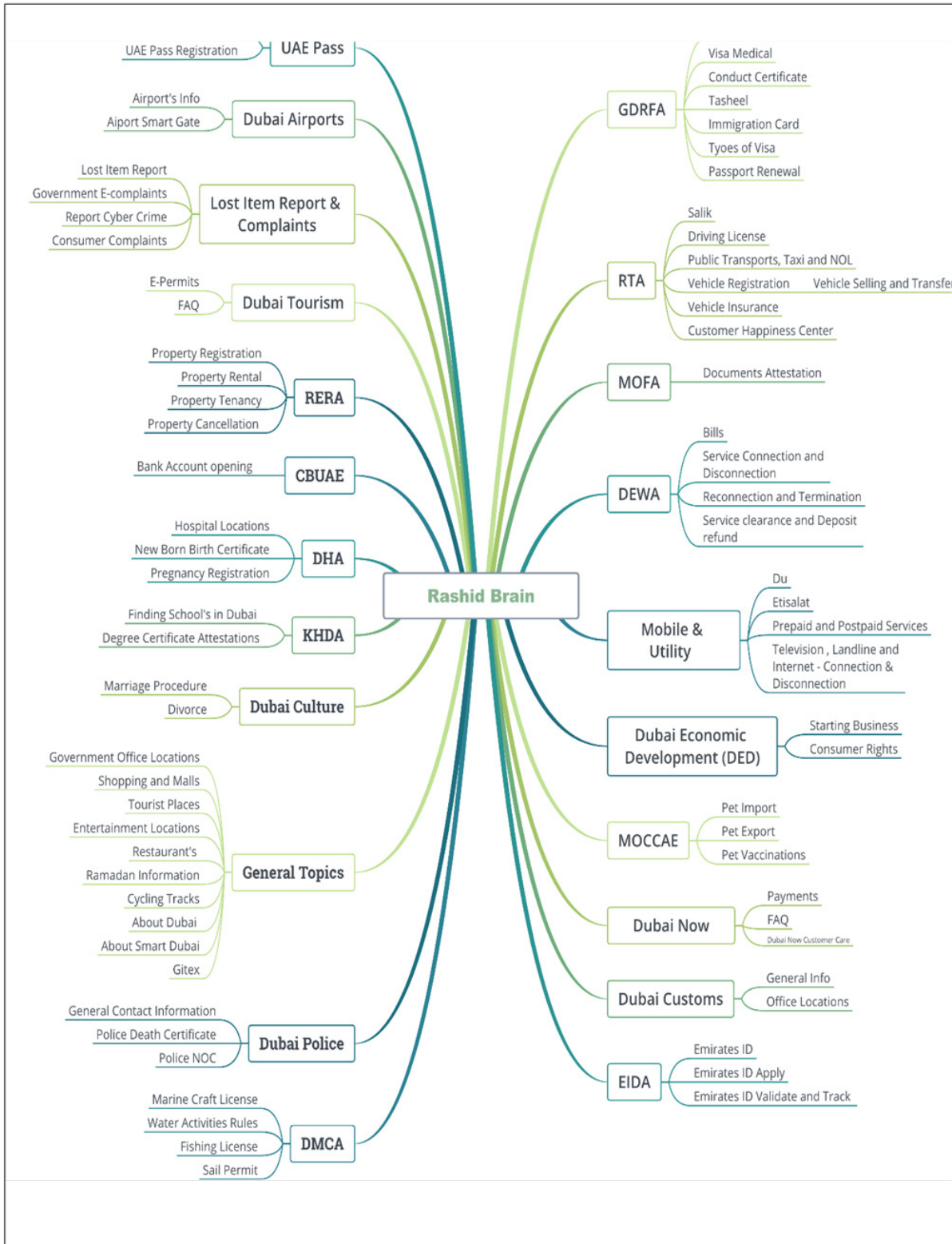
Figure 6: Rashid Topics in early 2019

<ul style="list-style-type: none"> • Consumer Rights • Starting a business • Visa processes • Renting, buying, or selling a property • Various utility services • Marriage and Birth • Educational services in Dubai • Banking • Driving services • Vehicle services 	<ul style="list-style-type: none"> • Health services • Government departments and services • Fishing and maritime information • Importing and exporting a pet • Public Transport Information • Dubai Taxi Information • Shopping Festivals and Malls • Cycling Tracks • DTCM E-Permits
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These topics are collected from several public and private sector entities and they are organized around further sub-topics and various potential questions under them along with their answers.

Hence, a significant amount of data was collected for each topic from various entities. The collected data also included questions which can potentially be asked by the users of Rashid and their answers as well. The list of questions and answers are continually updated with additional ones as new inquiries by users of Rashid are captured, analyzed and incorporated periodically to enrich it.

Figure 7: Overall Rashid Design and Topics



2.3. Results

Rashid Uptake and Implementation Results: Since its launch in Q4'2016 until the end of 2018, the uptake of Rashid has been significant regarding various city services in Dubai. Some adoption related figures reflecting actual results from Rashid are listed below.

- Total number of customers' conversations with Rashid from launch till the end of 2018- (59,241)
- Total number of questions asked to Rashid from launch till the end of 2018- (275,105)
- Number of main topics Rashid can answer questions on- (122)
- Average number of questions Rashid is asked daily- (464 per day)
- Average length of each conversation by Rashid- (3.9 min)
- Rashid also provides a feature rich backend system as part of its implementation which allows Smart Dubai and also entities to analyze its results, statistics, and more importantly questions answered and unanswered as well. Unanswered ones are then further analyzed and systematically incorporated as continuous enhancements to Rashid.

Rashid Impacts and Benefits: Rashid has been a very successful tool for Smart Dubai at the city level. The impacts are briefly indicated below.

Social Impact:

- **Direct linkage to Smart Dubai vision:** Rashid is designed to meet Dubai residents' and visitors' needs to have happy city experiences linking directly to Smart Dubai's vision of becoming the happiest city on earth.
- **Engaging Public:** Rashid is a simple tool using natural language processing to engage people to meet their city needs across digital channels. In certain instances, people feel more comfortable asking their inquiries openly to Rashid rather than talking to a government official through telephone.
- **Augmenting Social Services:** Rashid has been incorporated in several social services (in addition to others in the city) and enhances social services delivery.

Economic Impact:

- **Focus on core business:** Since Smart Dubai has taken the responsibility of designing, implementing and operating Rashid using cognitive computing and natural language processing, Dubai government entities were relieved to implement the same on their own and focus on their core businesses and enhance customer experiences during their services delivery. Scarce AI skills were utilized effectively and efficiently by Smart Dubai to deliver a city-wide service.

- **Cost savings through operational efficiencies:** Rashid has been implemented as a circular (shared) service capitalizing on the synergies that exist among the city entities that utilize it. This has allowed significant cost savings; since in the absence of such a shared solution, each and every entity would invest on cognitive computing and natural language processing skills and systems on their own to implement it. It also eliminated various call center telephone calls diverting them to Rashid as a freely provided digital service. Smart Dubai designed Rashid to be adaptive and decentralized to accommodate future expansion in terms of economies of scale (adding new entities) and also in terms of economies of scope (implementing new topics and sub-topics).
- **Encouraging entrepreneurship:** Rashid has been incorporated in several economic services (in addition to others in the city) including starting a business which actively promotes and encourages entrepreneurship. Rashid has played a complementary role in enabling start-ups and new businesses to be established in Dubai.
- **Knowledge sharing across the public sector:** Rashid collects detailed information about various city services and related topics in Dubai. This allows Rashid to compile a powerful list of topics, questions and their answers resulting in a rich knowledge base at the city level. It centralizes human knowledge and experiences by mimicking experts' knowledge into the brain of the system. It will also be enhanced with private sector information eventually.

Environmental Impact:

- **Enhanced Resilience:** The centralized nature of Rashid's implementation through a private sector partner enabled disaster recovery and resilience aspects to be implemented as part of the overall partnership approach. Rashid and its infrastructure is resilient by design featuring redundancies, automatic fail-over mechanisms, etc. Hence, it is designed resilient to various environmental stresses and disruptions.
- **Reduced environmental impact:** Shared implementation approach for Rashid undertaken by Smart Dubai has circumvented the need for other city entities to replicate ICT infrastructures in their own premises. This in turn has also resulted in reduced CO2 emissions. Hence, it is designed as an environment conscious solution and provides benefits in green computing.

3. Conclusions

Happiness is at the core of Dubai's digital transformation. In this context, Smart Dubai is utilizing various emerging technologies, including AI, to strategically enhance city experiences.

This case study illustrates the use of cognitive computing in addressing various inquiries of city residents and visitors through the use of natural language processing. The case study demonstrates that cities have a wide range of technologies at their disposal to enhance the happiness as well as quality of life. The topics in Rashid, the AI-based city concierge in Dubai, have been selected on purpose to include popular and mostly sought after ones which ensured its uptake and success.

An initial proof of concept (PoC) has been quite beneficial in understanding the technology and its application in the context of a use case. The PoC has then been extended to additional use cases and enabled adoption at a much larger scale.

Recently, Smart Dubai published its AI ethics principles and guidelines together with an ethical AI toolkit and an AI ethics self-assessment tool. Hence, Rashid as well as other AI use cases are designed to abide by these principles and guidelines. Dr. Aisha Bint Butti Bin Bishr, Director General of Smart Dubai, states that Smart Dubai's vision is to excel in the development and use of AI in ways that both boost innovation and deliver human benefit and happiness. Therefore, cities can consider formulating and abiding by a set of AI ethics principles and guidelines as they implement their own AI-based solutions and services.

The achieved results as well as the positive social, economic and environmental impacts strengthen the case for smart use of AI in city services. Smart Dubai embraced AI as a key emerging technology and strategically invests in it to achieve happiness at the city level.

A. References

Smart Dubai AI Strategy

<https://rashid.ae>

Smart Dubai Rashid Usage and Adoption Statistics

Smart Dubai AI Ethics Principles & Guidelines

<https://www.smartdubai.ae/initiatives/ai-principles-ethics>

B. List of discussion partners/interviews

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