Economic and Social Commission for Western Asia

Technology and Innovation for Developing Land Transport in the Arab Countries

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Part 2: Overview

Relevance of the Report

The Arab countries have the second highest annual population growth rate in the world at 1.9 %. In fact, by 2050 roughly 70 % of the region's population will be living in cities.

ESCWA, *Arab Sustainable Development Report 2020*

Most of Arab cities have high population density, which is a real opportunity for PT system and technological integration.

Main Benefits - SDGs

1- Improved traveller experience	SDG 8 (8.1)
2- Improved energy efficiency	SDG 9 (9.4), SDG 13 (13.2)
3- Better operational performance	SDG 7 (7.a, 7.b) SDG 9 (9.1)
4- Increased safety	SDG 3 (3.6), SDG 11 (11.2)

Main Benefits – Environment

- Currently, the modal share is based globally on private motorized modes.

- This is why, reducing GHG emission and fuel consumption where cars and traffic are the main source, has become a common policy goal.

- Most approaches focus on curtailing automobile use in cities to reduce greenhouse gases, improve air quality, and support sustainable development.

Main Benefits – Socio Economic

- Public transport contribute to access to jobs
- Public & private spaces dedicated for transport facilities are needed for economic development
- Technology in transport creates jobs and digital skills and contribute to economic development (i.e. smart cities)
- Effective policies will demonstrate link between transport infrastructure and economic growth

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Part 2: Digital technological solutions in land Transport

Advancements in Transport Technology

IOT

Hyperloop

AVS

On demand rides

Light weight material

Technology Trends Affecting Transport

Big Data

Internet of Things (IoT)

Road Sensors
Traffic Lights
Vehicle Tracking Devices
Cameras
…

Artificial Intelligence (AI)

AVS
Pods
ITS
Route Planning
Route Analysis
…

IaaS, PaaS, SaaS, MaaS, CaaS & XaaS

Uses of AI in Transportation

Vehicle Control

People would have extra free time with autonomous vehicles

Traffic Control

People would save time because of prediction in congestion conditions

Road Safety

People would be exposed to fewer crashes with systems that autonomously anticipate them

Example

Harnessing Technologies in Transport Sector – Dubai Case Study

Dubai has a **strategy for autonomous transportation** (2030). It is expected to save **bn 22 Dirham annually** in different sectors.

By 2020, 75% of the new metro systems will be driverless. The strategy itself will convert **25%** of mobility journeys in Emirates to autonomous transportation.

RTA has been testing the world first **autonomous pods**.

Source: https://www.dubaifuture.gov.ae/ar/our-initiatives/dubais-autonomous-transportation-strategy
RTA, Annual Report, 2018, Middle East Rail,2018.

Example

Harnessing Technologies in Transport Sector – Dubai Case Study

"Mahboob" is an institutional chatting system harnessing AI to present 89 service to public.

8 cameras established in 4 service centers to measure **customers' happiness based on AI**.

"Suhail" is a comprehensive platform facilitating accessibility to all transport means by one window. 849,000 planned journey by this platform.

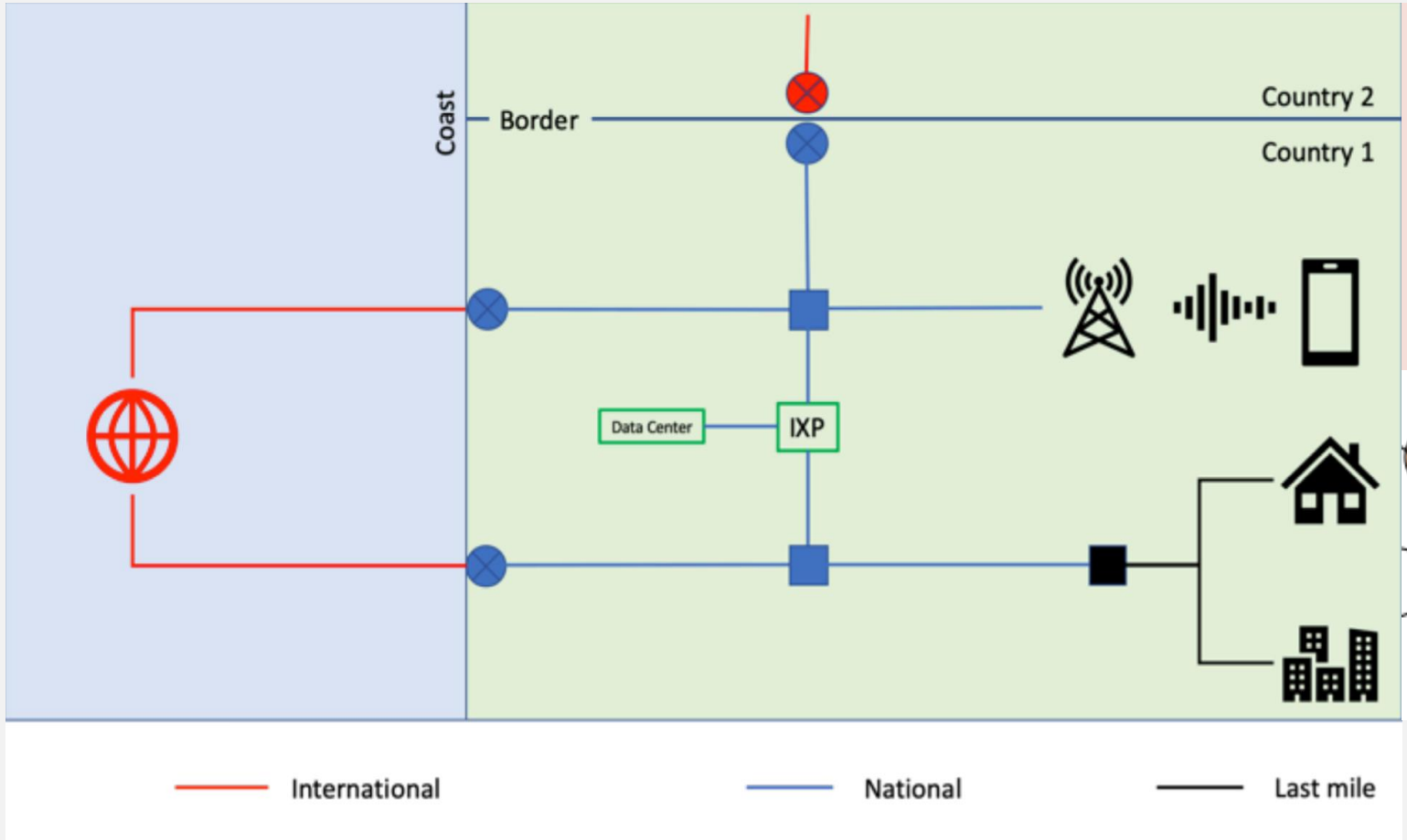
Digital Transformation Initiatives in Transport Sector

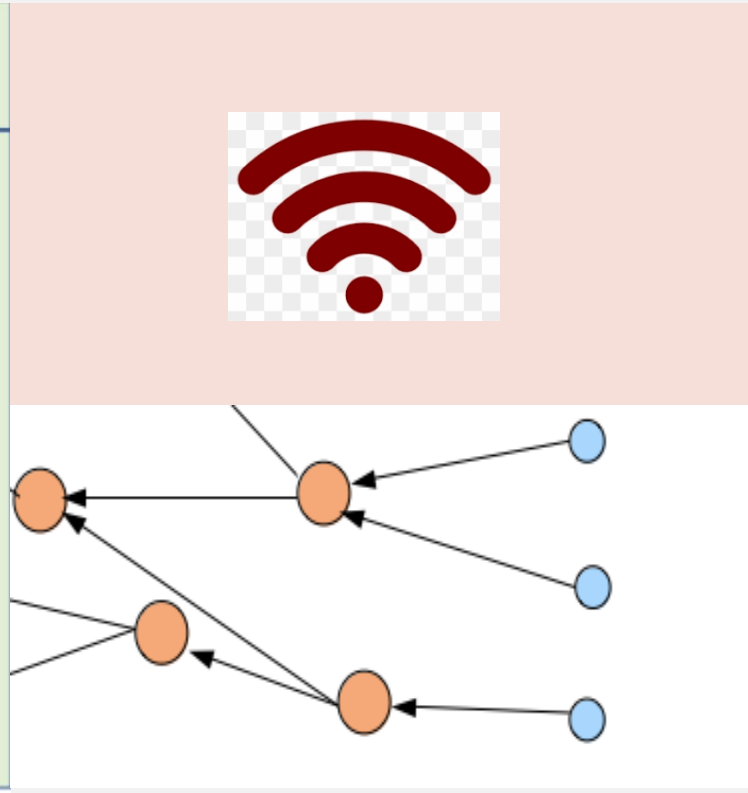
Source: RTA, Annual Report, 2018.

Enabling technologies for land transport

1. Connectivity Infrastructure
2. IOT
3. Big Data
4. Cloud Computing
5. Global Positioning System (GPS)
6. Geographic Information System (GIS)
7. Open Data
8. Inter-operability and cross borders cooperation

Levels for connectivity





Wireless or wireline for IOT

Technology applications in land transport

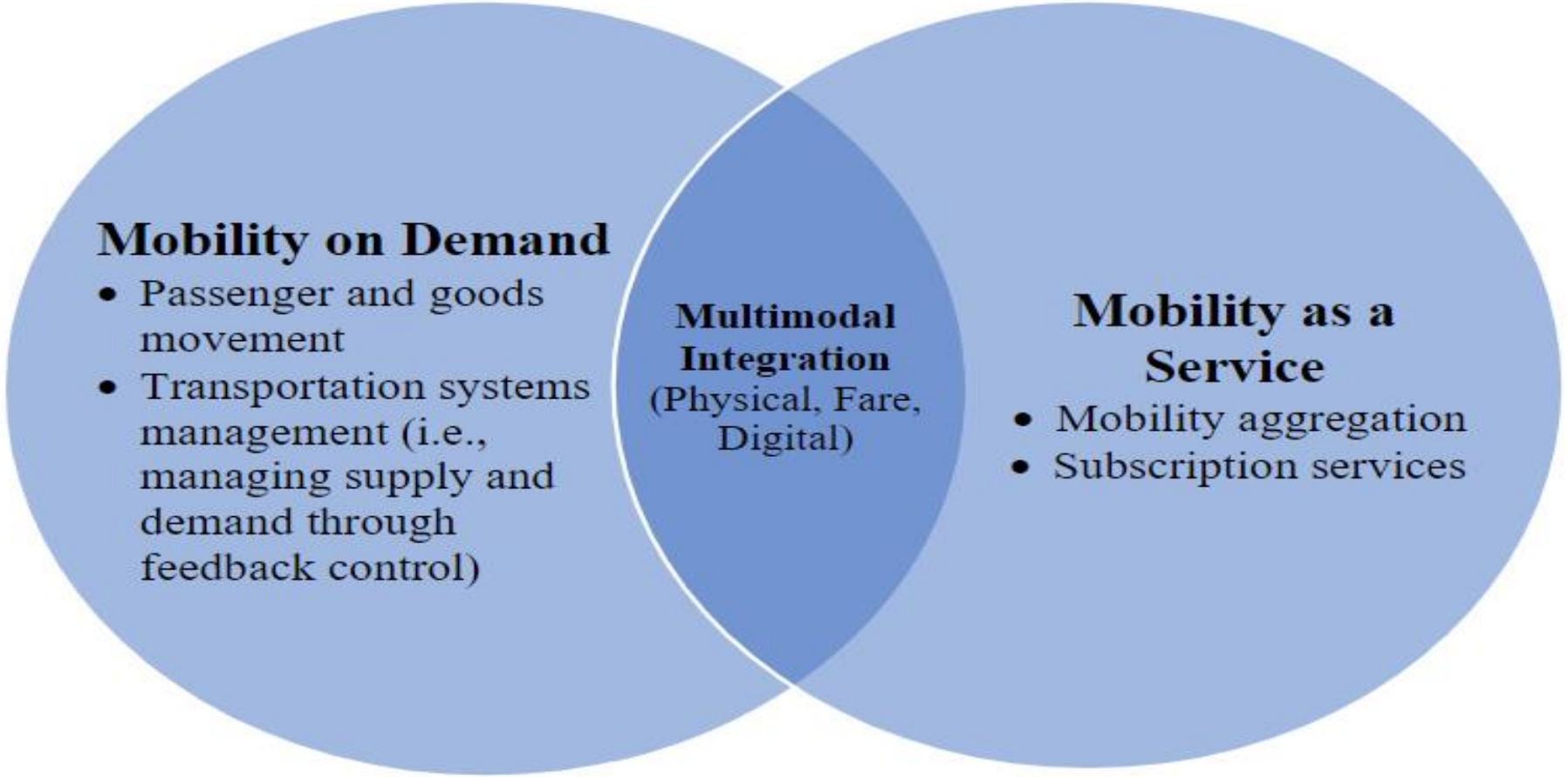
- Management of Freight
    - Transportation Management Systems (TMS)
    - Fleet Management Systems (FMS)

- Management of Traffic and Infrastructure
    - GeoFencing
    - Electronic Toll Systems
    - Intelligent Transport Systems (ITS)

Technology applications in land transport

- Management of Passengers
  - Mobility as a Service (MAAS)
  - Mobility on Demand (MOD)
  - Dynamic Ride Sharing
  - Other

Difference between MOD and MAAS



Reference: Susan Shaheen, University of Berkeley, 2020

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Part 3: Status of technology and innovation in land transport in the Arab region

Main Target

The aim of technology integration is to facilitate data exchanges and to enhance the fluidity of land transport routes by avoiding dissimilarities, inconsistencies and gaps.

Some challenges which are impacting the technology incorporation in land transport have to be identified and addressed.

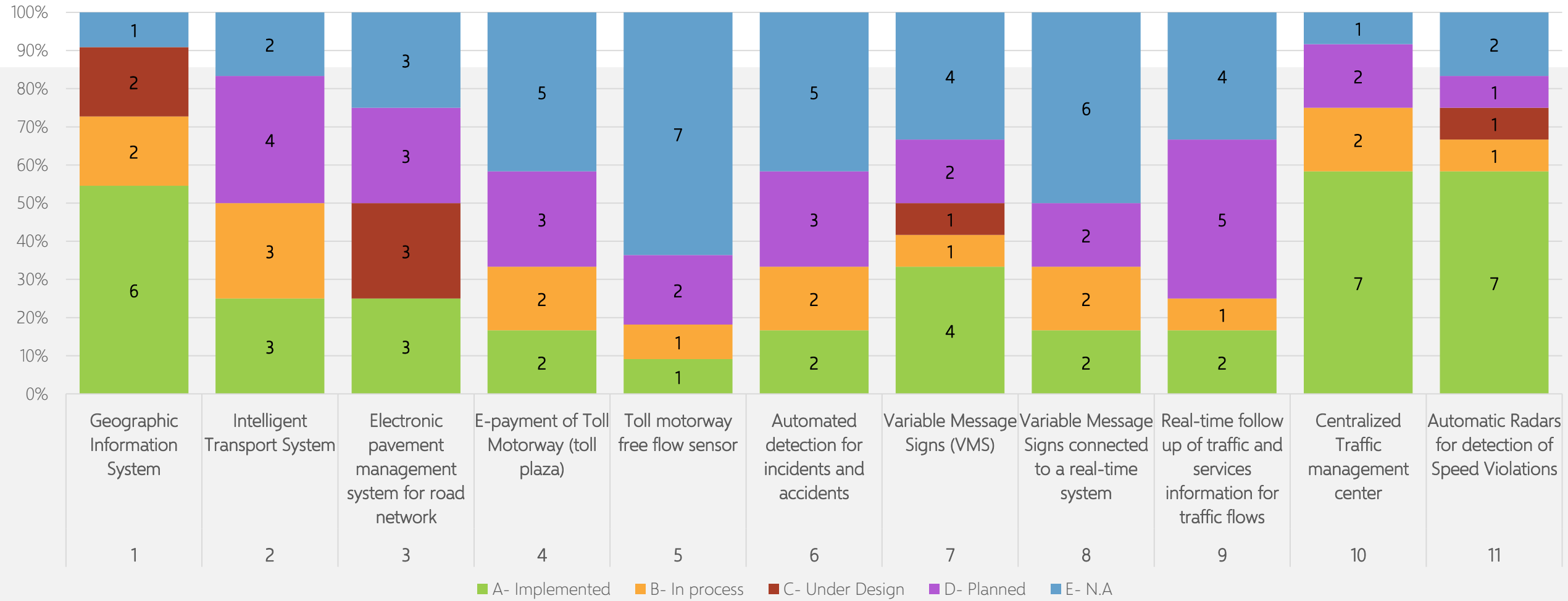
Feedback from Questionnaire

1. Rural Roads:

More developed and economically flourishing countries have high level of integration of technology with quite high standard conditions.

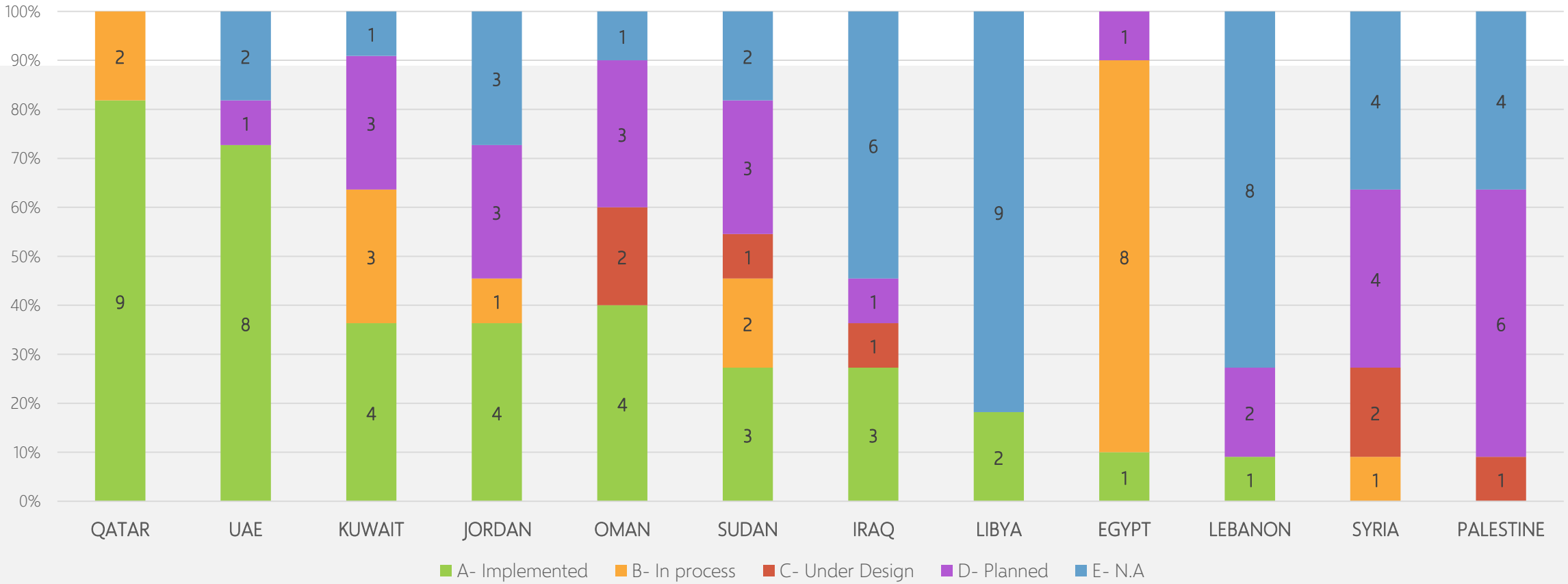
Other less incomed countries still need to focus more on the infrastructure of their roads, their pavement and connection, implementing new technologies appears to be with less priority.

Rural Roads - Status by technology



Automatic radars, traffic management centers and GIS systems are the most technologies implemented on rural roads

Rural Roads - Status by country



More advanced countries like Qatar and UAE have the greatest number of implemented technologies, countries like Palestine, Syria and Lebanon barely / don't yet have any of the implemented technologies for their rural roads

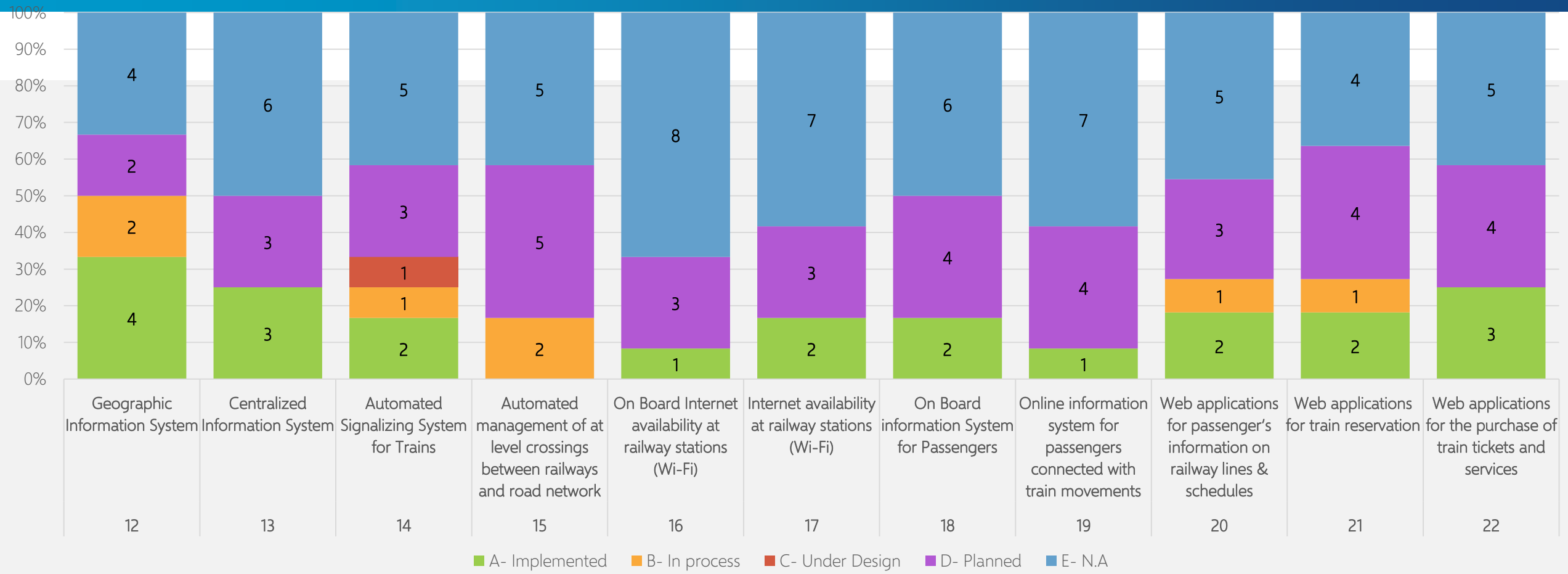
Feedback from Questionnaire

2. Railways:

The questionnaire results show that railways infrastructures and facilities are globally not advanced in the Arab countries and need to be developed at both coverage and performance levels.

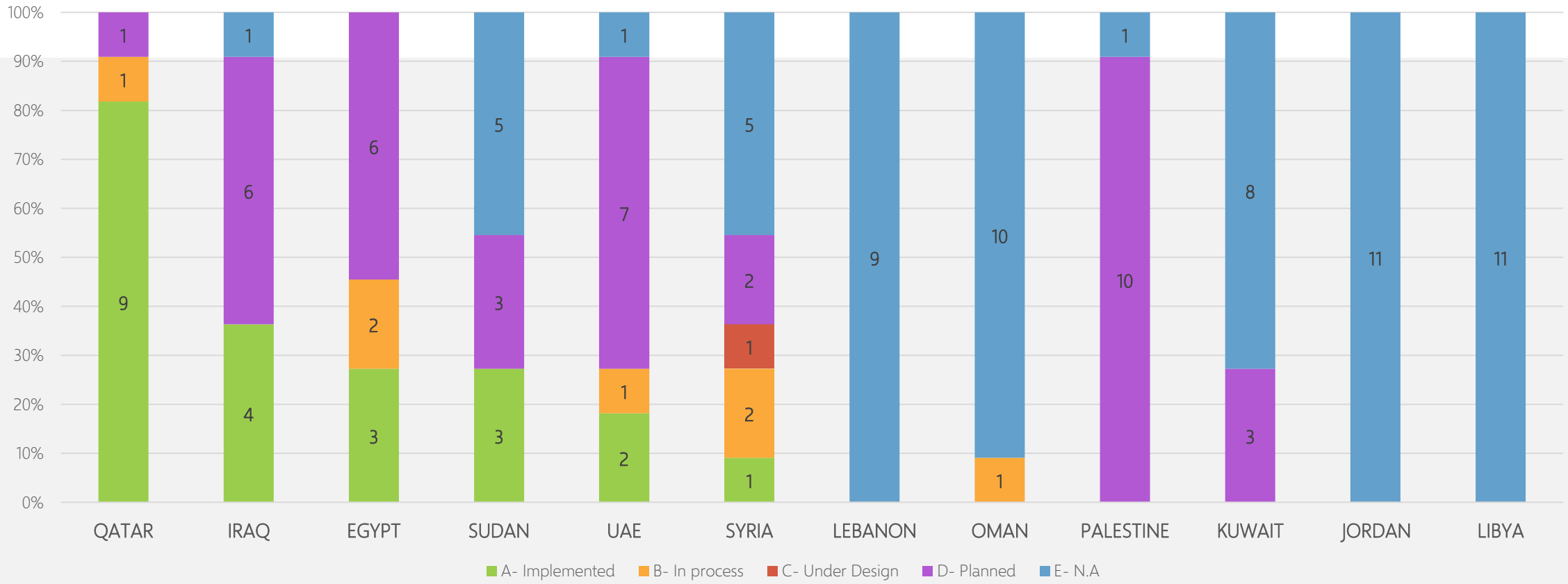
More investment and modernization programs should be engaged together with the technological integration.

Railways - Status by technology



Few railway technologies have been implemented, while most have not yet been planned (especially automated management, Wi-Fi availability and online information system technologies)

Railways - Status by country



Qatar is the leading country in terms of railway technology implementation, while countries like Jordan, Libya, Oman and Lebanon have yet to have plans for railway technologies

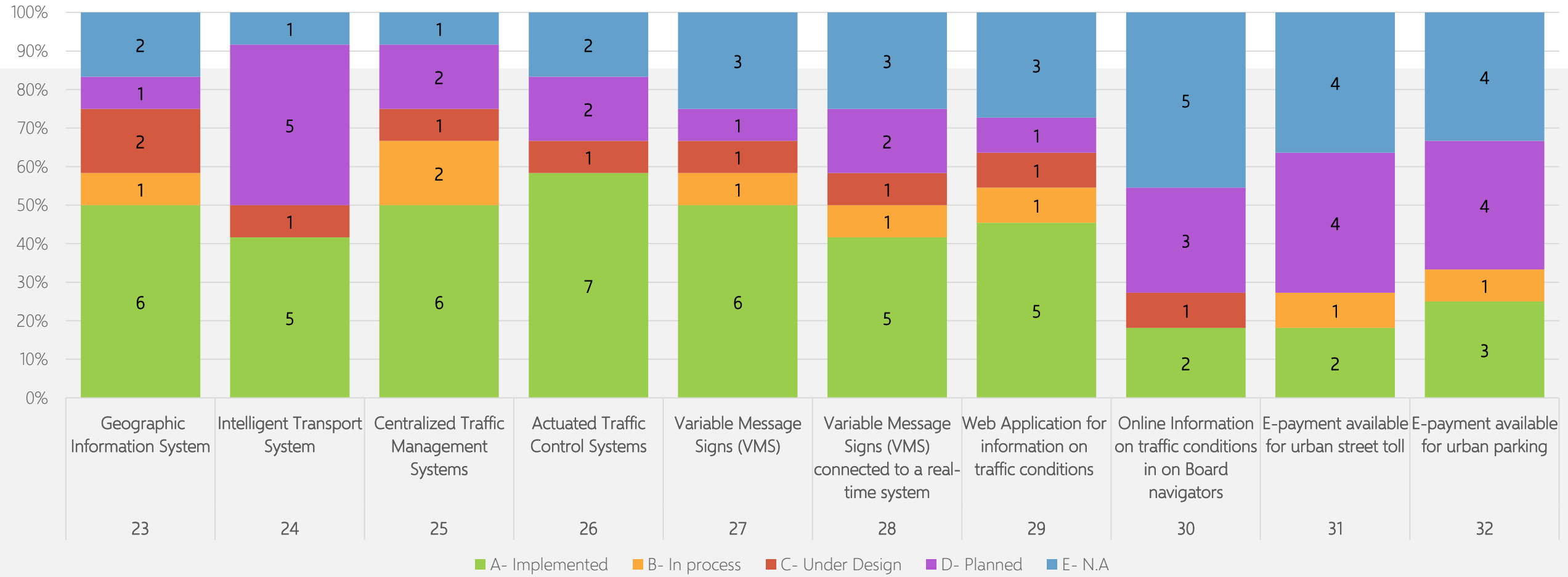
Feedback from Questionnaire

3. Urban streets:

There is generally more focus in Arab countries towards building streets more relying on private vehicles, with limited (to no focus) on pedestrian and cyclist routes, public transport lanes, open green spaces.

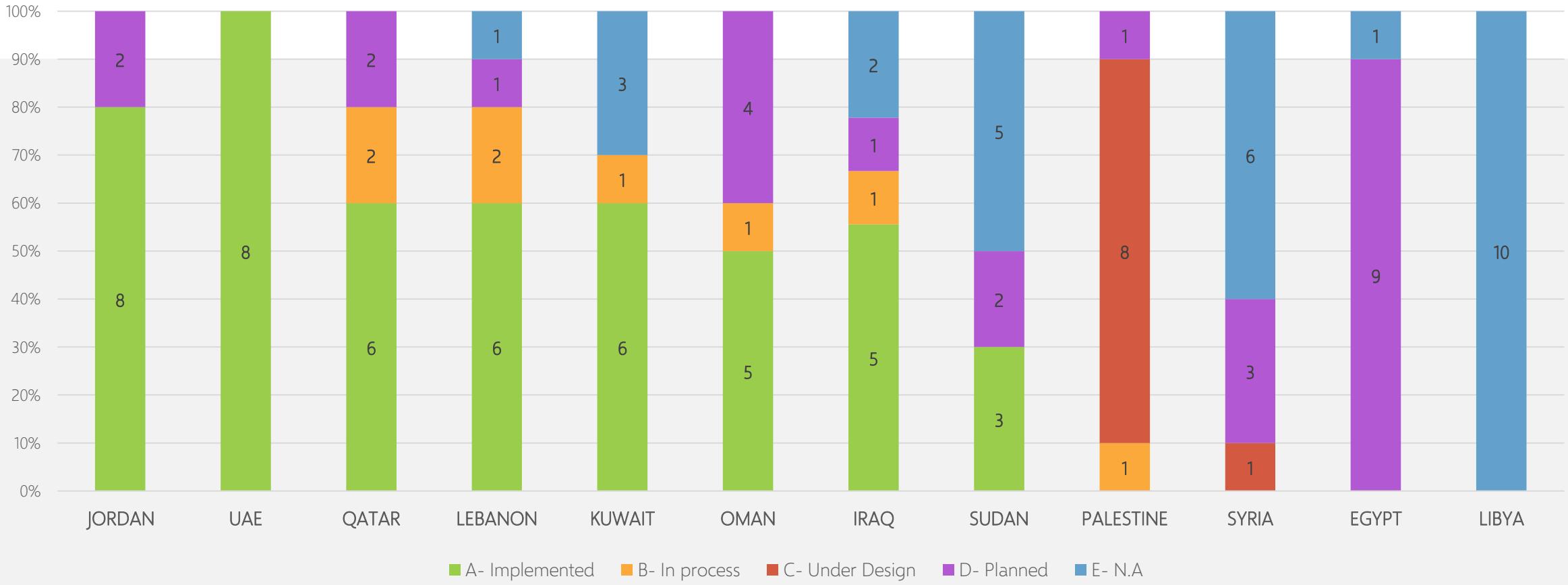
This problem is making Arab urban cities rely more on private motorized modes rather than shared or collective modes, which in return is causing congestion, accidents, and negative effects on the environment and the public spaces.

Urban streets - Status by technology



Urban street technologies are mostly either implemented or planned. Few are still mostly not planned, such as Online Information on urban traffic conditions in on Board navigators in vehicles

Urban streets - Status by country



Qatar is the leading country in terms of railway technology implementation, while countries like Jordan, Libya, Oman and Lebanon have yet to have plans for railway technologies

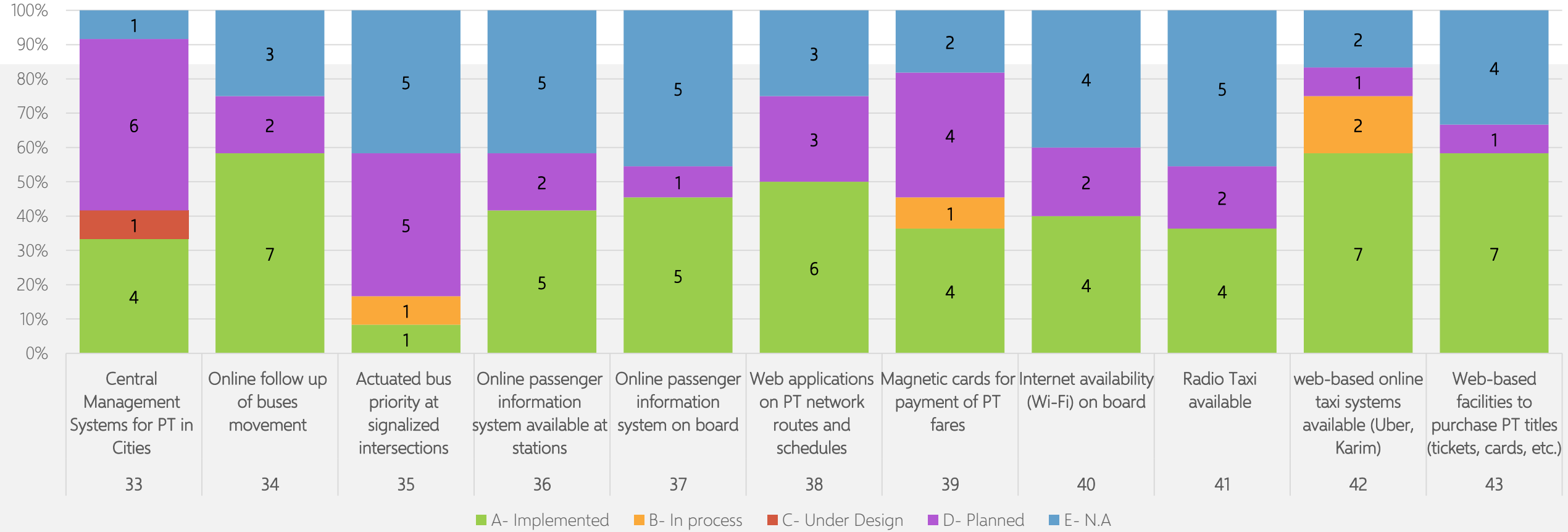
Feedback from Questionnaire

4. Public transportation:

With some exceptions, the majority of the Arab cities have not developed or organized heavy public transport systems and have suffered from a lack of anticipatory strategy when transport demand is constantly increasing.

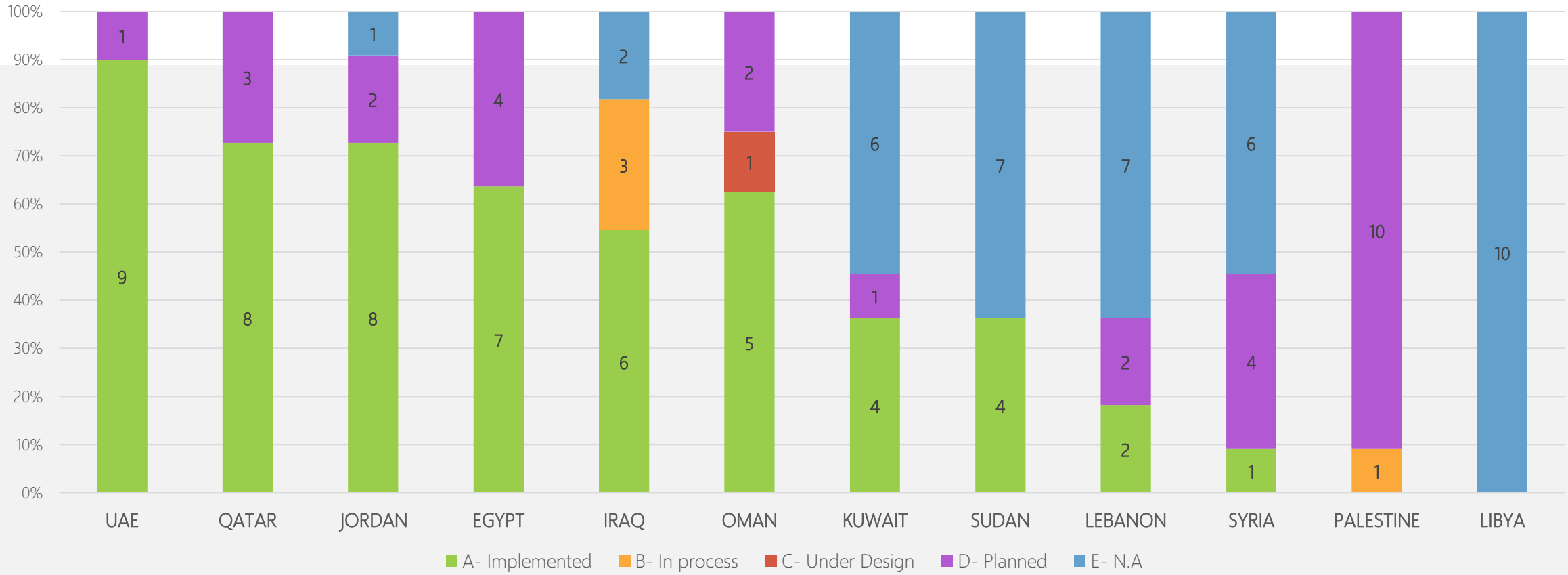
Globally there is a need for more investments and modernization programs in the PT technology systems, taking into account significant differences between the countries.

Public transportation - Status by technology



Public transport technologies are mostly either implemented, planned or not planned

Public transportation - Status by country



Public transport technologies are implemented in countries like UAE, Qatar, Jordan and Egypt, while countries like Libya have not yet planned for such technologies

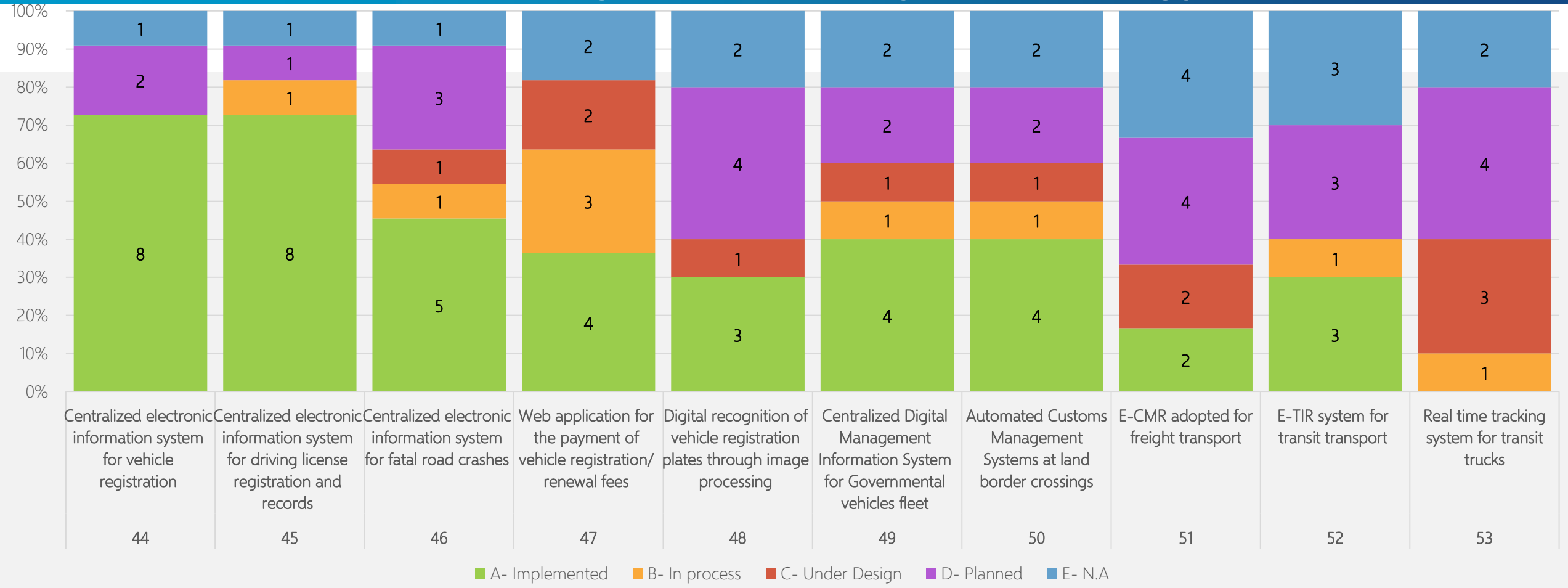
Feedback from Questionnaire

5. Land Transport Management, Operation and Border Crossings:

The transport conditions and transport regulations and standards differ markedly around the Arab region.

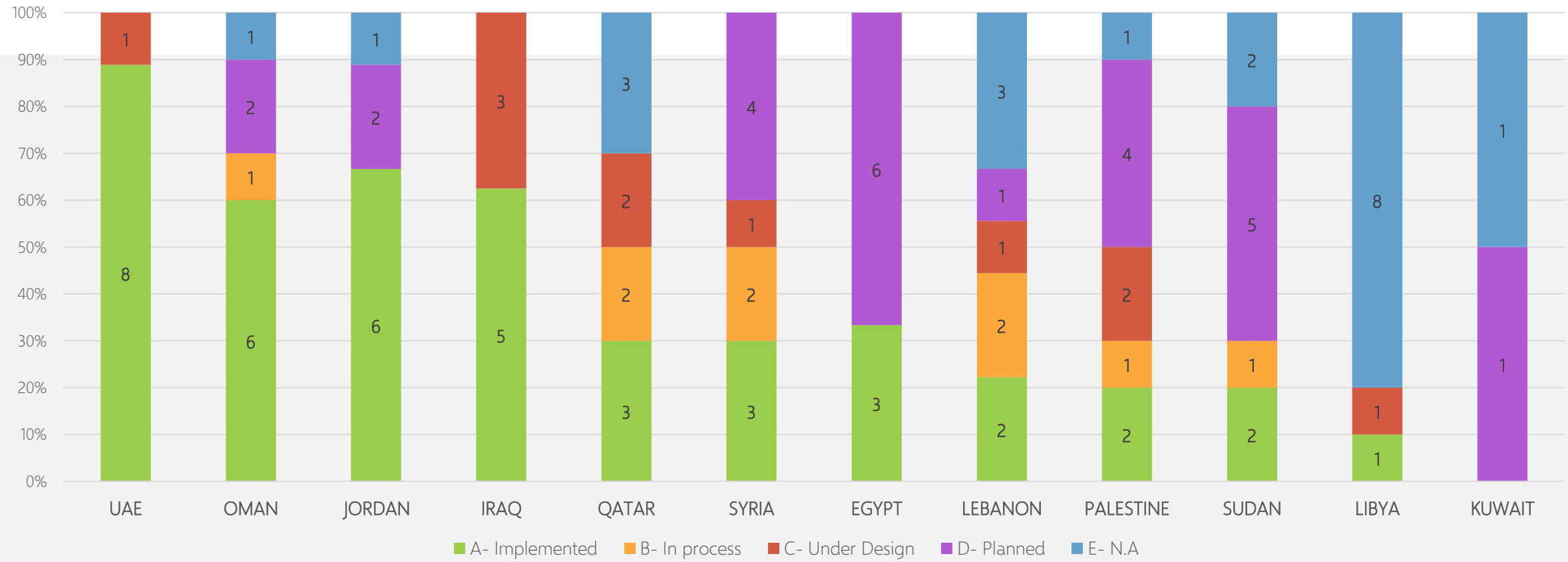
Generally, efficiency of sustainable transport regulations can be enhanced if they are linked with economic incentives and adequate technological solutions.

Land Transport Management, Operation & Border Crossings - Status by technology



Land Transport Management, Operation & Border Crossing technologies are mostly either implemented or planned. Few are not yet planned in some countries.

Land Transport Management, Operation & Border Crossings - Status by country



Land Transport Management, Operation & Border Crossing technologies are implemented in countries like UAE, Oman, Jordan and Iraq, while countries like Kuwait or Libya have mostly not yet planned for such technologies

Main Issues

1. Limited financial capacity, no real incentives for PPP schemes
2. Governance structures
3. Lack of proactive policies and frameworks
4. Less focus from lower income economies on implementing transport technologies

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Part 4: Policies for mainstreaming technological solutions in transport planning

Policy Recommendations / Challenges

I. Flexible Regulatory Framework
II. Financial Incentives
III. Open data
IV. Vibrant Innovation and Entrepreneurship Eco-system
V. Reducing Fuel Consumption
VI. Privacy and Security
VII. Ubiquitous Connectivity
VIII. Standardization and Inter-operability

I. Flexible Regulatory Framework

The regulatory framework determines the way in which transport services are designed, planned and produced.

1. A flexible regulatory framework will help to achieve economic efficiency, quality of service and transparency in operation & organization.
2. Transparent rules should be established between the different agents of the systems (allocation of responsibilities and sharing of risks).
3. The main issue that influences the implementation of sustainable transport services is the insufficient national or regional legislation.

II. Financial Incentives

Budgetary constraints remain a real problem for most countries; Incentives can affect change in consumption and production behaviors

1. Public Private Partnerships to boost risks sharing in investment funds.
2. Implementing corrective taxes on consumers and producers (e.g. a citizen may be given a subsidy to purchase cleaner cars and/or to support PT facilities).
3. Control externalities in order for the market to achieve an efficient equilibrium.

III. - Open Data

Government data is the number one source of open data

1. Citizens become partners in monitoring and planning.
2. Citizens and start-ups can innovate around this data to provide new services to help a city or region.
3. Ease the life of public transport users and systems (provides passengers with basic transit maps, transit signs, screens and apps, information systems that allow for planning efficient trips by PT and for avoiding unnecessary waiting).

IV.- Vibrant Innovation and Entrepreneurship Eco-system

A vibrant innovation and Entrepreneurship Eco-system will ensure

1. Digital skills are developed in-country.
2. Innovative strategies for transport policies are developed at adequate scale locally to solve identified needs.
3. Local solutions (mobile apps and others) are developed to solve local problems.

V. Reducing fuel consumption and global warning

Transport generates a large and growing share of greenhouse gas emissions, this calls for Governmental policies to restrain emissions such as

1. Fuel taxes and fuel economy regulations
2. Road pricing
3. Fuel quality regulations
4. Attempts to modify mode choice
5. Use technology to provide safer, more efficient, cheaper, and greener transportation systems

VI. Privacy and Security

- Safety & Security: Improving of related conditions for the whole multimodal chain of services is an appreciated achievement, but it still need efforts and investments.

- Privacy and personal data protection: To keep balance between privacy protection conditions and technical needs to enhance technological integration (to facilitate and to smooth the land transport route).

VII. Ubiquitous Connectivity

Provide connectivity to everyone and everything, everywhere, every time

1. Lower the price of International bandwidth and interconnection
2. Adopt IPV6
3. Make fiber available as a service
4. Establish national IXPs to provide local redundancy and lower latency
5. Ease regulations on technology (cloud computing, IOT, etc.)

VIII.Standardization and Inter-Operability

- Standardization: Levels and quality of the coordination and administrative reticence could be an obstacle.

- Interoperability: Main issues could be related to different level of development and/or performances as well as problems of interfaces.

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Q&A

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