IN THE FRAMEWORK OF:

SESEI | Seconded European Standardisation Expert in India

Enabling Europe-India Cooperation on Standards

EUROPEAN COMMITTEE FOR STANDARDIZATION

EUROPEAN COMMITTEE FOR ELECTROTECHNICAL STANDARDIZATION

European Commission

EFTA

4th Indo-European Conference on Standards & Emerging Technologies

7th December 2023 | The LaLiT, New Delhi, India

SMART CITIES -

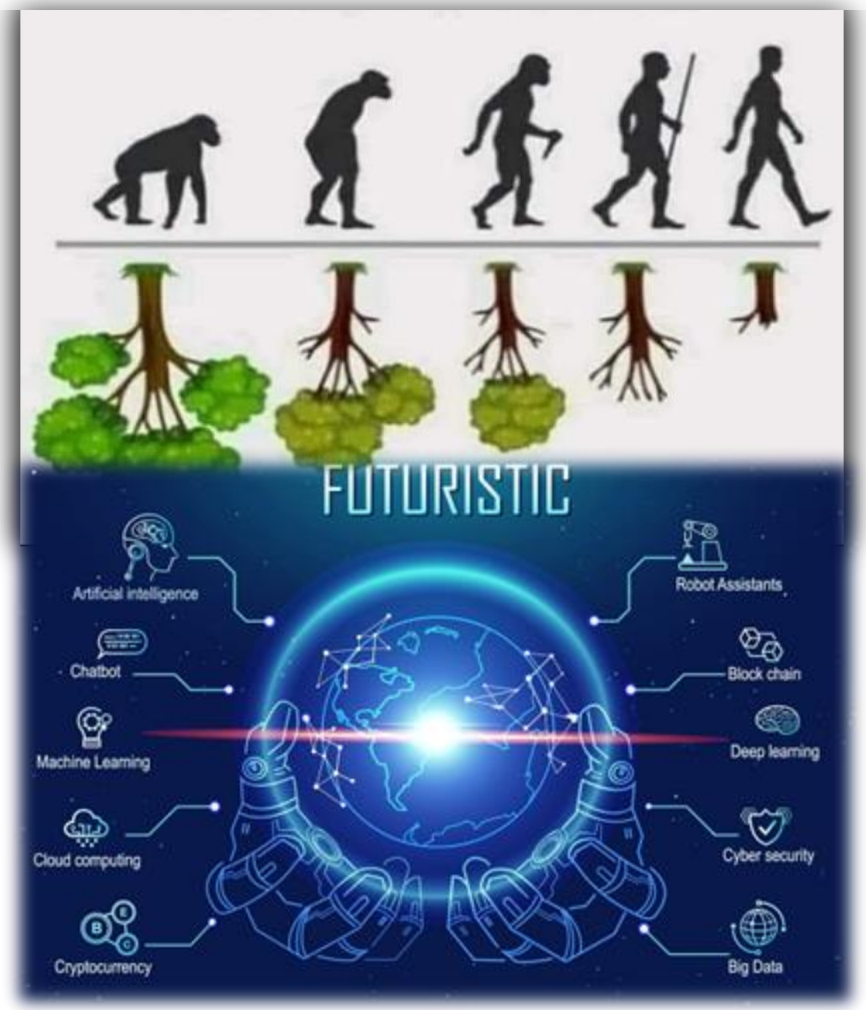
STANDARDIZATION IMPERATIVES & STRATEGY

N. KISHOR NARANG, NARNIX TECHNOLABS, India.

narnix

Future of Life… on EARTH…

The EVOLUTION we NEVER EXPECTED



"Nature no longer runs the Earth, we do."

It has been observed that the technologies developed by human beings in the last 2-3 centuries have had a major impact on the earth's climate and our nature's equilibrium.

Some believe that we have reached a point of no return. This can have a huge impact on *life on earth*, especially on the *human species*.

However, while technology has been responsible for most of it, technology also seems to have a solution for it.

It is increasingly clear that today's environmental conditions are not sustainable. Over the past few decades, we have made huge progress fighting disease, poverty, and illiteracy.

Now we must apply that same ingenuity to the problem of global warming and other consequences of human activity.

Climate is not politically strong enough to fight carbon by itself.

Smart Cities Mission: Background

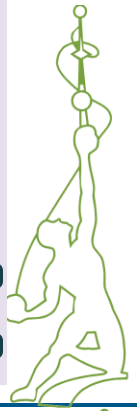
- **National Imperatives**
- To provide a Secure & Sustainable Basic Infrastructure and Environment
- To use Smart Solutions to improve the Infrastructure, Services & Quality of Life of its Citizens
- To Rely on Area Based Development
- To set examples that could be replicated both within and outside the Smart City and catalyze the creation of similar Smart Cities.

Ministry of Housing and Urban Affairs (MoHUA) has created a roadmap highlighting the key **urban development outcomes** it intends to achieve by **2022** and **2024** respectively.

- Ease of Living
- Responsive Governance
- Sustainable Environment
- Economic Growth

100 Cities

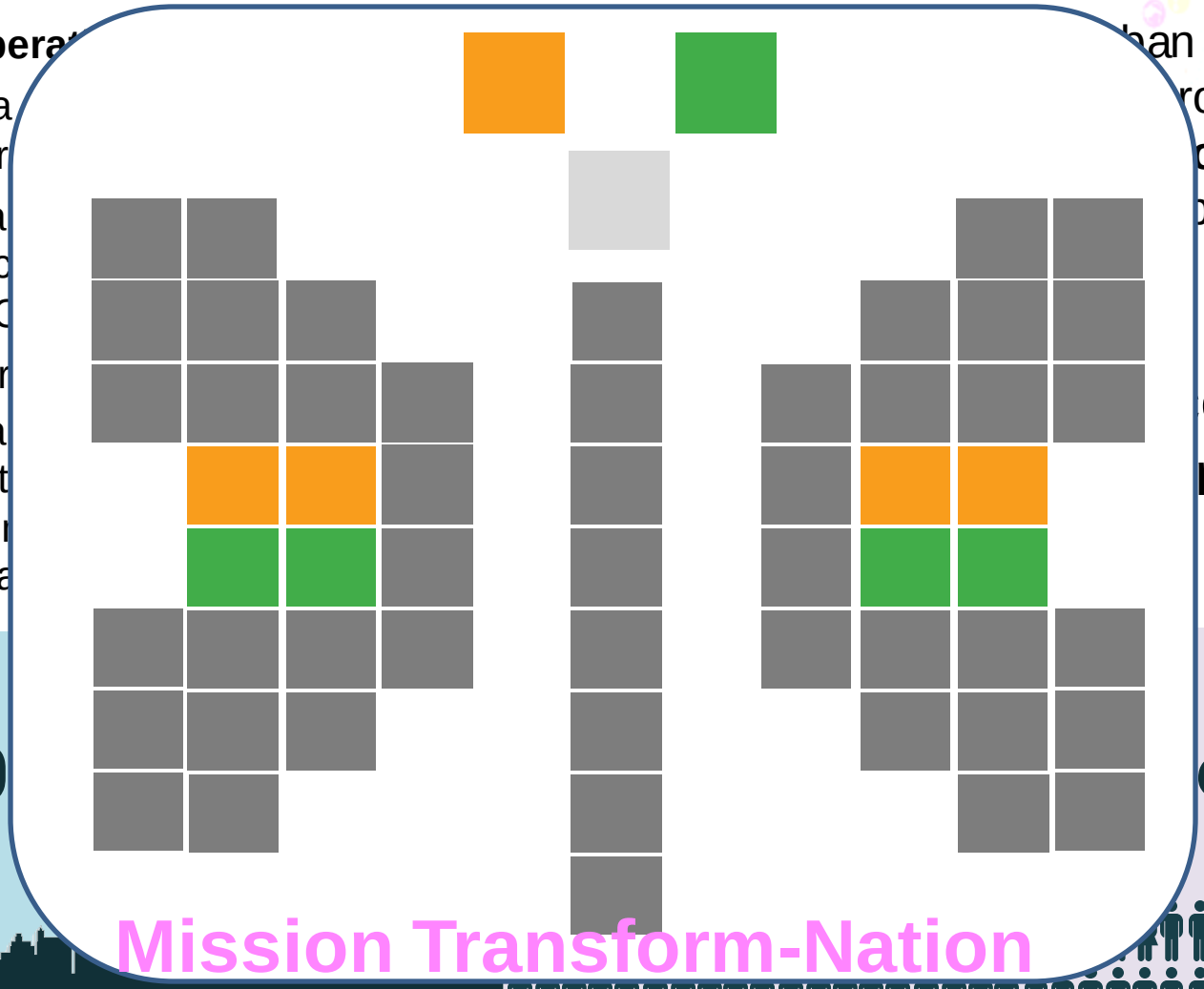
100 Million People



Smart Cities Mission: Background

- IN **National Imperat** …han Affairs
- IN To provide a … roadmap Basic Infrastr… …opment
- IN To use Sma… …by **2022** the Infrastruc… of Life of its C…
- IN To Rely on Ar… …e
- IN To set exa… …nt replicated bot… Smart City a… of similar Sma…

10… …e



Mission Transform-Nation

Smart Cities Mission: Background

- IN **National Imperat**
- IN To provide a
  Basic infrasti
- IN To use Sma
  the infrastruc
  of Life of its C
- IN To Rely on Ar
- IN To set ex
  replicated bot
  Smart City ar
  of similar Sma

han Affairs
roadmap
pment
by **2022**

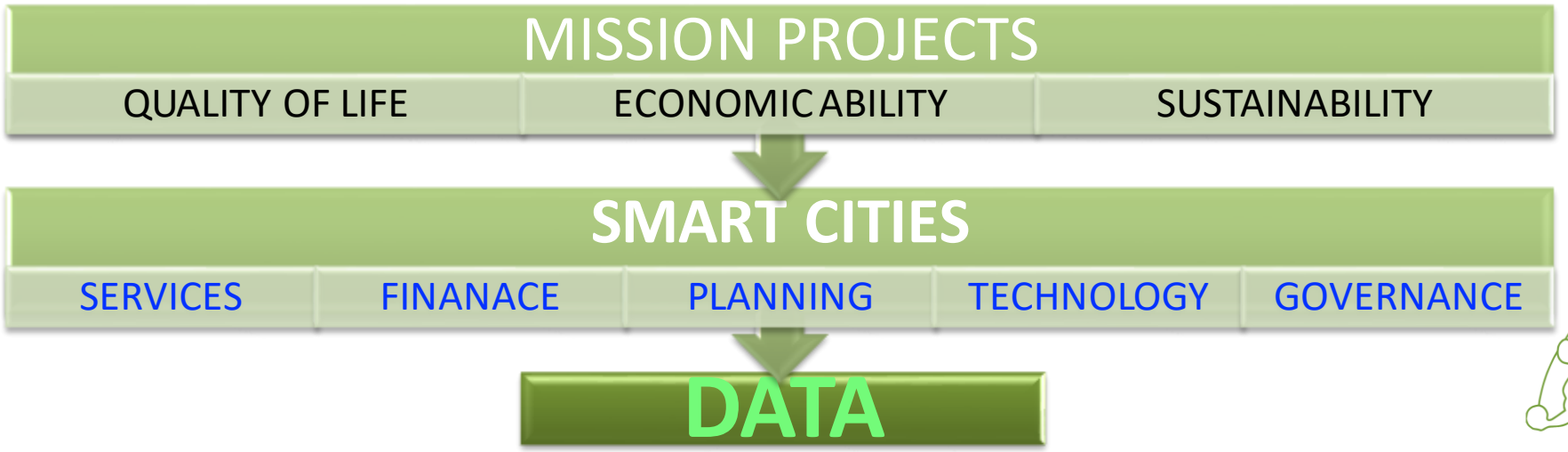
e
nt

The Indian Smart Cities are evolving as connected, liveable, energy efficient, adaptive and resilient cities using cutting edge emerging technologies.

Mission Transform-Nation

4th Indo-European Conference on Standards & Emerging Technologies
7th December 2023 | The LaLiT, New Delhi, India
narnix

Smart Cities – Addressing 3 Core issues



Initiatives of the Mission

Urban Resilience

- Climate Smart Cities Assessment Framework 2019

Connected Communities

- Data Smart Cities Strategy
- Open Data , IUDX

Smart Governance

- City GDP Measurement Framework
- National Urban Innovation Stack (NUIS)
- India Smart Cities Fellowship Program
- National Urban Learning Platform (NULP)

Competitiveness

City Investments to Innovate, Integrate and Sustain (CITIIS) Challenge

India Smart Cities Awards Contest

Smart Cities Digital Payment Awards

Ease of Living

Ease of Living Index 2019 and Municipal Performance Index 2019

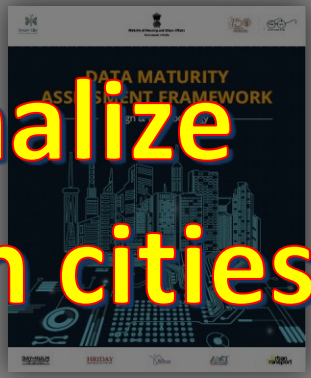
Initiatives of the Mission

"To support future city strategies, we need to understand the benefits of the embedded ubiquitous technologies and smart city developments in our everyday lives"

Mission Initiatives on DATA Empowerment

Strategy

Smart Cities Open Data Portal

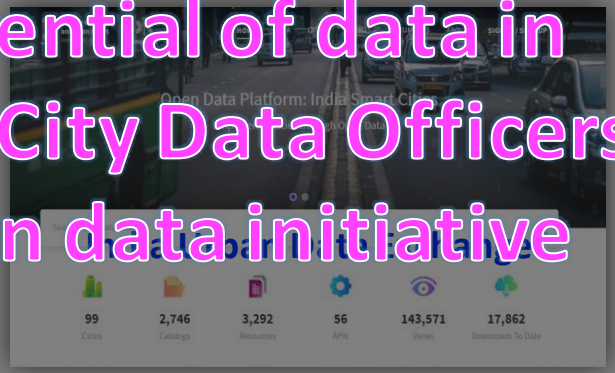


Maturity Assessment Framework

A Strategy to institutionalize "culture of data" in Indian cities

To assess and tap the potential of data in cities and drive innovation City Data Officers — the flag bearers of open data initiative

100 City Data Officers



IN THE FRAMEWORK OF:

SESEI | Seconded European Standardisation Expert in India

Enabling Europe-India Cooperation on Standards

CEN EUROPEAN COMMITTEE FOR STANDARDIZATION

CENELEC EUROPEAN COMMITTEE FOR ELECTROTECHNICAL STANDARDIZATION

ETSI

European Commission

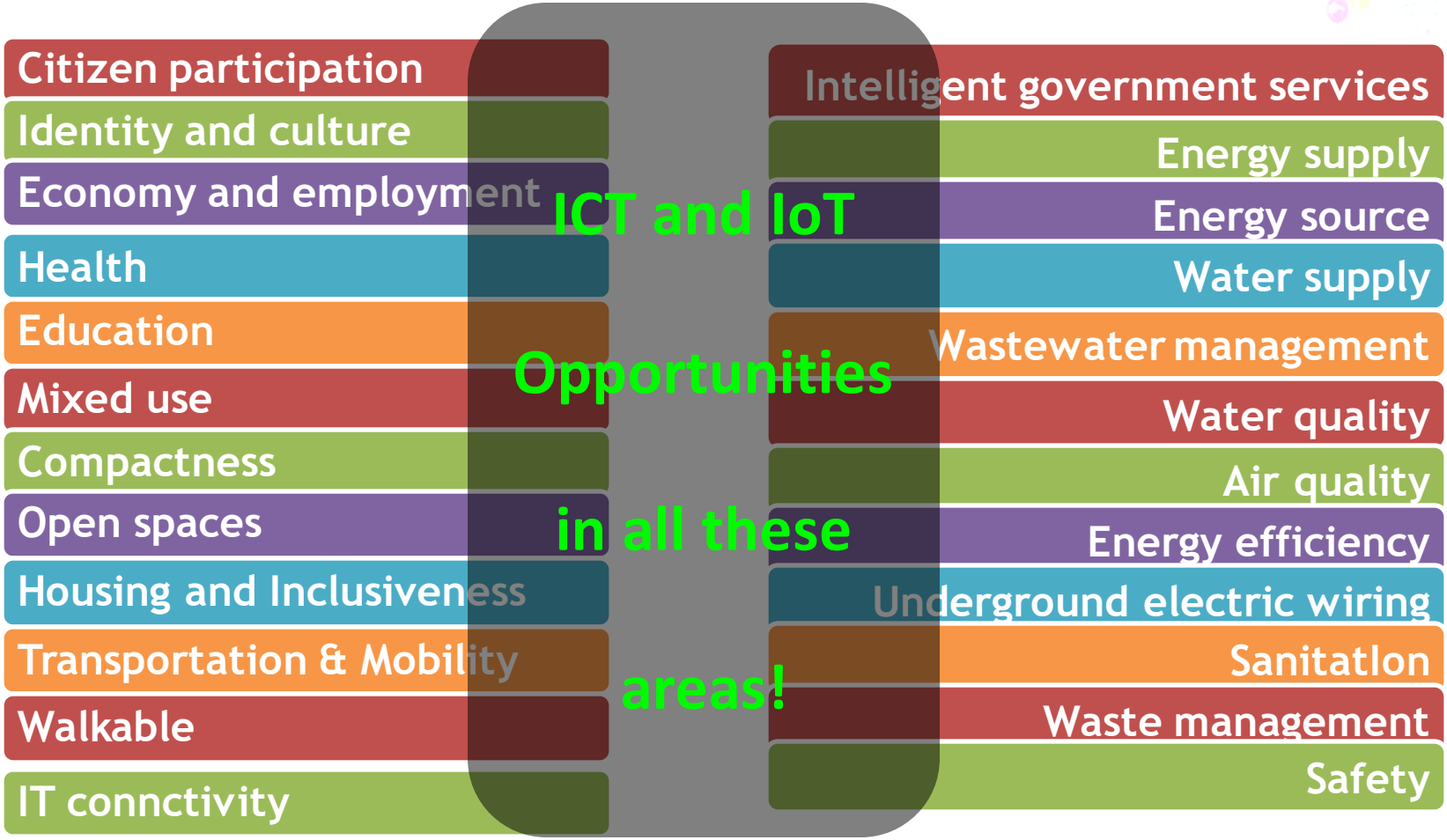
EFTA

UNIFIED DIGITAL INFRASTRUCTURE ICT REFERENCE ARCHITECTURE (UDI ICT RA)

Bureau of Indian Standards, Govt. of India

narnix

Features of a Smart City



24 Features identified by MoHUA GoI

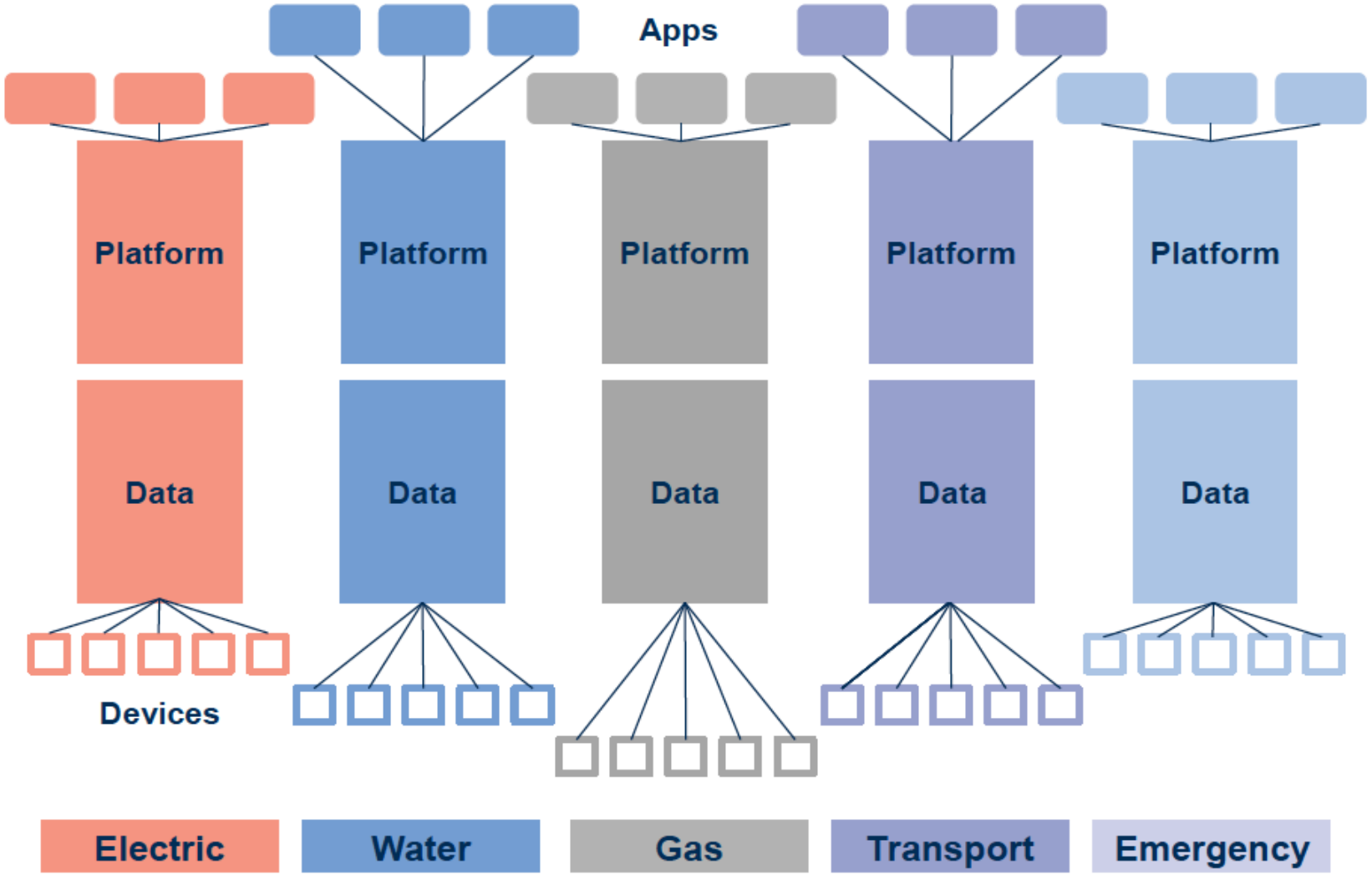
Smart Cities & Smart Infrastructure

A sample Indian business case for next 5-10 years:

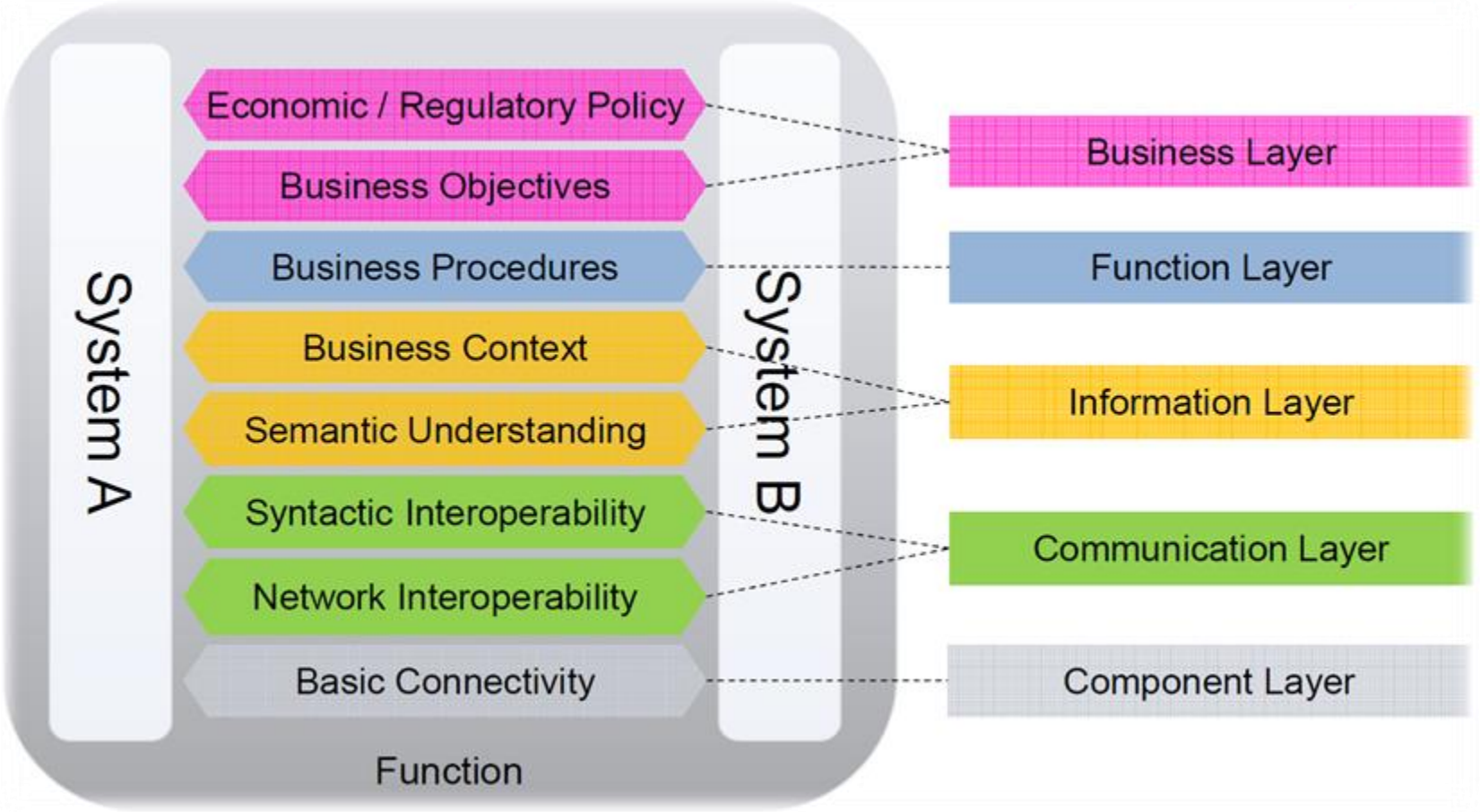
- 250 million Smart Electricity Meters are going to be procured & deployed under the NSGM (National Smart Grid Mission).
- All these **Smart Meters** are going to use **250 million Communication Modules** and minimum **0.5 million Gateways/DCUs** (Data Concentrator Units).
- **Smart Streetlights** are going to use more than **100 million Communication Modules** and at least **half a million of DCUs/Gateways**…
- **Smart Buildings** are going to deploy more than **50 million smart Sensors** and at **least 100K – 200K DCUs/gateways…**
- **Automobile**s shall be using at least **100-200 million** communication nodes for Vehicle O & M, V to V, V to I & other telematics applications…
- Similarly, various applications of the Smart Infrastructure paradigm like Smart Water, Smart Gas, Smart Traffic, Smart Environment, Smart sewage Disposal etc. are going to use a few billions of Smart Sensors with Communication Modules

To summarize, India ALONE, is going to need a minimum of **5 - 10 billion Communication modules** to be integrated into the Smart Sensors and Controllers and **10– 50 million Gateways** that shall be needed to operate and maintain the ***Nation-Wide Critical Infrastructure*** that needs to be deployed to enable and empower the citizens to lead a sustainable, safe and secure life …

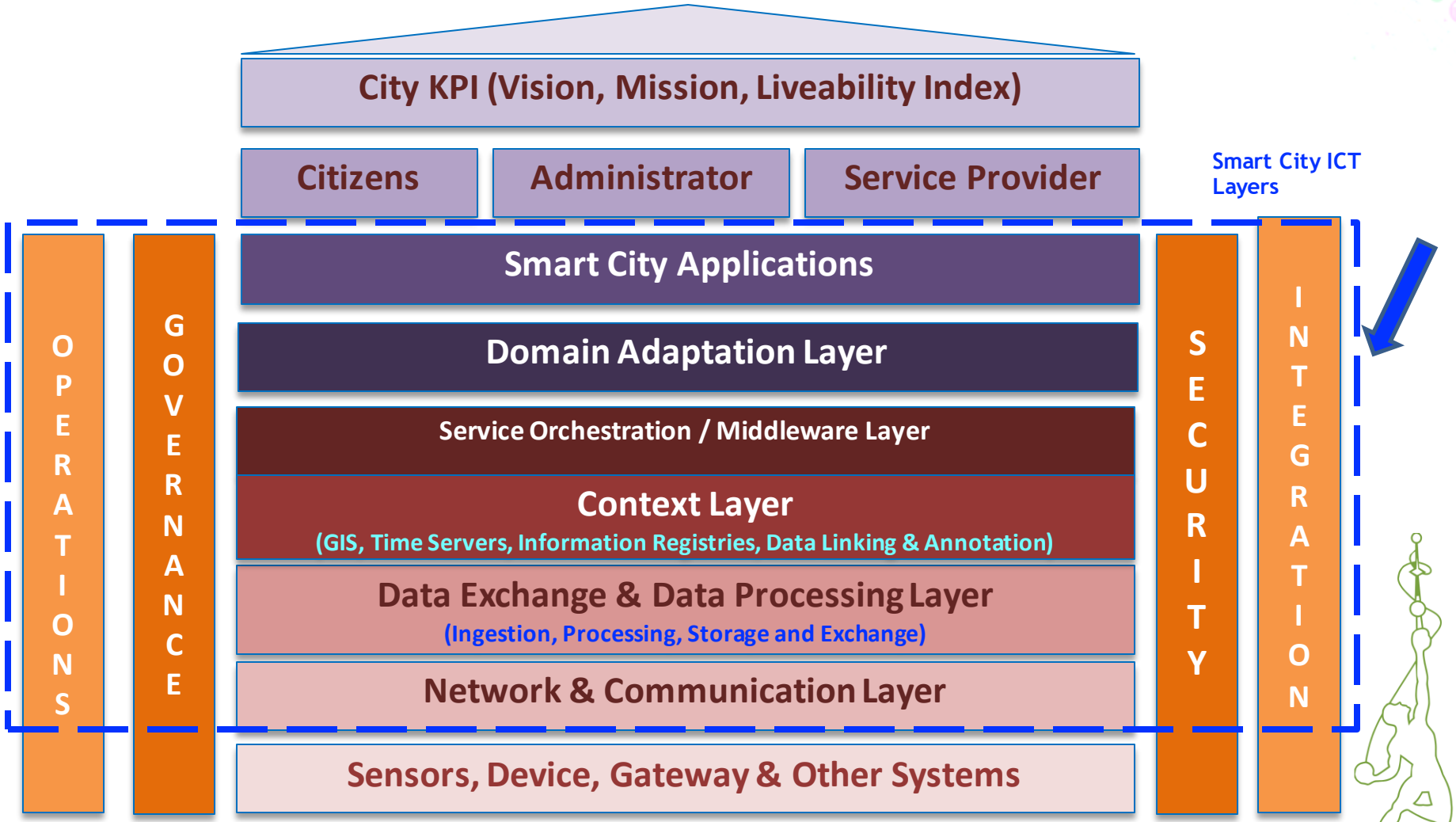
Current applications live in “silos”



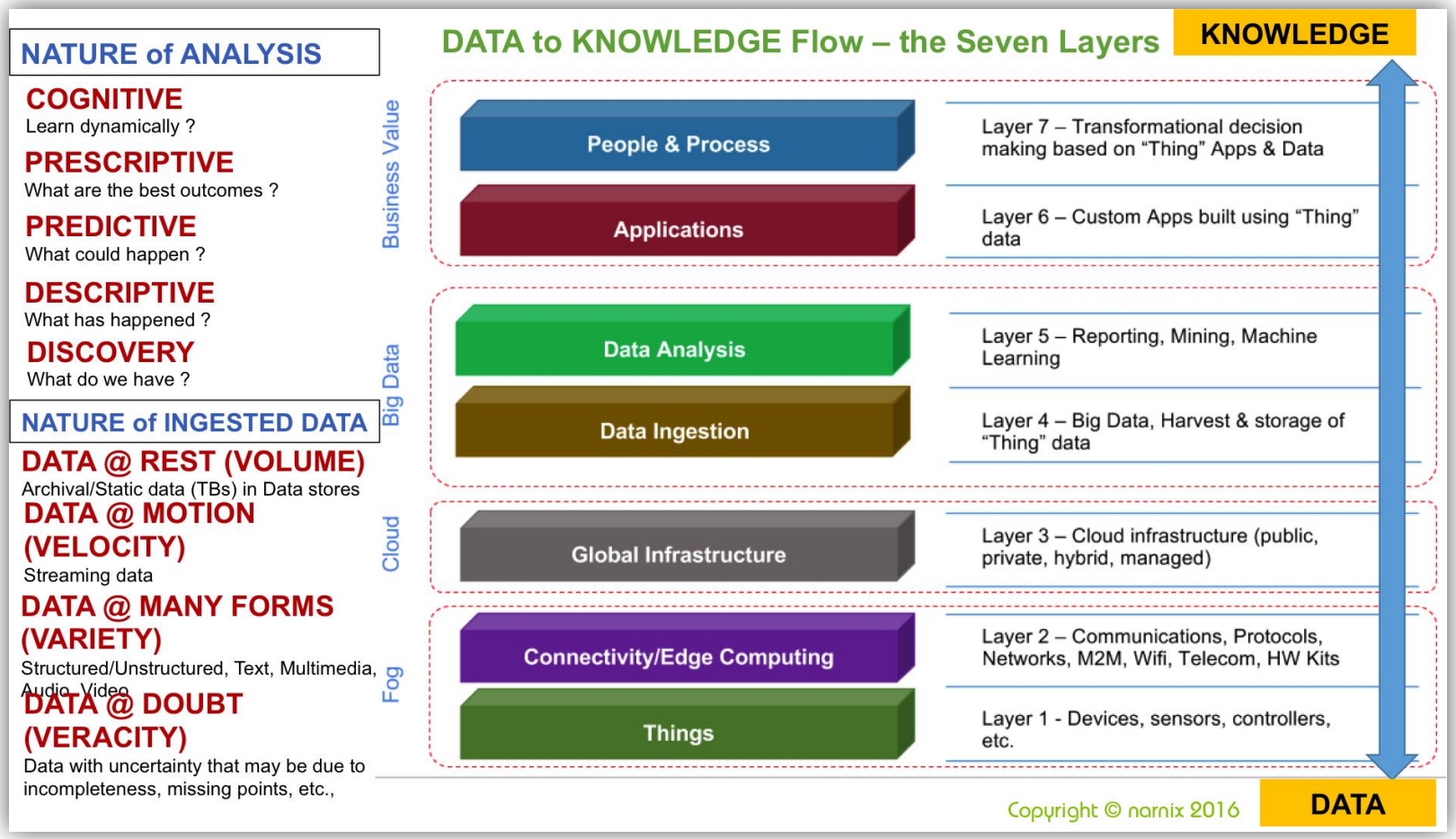
Interoperability Imperatives



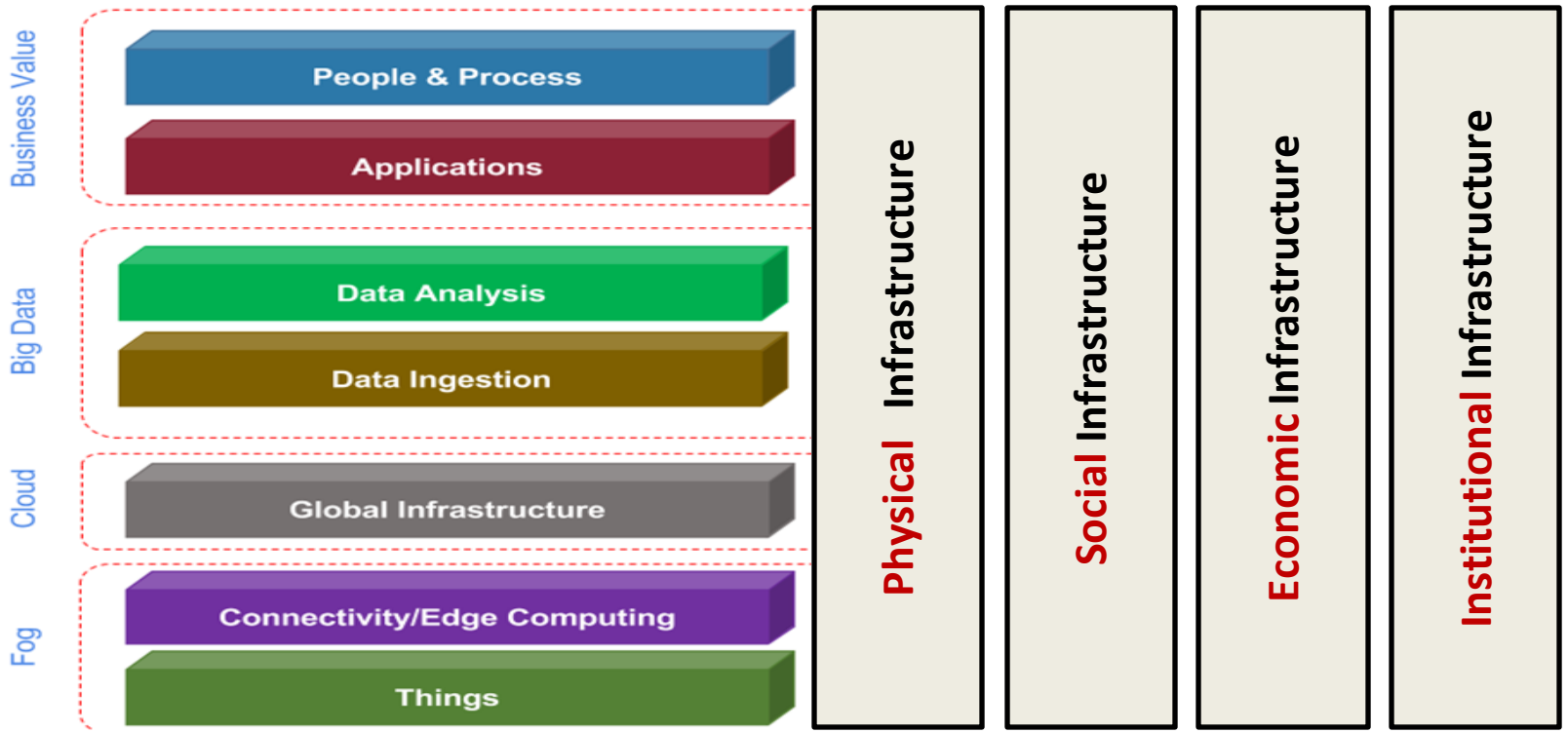
Smart City ICT Architecture - Simplified View



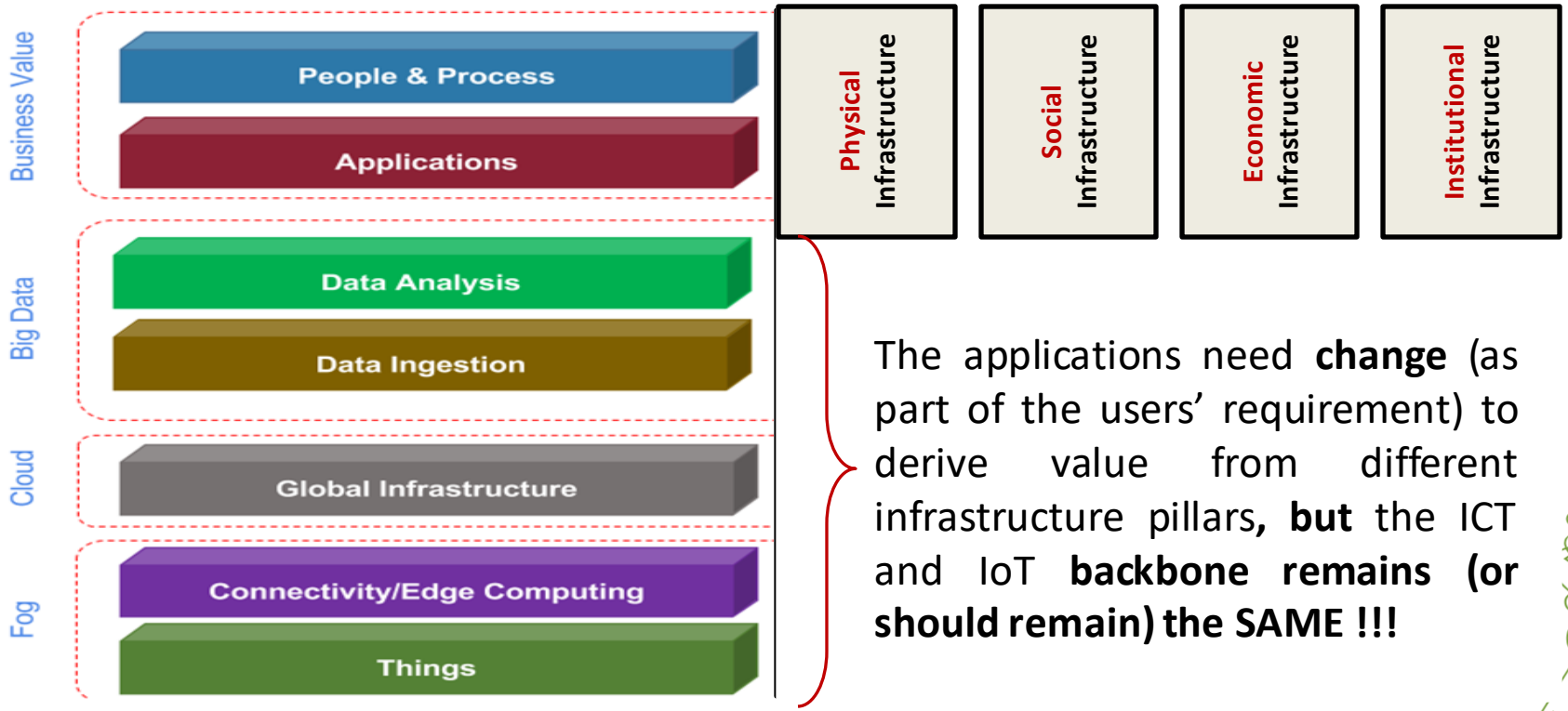
Layers of Information Flow



Mapping the Smart Infrastructure Philosophy to High-level Functionality

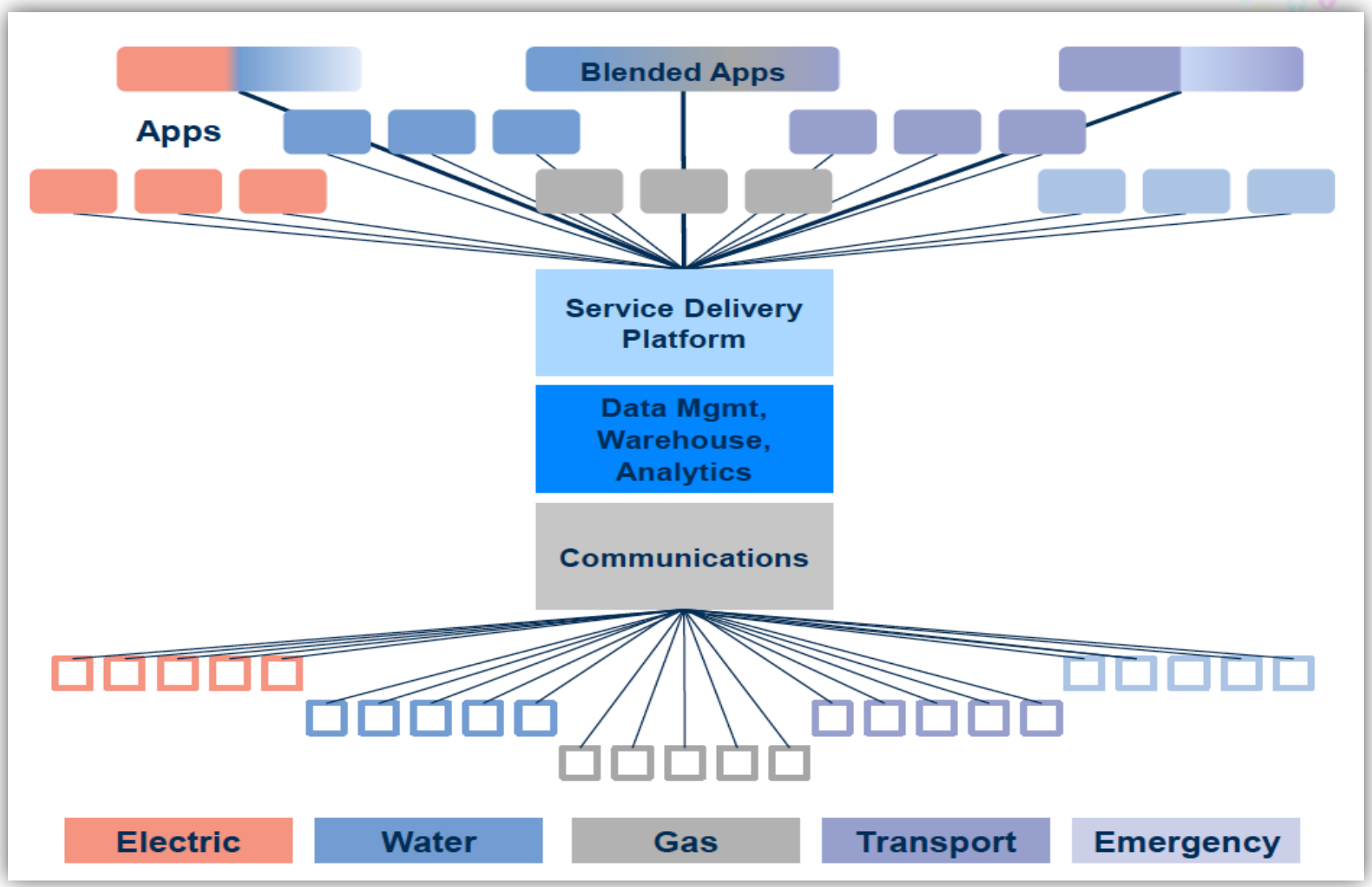


Mapping the Smart Infrastructure Philosophy to High-level Functionality

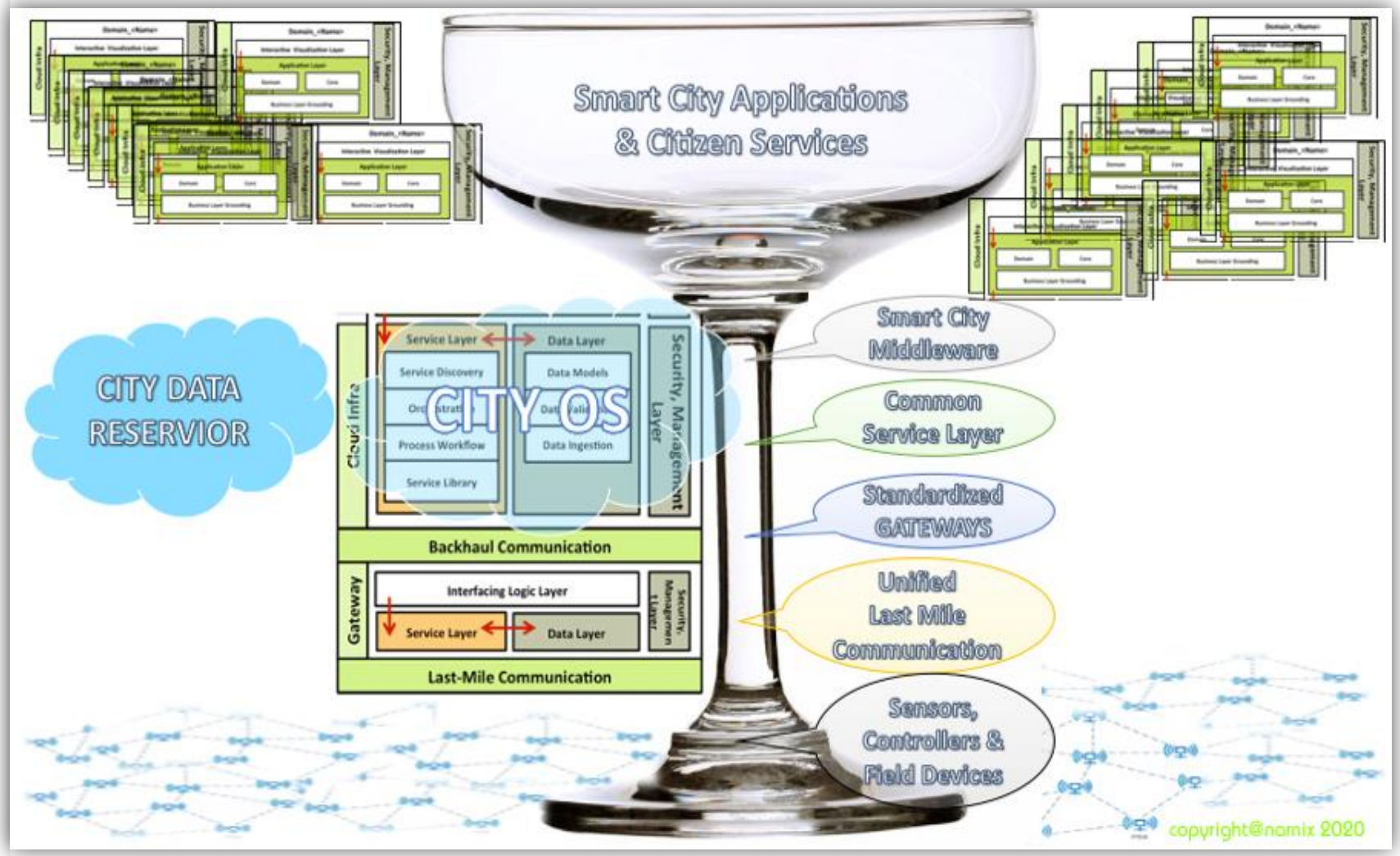


The applications need **change** (as part of the users' requirement) to derive value from different infrastructure pillars**, but** the ICT and IoT **backbone remains (or should remain) the SAME !!!**

The way forward: Unified Architecture



CLASSIC SAUCER CHAMPGANE GLASS ARCHITECTURE MODEL



Unified Digital Infrastructure: Reference Model

The evolved Comprehensively Unified ICT Architecture can be modelled as a “Classic Saucer Champagne Glass” with a wide Flat Bottom Base depicting the multitude of Field Devices & sensors etc. The Saucer Shaped Bowl on the Top depicting being filled with an ever-increasing spectrum of City Applications and Citizens’ Services.

The Long Stem depicts all the Common Layers viz.: the Unified Last Mile Communication, Common Standardized Gateways (application or Vertical Agnostic), Common Service layer representing the Common Service Functions in the Gateways, as well as, in the Cloud… and the Smart City Middleware & City Data Reservoir in the Cloud.

It is the “Long Stem” of the “Champagne Glass Model” instead of the Short & Narrow Neck in the “Hourglass Model” that brings the comprehensive harmonization, standardization & interoperability in the Architecture leading to optimization in operational efficiency & Life Cycle Cost of the ICT Infrastructure in any Smart City.

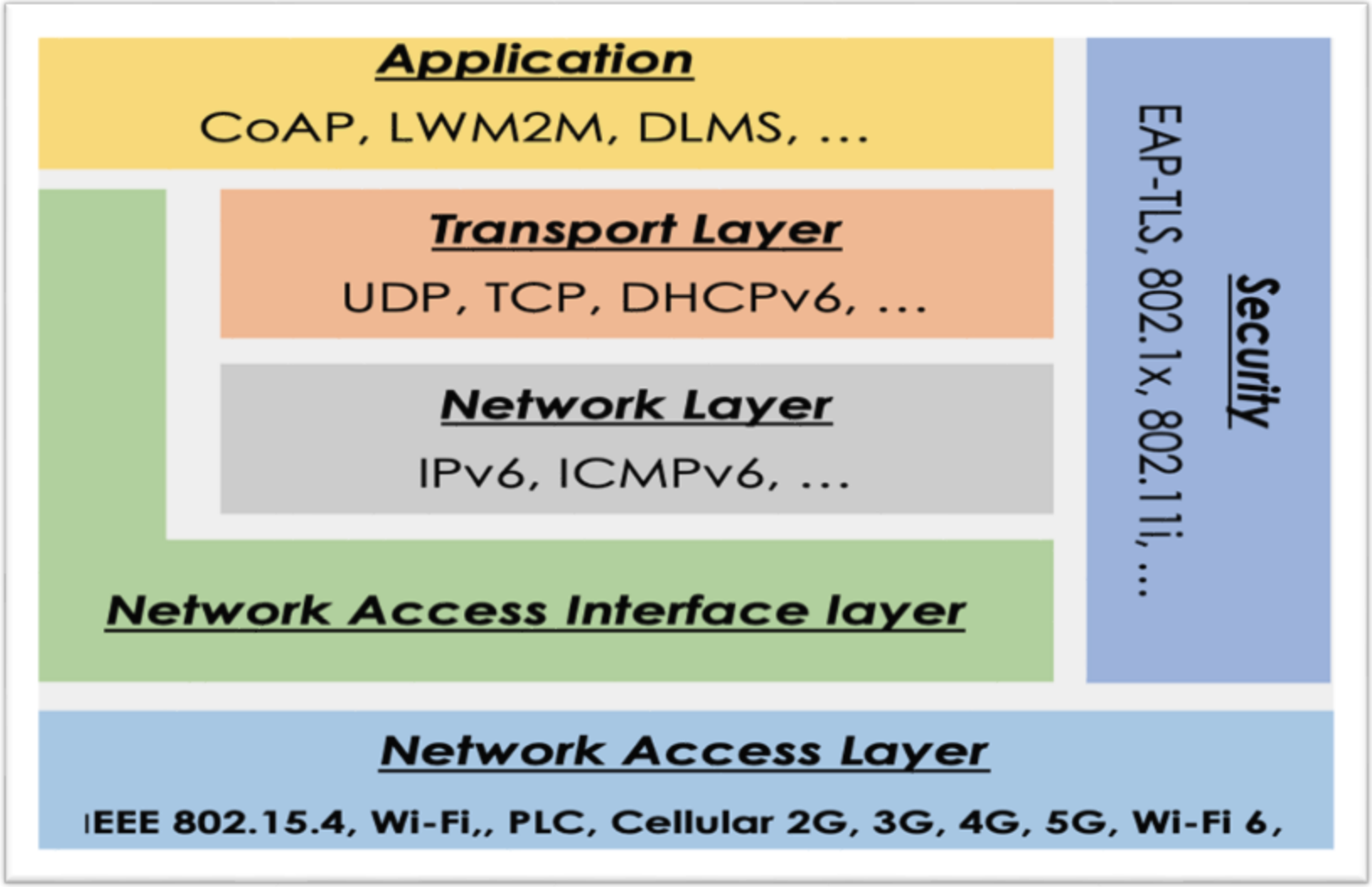
This Architecture Model, beyond reducing significantly, the CAPEX, OPEX & Carbon Footprint of the Digital Infrastructure, enables a unified & well architected Infrastructure that can be easily designed to be comprehensively Resilient & Cyber Secure.

A major Gap…

It is evident that there is Glass Wall Barrier between the Communication Protocols & Standards for IoT applications and that for Infrastructure & Industrial popularly called OT applications. In spite of evident appreciation of strengths and weaknesses of both classes of standards, there has been NO initiative by any Global SDO or Industry Consortia.

This exercise is an effort in this direction with intent to break the Glass Wall Barrier and homogenize these Two siloed paradigms comprehensively by developing a Unified Last Mile Communication Protocol Stack Architecture leveraging the best of both the worlds and developing a Communication Technologies agnostic robust Stack Architecture that shall enable ubiquitous Data sharing seamless across domains, use cases and applications.

The Unified Last Mile Communication Protocol Stack Reference Architecture



Intended Outcomes / Changes / Benefits

To meet the vision of “Sustainable Digital Transformation of the Urban Landscape” in India, Bureau of Indian Standards (the National Standards Body of India) constituted a Sectional Committee LITD 28 on Smart Infrastructure in 2017 based on learnings and recommendations of the Pre-standardization Study Report - Technical Requirements Analysis of Unified, Secure & Resilient ICT Framework for Smart Infrastructure. This Committee is developing a Series of System Standards (IS 18000 to IS 18100) to address the gaps and challenges in the Smart Cities’ Digital Infrastructure (including Critical/Civic Infrastructure) domain, Operations & Governance. First Ten Standards have already been released in December 2020 and June 2021:

- IS 18000:2020 – Unified Digital Infrastructure – ICT Reference Architecture (UDI-ICT RA)
- IS 18002-1: 2021 – Unified Digital Infrastructure — Data Layer Reference Architecture
- IS 18003-1: 2020 – Unified Data Exchange Part 1 Architecture
- IS 18003-2: 2021 – Unified Data Exchange - API Specifications
- IS 18004-1: 2021 – Unified Digital Infrastructure - IoT System Reference Architecture
- IS 18006-1: 2021 – Municipal Governance Reference Architecture
- IS 18006-3-1: 2021 – Municipal Governance – Property Tax – Taxonomy
- IS 18008-1: 2021 – Smart Cities GIS Reference Architecture
- IS 18010-1: 2020 – Unified Digital Infrastructure – Unified Last Mile Communication Protocol Stack Part 1 Reference Architecture (UDI – ULMCPS – RA).
- IS 18010-5-1: 2020 - Unified Digital Infrastructure – Unified Last Mile Communication Protocol Stack Part 5 Network Access Layer (IEEE 802.15.4) Section 1 Specification

The BIS Standards referred above are available in the following link: https://standardsbis.bsbedge.com/

Good Practices

Based on the initial set of System Standards already published, cities are being encouraged to update their respective Deployment strategies by including these standards in the future Solutions' RFPs. The various Guidelines, Indices and Maturity & Assessment Frameworks are being re-calibrated to ensure compliances to the standards.

The Technology Products, Systems & Solutions providers are aligning their respective offering to comply to the published standards. These standards have enabled the Sustainable Digital Transformation of the Urban Landscape by enabling optimization of the Digital Infrastructure in a Technology agnostic & Vendor Agnostic manner opening the floodgates of structured innovation by the Academia, Researchers, Start-ups, and industry at large.

The initiatives have created a healthy competitive environment for the industry with level-playing field for big and small enterprises leading to new synergies amongst innovators/start-ups and large organization to collaborate to develop new Standards based Technology Solutions for Smart Cities.

These Standards have been developed in accordance with principles laid out in the IEC SRD 63188 - Smart Cities Reference Architecture Methodology (SCRAM) & IEC 63205 – Smart Cities Reference Architecture (SCRA). These Standards are being developed under IEC Systems Committee Smart Cities.

Lessons learned

These standards shall help bring the Lifecycle cost of the Digital Infrastructure down substantially because of standards based Interoperable system components available through multiple vendors along with making it Resilient and Cyber Secure & Trustworthy.

The 100 Smart cities acting as the living lab and Test Beds for innovation have provided a vast body of knowledge base and actionable insights to the City Planners, Administrators, Technology Solutions Providers & Deployers to bring a comprehensive homogeneity in the heterogenous & fragmented ecosystem.

However, it is still 'work in progress' and continuous new learnings are being imbibed to leverage in updating the National Standardization Strategy and Roadmap for the "Sustainable Digital Transformation of the Urban Landscape" in India.

Rethinking Smart Cities: Prioritising Infrastructure

- The premise of a smart city has evolved from a technology-centric project to one that leverages technology to create a sustainable and citizen-centric environment.
- It is no longer enough simply to deploy sensors – companies and governments need to demonstrate a meaningful impact on the population.
- Keeping pace with the challenges presented by COVID-19, escalating sustainability commitments and ongoing population growth will require unprecedented urban investment and innovation.
- We see digital infrastructure as pivotal to the Smart City evolution.

Some insights from current imperatives…

- What is the city but the people?
- Cities are where problems and solutions meet…
- Urbanisation is bound to alter the ecological balance
- We shape our cities, thereafter they shape us…..
- Cities are where the climate change battle will be primarily won or lost.
- TO REBUILD OUR FUTURE - CITIES NEED TO NURTURE THE NATURE
- One Planet to Share: Sustaining Human Progress in a Changing Climate

One earth, One family, One future

narnix

Thank you!

For a Sustainable & Resilient Future

narnix

narang n. kishor
+91 9810163990
kishor@narnix.com

N. KISHOR NARANG

Technology Philanthropist, Innovation, Standardization & Sustainability Evangelist | Technology Advisor, Mentor, Design Strategist & Architect in Electrical, Electronics & ICT; running an Independent Design House – NARNIX since 1981.

- Over 46 years of hardcore Research and Design Development Experience in Solutions, Systems, Products - Hardware, Software & Firmware (Embedded Software) in fields of Industrial, Power, IT, Telecom, Medical, Automotive, Aerospace, Défense, Energy and Environment. Over 10 years of Advisory Experience to different segments of business & industry.
- Leading multiple National & Global Standardization Initiatives and Projects at BIS, TSDSI, IEEE, IEC, ISO, ITU +++
- For the last 15 years, been deeply involved in standardization in the electrical, electronics, communications, information technology, digital infrastructure and cyber security domains with a focus on identifying gaps in standards to bring harmonization through system standards and standardized interfaces to ensure end-to-end Interoperability.