What is a smart city?

focus

leade

inspiration

creative

An evaluation of a small community using the INCOSE Smart Cities framework

Human-centered Smart Cities

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Jargalsaikhan Dugar

What's a Smart city?

Shutterstock

resources.nvidia.com/en-us-metropolis-smart-cities

Search engines say…

Wikipedia says…

A **smart city** is a technologically modern urban area that uses different types of electronic methods and sensors to collect specific data. Information gained from that data is used to manage assets, resources and services efficiently; in return, that data is used to improve operations across the city.[1] This includes data collected from citizens, devices, buildings and assets that is processed and analyzed to monitor and manage traffic and transportation systems,[2] power plants, utilities, urban forestry,[3] water supply networks, waste disposal, criminal investigations, information systems, schools, libraries, hospitals, and other community services.[4][5] Smart cities are defined to be smart both in the ways in which their local governments harness technology as well as in how they monitor, analyze, plan, and govern the city.

ChatGPT says…

Smart cities leverage technology and data to enhance the quality of life for their residents, improve sustainability, and streamline urban management. Here are five key criteria for smart cities:

Digital Infrastructure:

Connectivity, Internet of Things (IoT):

Sustainability and Environmental Initiatives:

Energy Efficiency, Waste Management, Water Management

Mobility and Transportation:

Smart Public Transportation, Traffic Management, Electric and Autonomous Vehicles

Governance and Citizen Engagement:

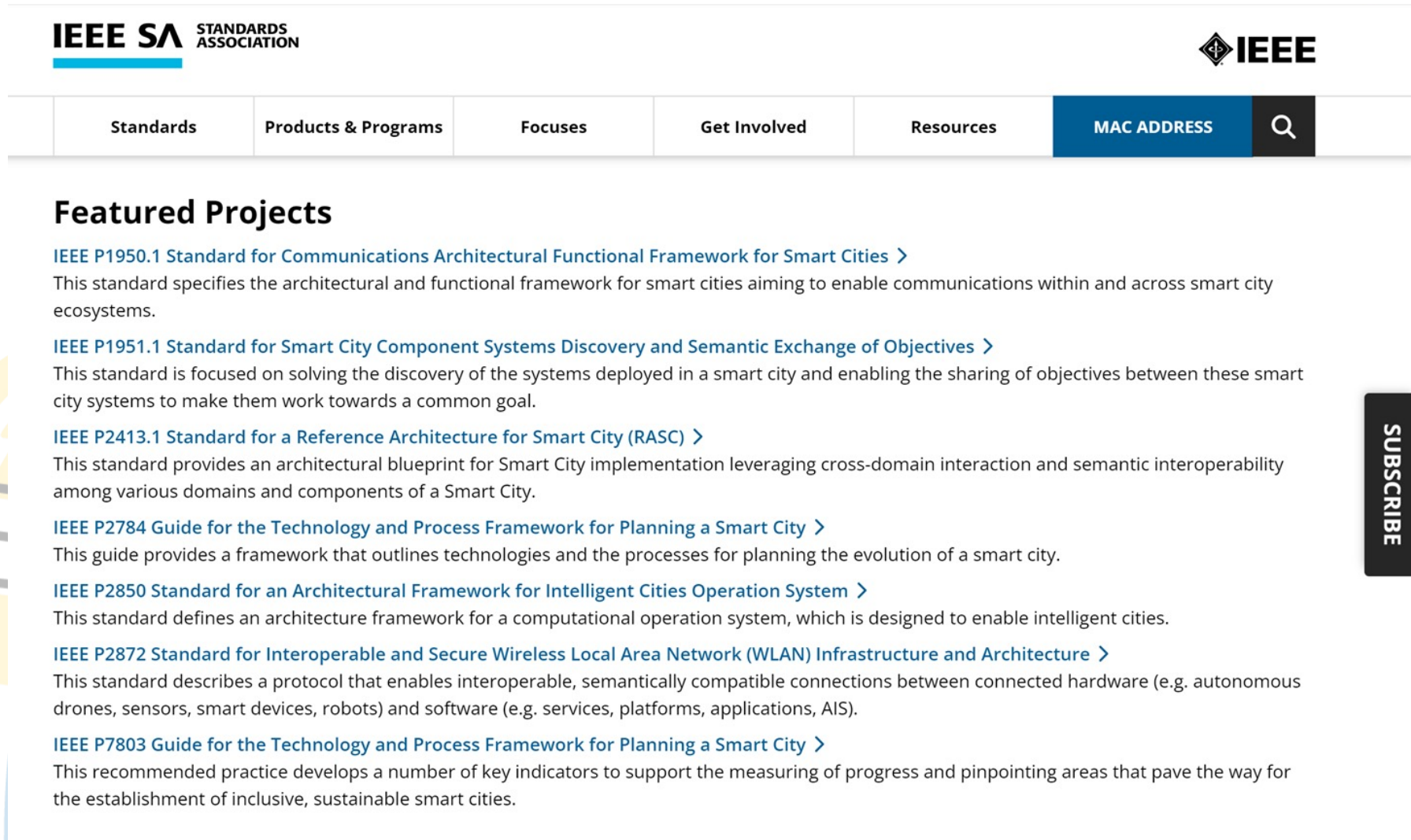E-Government Services, Citizen Participation

Health and Safety:

Healthcare Services, Public Safety

Standards say…

IEEE SA STANDARDS ASSOCIATION   ◆IEEE

| Standards | Products & Programs | Focuses | Get Involved | Resources | MAC ADDRESS | 🔍 |

Featured Projects

IEEE P1950.1 Standard for Communications Architectural Functional Framework for Smart Cities ›
This standard specifies the architectural and functional framework for smart cities aiming to enable communications within and across smart city ecosystems.

IEEE P1951.1 Standard for Smart City Component Systems Discovery and Semantic Exchange of Objectives ›
This standard is focused on solving the discovery of the systems deployed in a smart city and enabling the sharing of objectives between these smart city systems to make them work towards a common goal.

IEEE P2413.1 Standard for a Reference Architecture for Smart City (RASC) ›
This standard provides an architectural blueprint for Smart City implementation leveraging cross-domain interaction and semantic interoperability among various domains and components of a Smart City.

IEEE P2784 Guide for the Technology and Process Framework for Planning a Smart City ›
This guide provides a framework that outlines technologies and the processes for planning the evolution of a smart city.

IEEE P2850 Standard for an Architectural Framework for Intelligent Cities Operation System ›
This standard defines an architecture framework for a computational operation system, which is designed to enable intelligent cities.

IEEE P2872 Standard for Interoperable and Secure Wireless Local Area Network (WLAN) Infrastructure and Architecture ›
This standard describes a protocol that enables interoperable, semantically compatible connections between connected hardware (e.g. autonomous drones, sensors, smart devices, robots) and software (e.g. services, platforms, applications, AIS).

IEEE P7803 Guide for the Technology and Process Framework for Planning a Smart City ›
This recommended practice develops a number of key indicators to support the measuring of progress and pinpointing areas that pave the way for the establishment of inclusive, sustainable smart cities.

SUBSCRIBE

Why don't smart cities look like this?

INCOSE Smart City Definition says…

Smart Cities Initiative

A smart city is capable of

identifying its problems and

mitigating root causes

by generating and processing

engineered quality data in a continuous and inclusive manner.

The INCOSE-TUS Reference Model is a robust, tailorable, and systematic way to view and evaluate a smart city as an integrated complex social system

Smart Cities Initiative
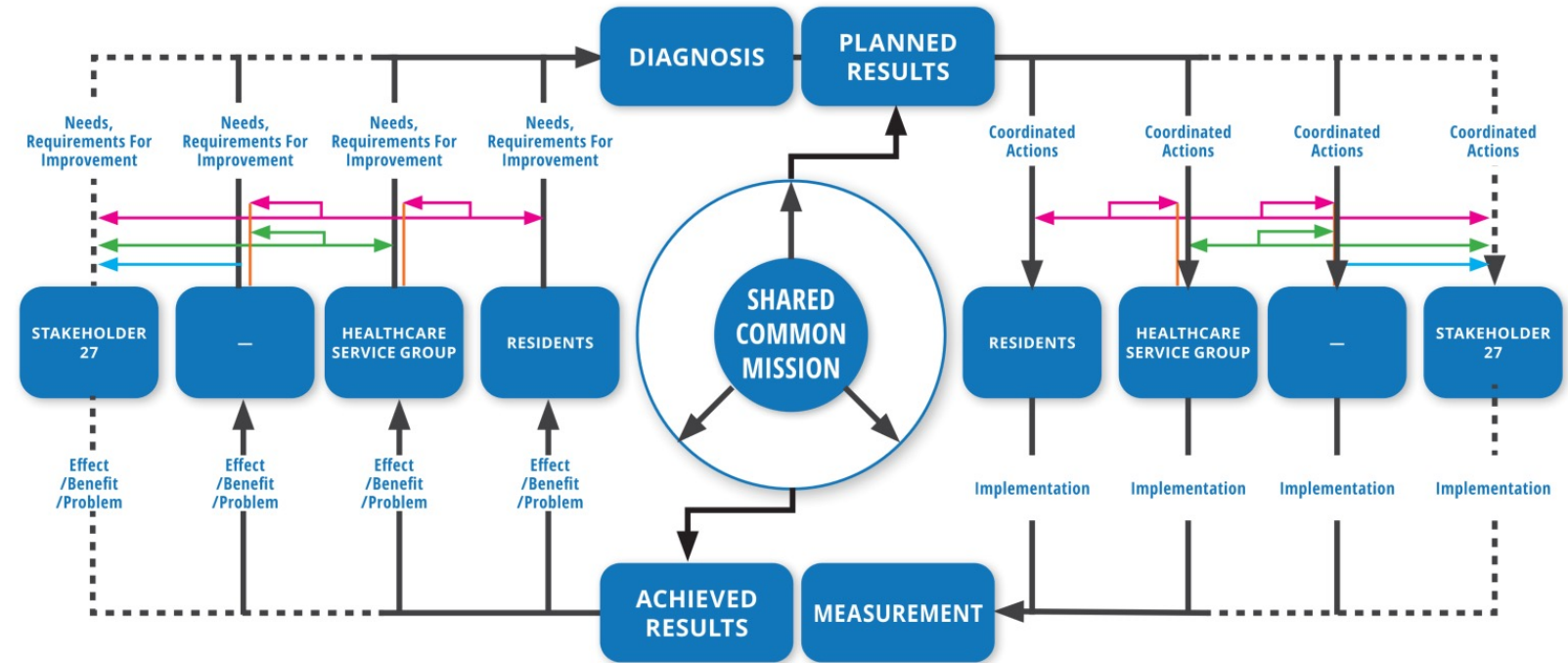
Fundamental human needs are the basis for a smart city's common mission
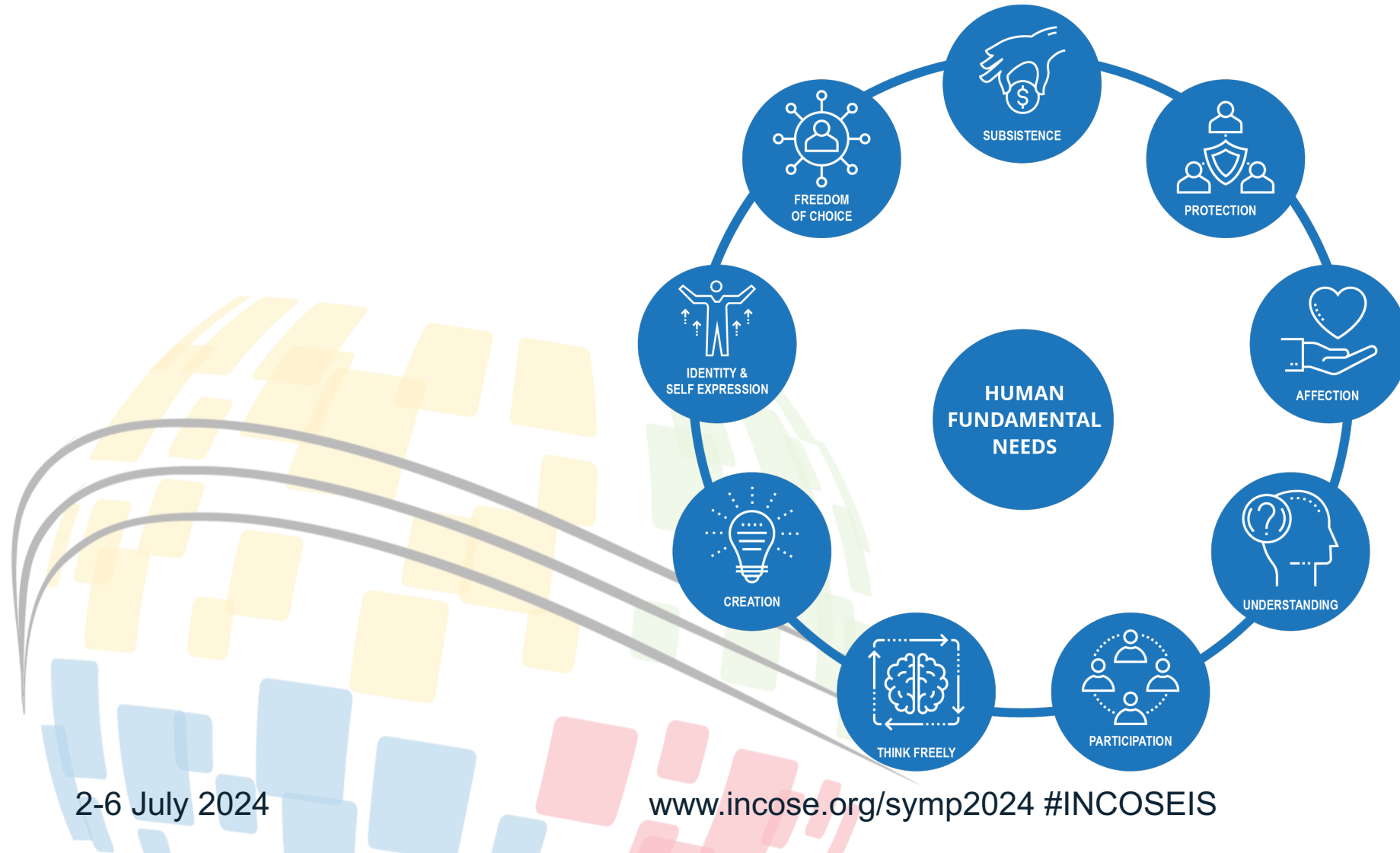
Several definitions and concepts provide the foundation for our Smart Cities framework

- Smart City definition

- Common mission

- Fundamental human needs

- City definition

- Paradigm shifts

What is a City?
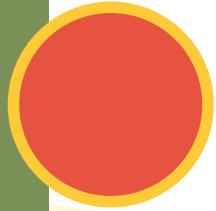
- **Purposely created**
- **Land officially recognized**
- **Infrastructure for residents**

The INCOSE Smart City Framework is based on paradigm shifts
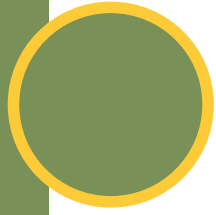
Technologies make Smart cities

A city has its own goal

A city must satisfy the needs of its residents

INCOSE Smart City Paradigms

Humans build Smart cities

Humans develop technologies that support human activities

A city has a goal reflecting the common needs of the humans in the city

A city must create an environment enabling its residents to satisfy their own needs

How robust is our model? Can the INCOSE-TUS model be applied to a small, low-tech community?

Key aspects of the INCOSE Smart City Framework were considered

Paradigm Shifts

Definitions

Common Goal

Fundamental Human Needs

JAMES PROJECT

Key Background Factors

Guatemalan context

(Meyer, 2024)

Municipal context

(Russell, 2022)

Key Background Factors

Human condition

Age Distribution in Guatemala

Median age = 22

Population (y-axis): 0, 500 000, 1 000 000, 1 500 000, 2 000 000, 2 500 000, 3 000 000, 3 500 000, 4 000 000, 4 500 000, 5 000 000

Age range (years) (x-axis): 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+
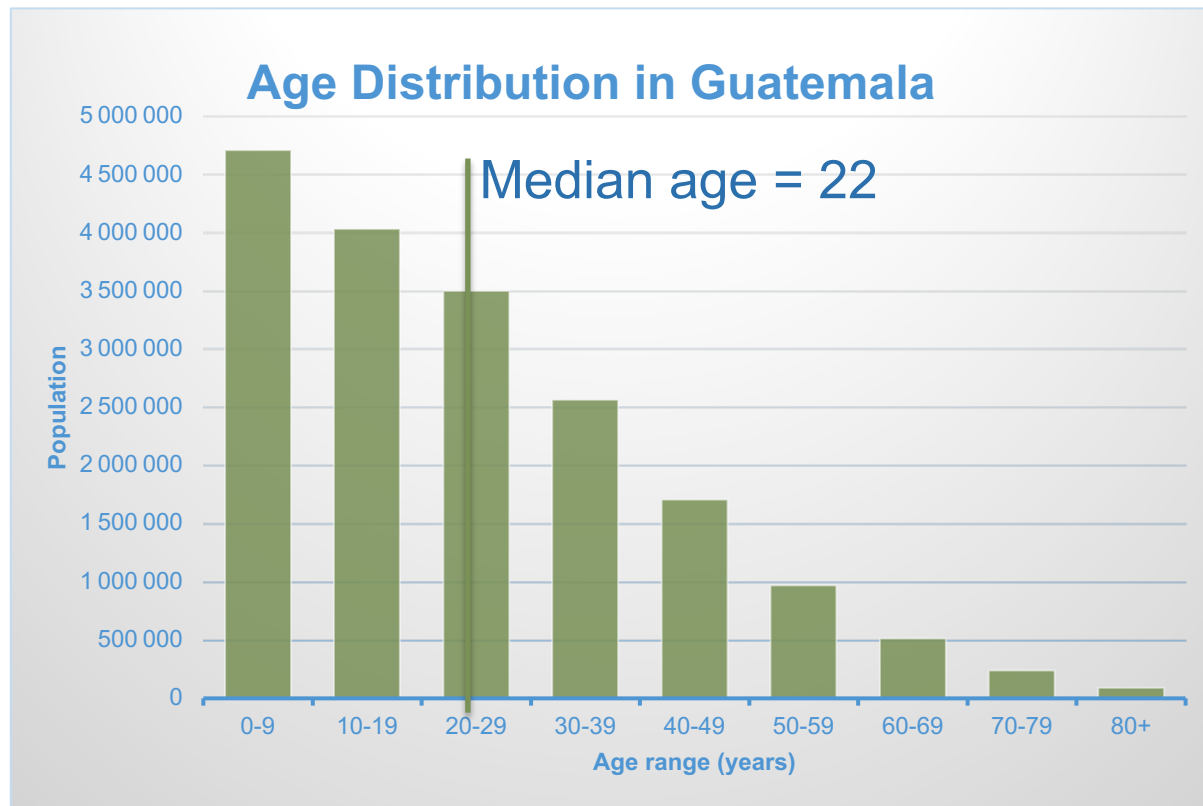
(World Population Prospects, 2022)

The James Project

(JamesProject.org, 2024)

Is the James Project a City?

YES

Purposely created

- Established in 2008 for the purpose of providing temporary housing and care for foster children in Guatemala

Land officially recognized
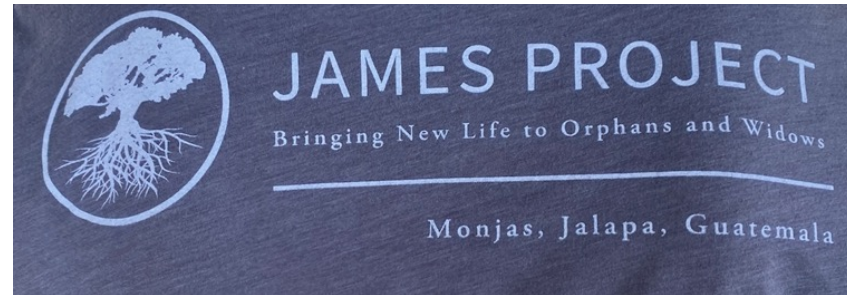
- Physical walls differentiate property boundary

Infrastructure

- Water
- Electricity
- Roads
- Security
- Education
- Farming
- Medical
- Housing

Does the community (James Project) meet intended paradigm shifts? YES

INCOSE Smart City Paradigms

Humans build Smart cities

Humans develop technologies that support human activities

A city has a goal reflecting the common needs of the humans in the city

A city must create an environment enabling its residents to satisfy their own needs

Does the community meet the definition of a smart city?

Problem:
Government removal of children without support to care for them.

A smart city is capable of

identifying its problems and

Does the community meet the definition of a smart city?

Root causes:

- lack of a commonly shared goal

- a misunderstanding (or disregard) for human needs

- no accountability for existing laws or policies.

A smart city is capable of

identifying its problems and

mitigating root causes

Defining a common goal was part of process for this group

Does the community meet the definition of a smart city?

Mitigate root causes:

- define a commonly shared goal

- understanding and meet human needs

- be accountable to follow existing laws and policies.

A smart city is capable of

identifying its problems and

mitigating root causes

Does the community meet the definition of a smart city?

YES

Next steps

A smart city is capable of

identifying its problems and

mitigating root causes

by generating and processing

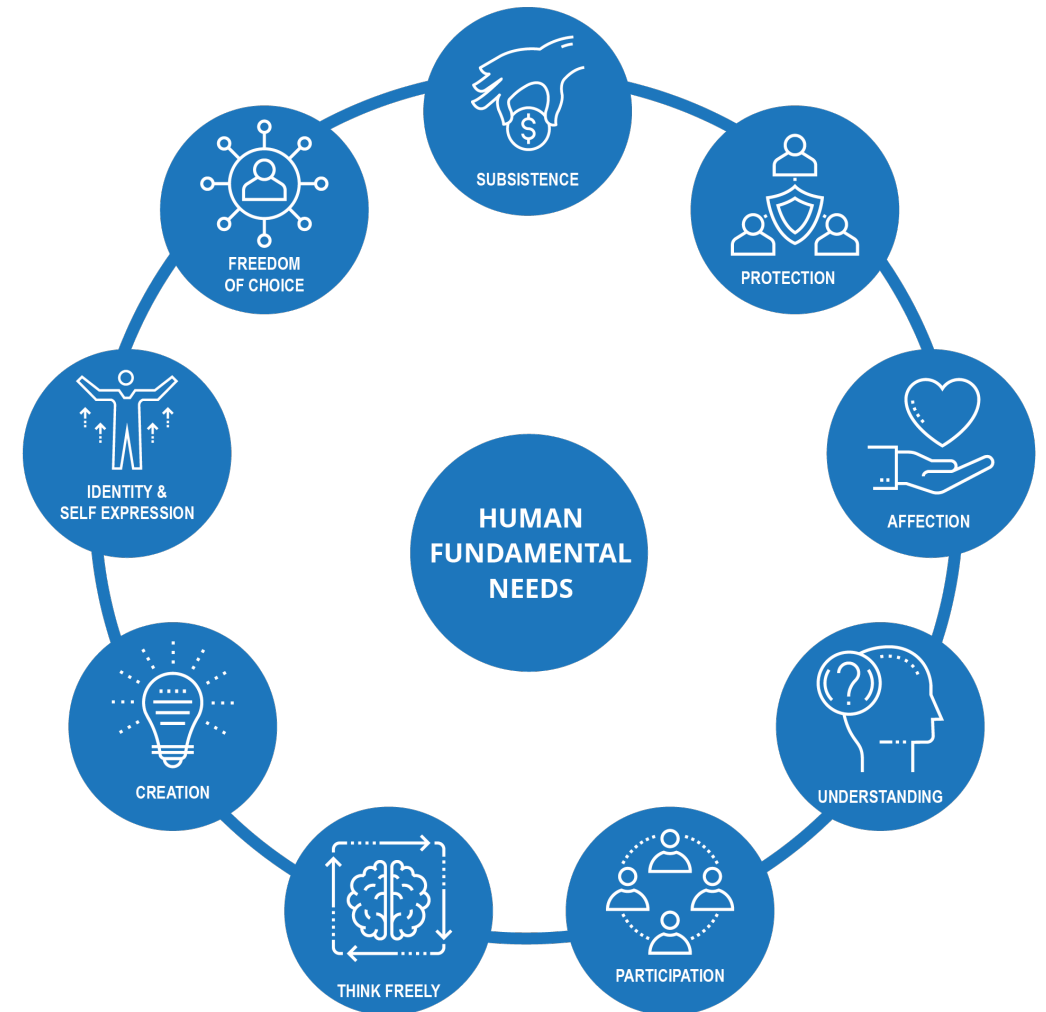engineered quality data in a continuous and inclusive manner.

Fundamental human needs are the basis for a smart city's common mission

Remember our new paradigm:

A city must create an environment enabling its residents to satisfy their own needs

SUBSISTENCE

PROTECTION

AFFECTION

UNDERSTANDING

PARTICIPATION

THINK FREELY

CREATION

IDENTITY & SELF EXPRESSION

FREEDOM OF CHOICE

HUMAN FUNDAMENTAL NEEDS

Affection and Understanding

Our process

For those who have suffered, we offer holistic care, including providing essentials like food and shelter, psychological support, legal advocacy, and educational opportunities. Those in need find refuge within our safe homes and programs, shielded from harm and nurtured toward healing and growth, often under the protective umbrella of court orders.

JAMES PROJECT
RESCUING THE VULNERABLE

2-6 July 2024
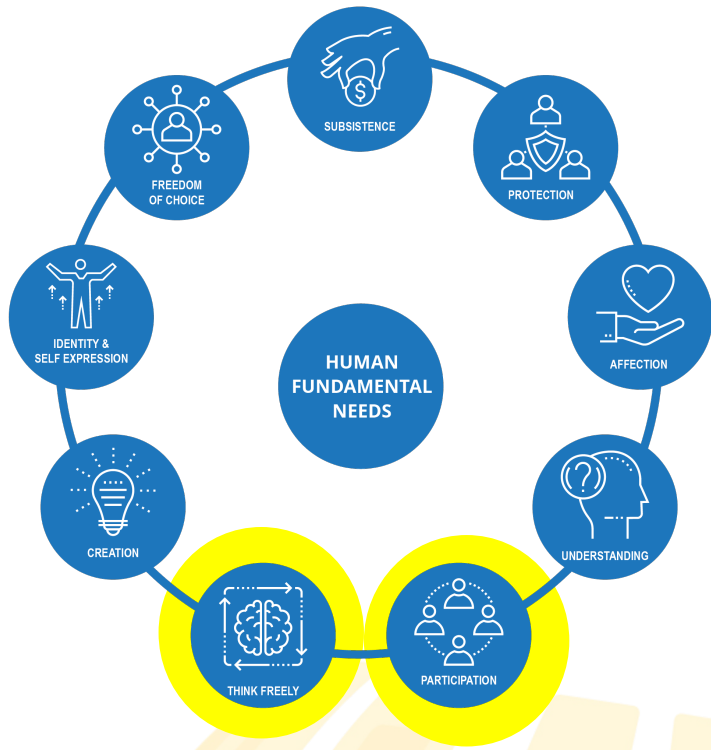
Participation and Free Thinking

Creation

Freedom of Choice
Identity and Self-expression

Did our key aspects of a smart city help us deeply analyze the services the city is providing?

YES

Paradigm Shifts — YES

Definitions — YES

Common Goal — YES

Fundamental Human Needs — YES
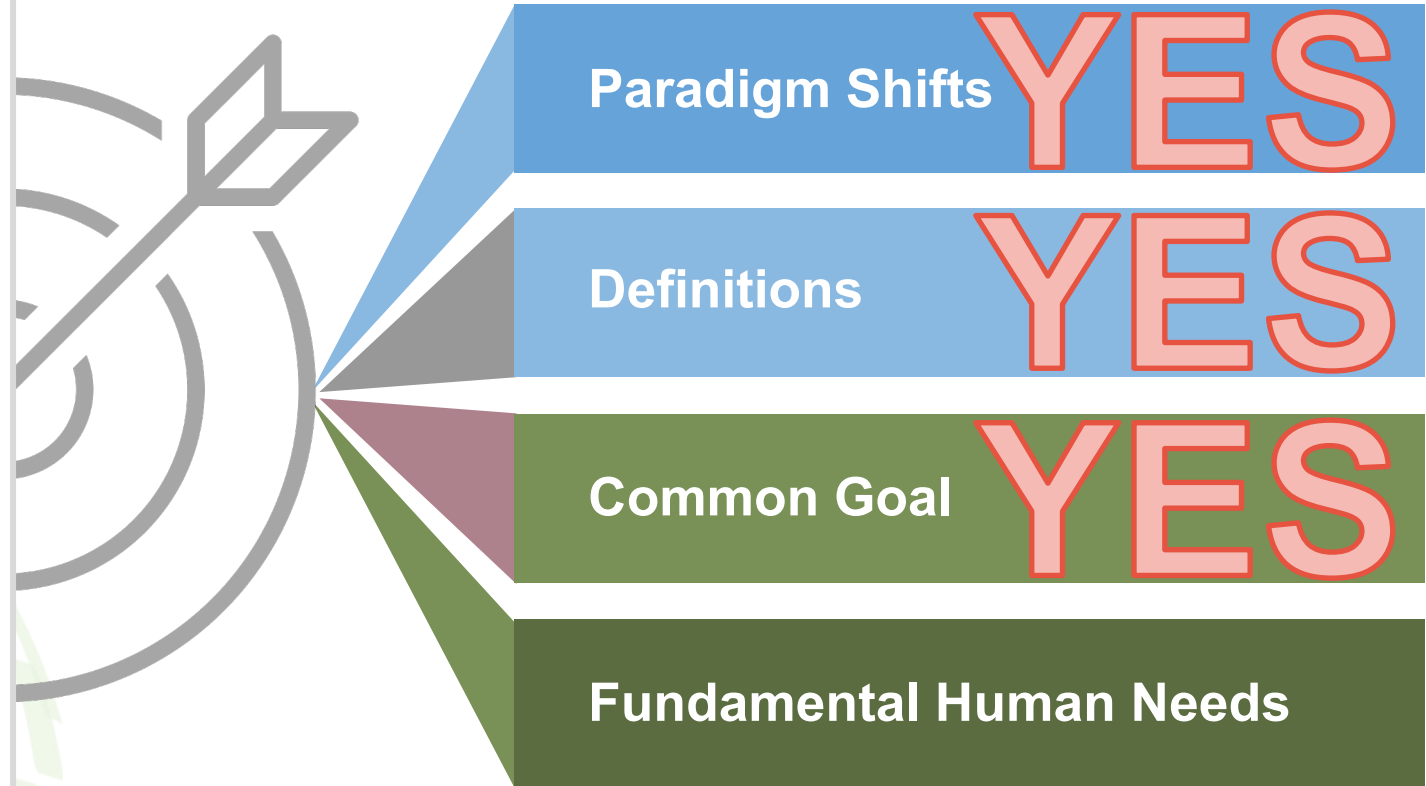
YES

Was the approach of putting the humans first an effective way to evaluate 'smart-ness'?
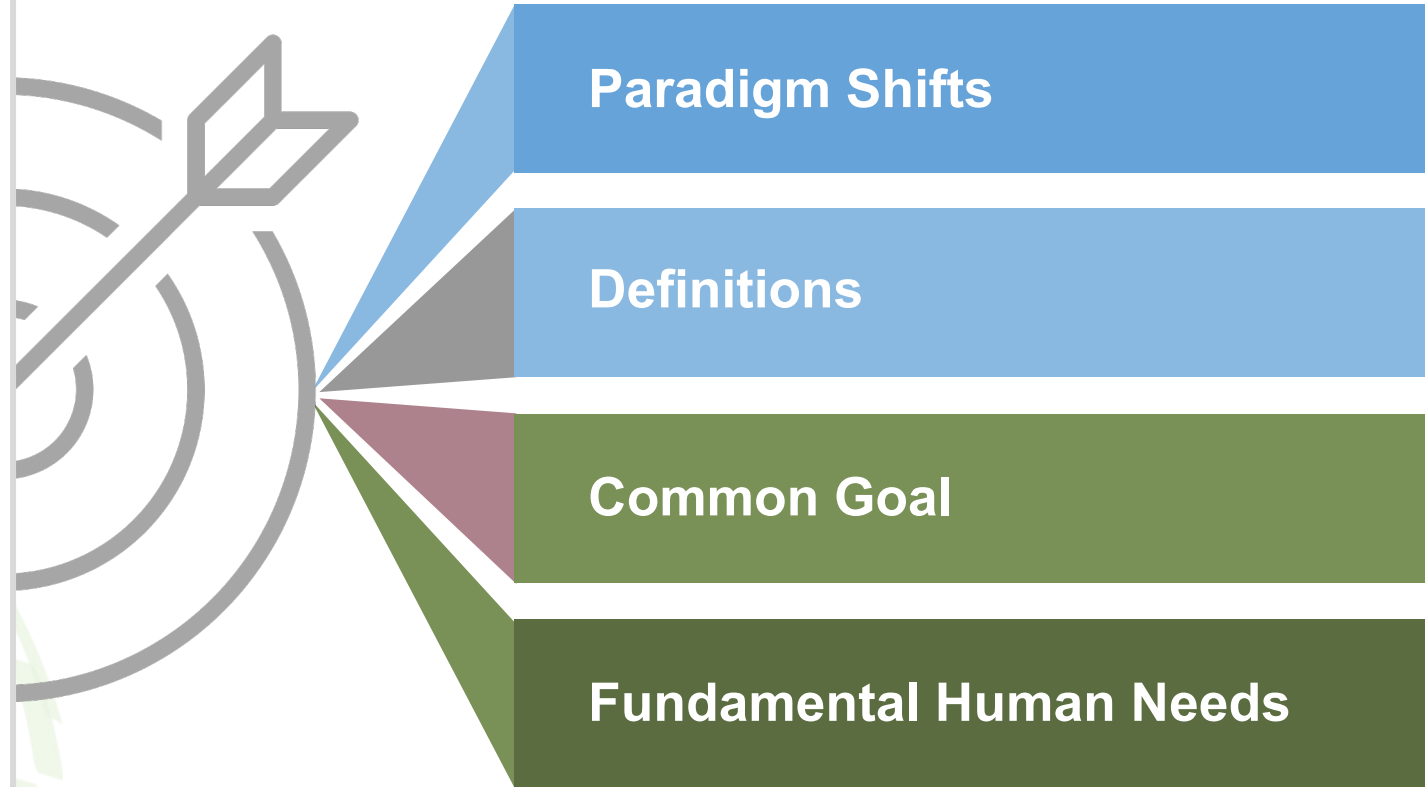
YES

Strengths

- Fast, simple evaluation
- Streamlined review of human needs and links to services provided
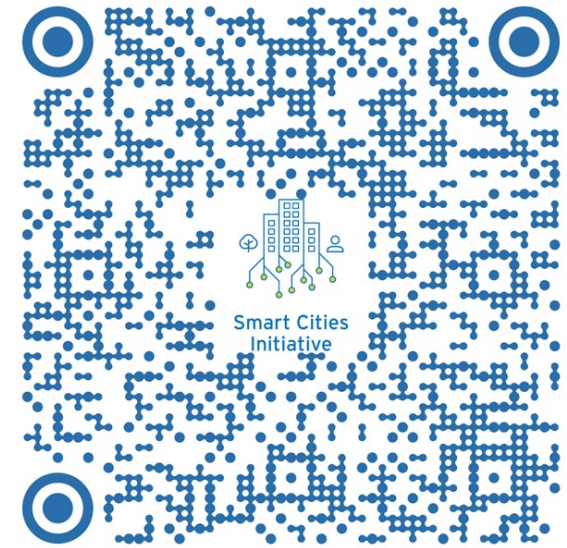- Maintains focus on fulfilling fundamental human needs

Weaknesses

- Deeper analysis is beneficial
- Didn't evaluate engineered quality data
- Didn't review the technology supporting delivery of services

Conclusion: The foundations of INCOSE-TUS Smart City Framework are robust

Paradigm Shifts

Definitions

Common Goal

Fundamental Human Needs

Learn More   and   Join Us

JamesProject.Org

About Us

INCOSE Profile Updates

https://portal.incose.org/ membership/ processApplication

(1)   (2)   (3)

SELECT A WORKING GROUP   **DETAIL OF CHANGES**   **REVIEW CHANGES**

Join a Working Group and Initiative

Joining is free, however you will need to click through the 4 step process to add a Working Group or Initiative.
Please review the INCOSE website if you have any questions.

Working Group

Smart Cities Initiative   ✔ Selected
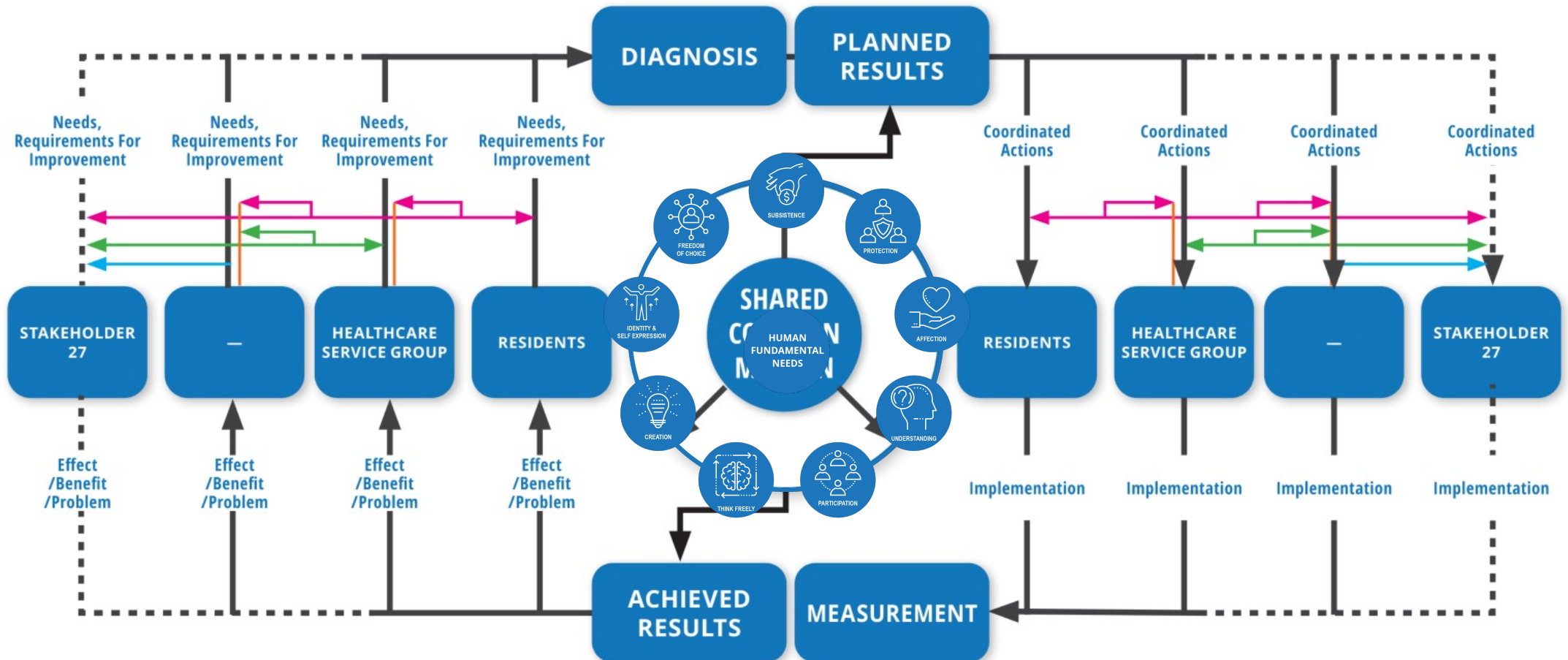
37

34th Annual INCOSE international symposium
hybrid event
Dublin, Ireland
July 2 - 6, 2024
www.incose.org/symp2024
#INCOSEIS

Conclusion: The foundations of INCOSE-TUS Smart City Framework are Useful

Engineered Quality Data is used to identify and mitigate root causes

INCOSE's smart city metrics are tied to fulfilling the fundamental human needs

NEEDS AND SATISFIERS	METRICS FOR SMART CITY MISSION REALIZATION
SUBSISTENCE	1. GDP Per Capita 2. Homelesness Rate 3. Employment Rate (Employed/Total Population) 4. Average Household Income 5. Air Quality Index 6. Water Quality Index 7. Soil Quality Index 8. Life Expectancy 9. Consumer Price Index 10. Import Dependency Ratio
PROTECTION	1. Population Health Index 2. Mortality Rate 3. Number of Households Below Minimum Income Standard 4. Crime Rate 5. Injury Incidence Rate 6. Infant Mortality Rate 7. Domestic Violence Rate 8. Budget Transparency Score