

Smart Systems Architecture

יולי 2018

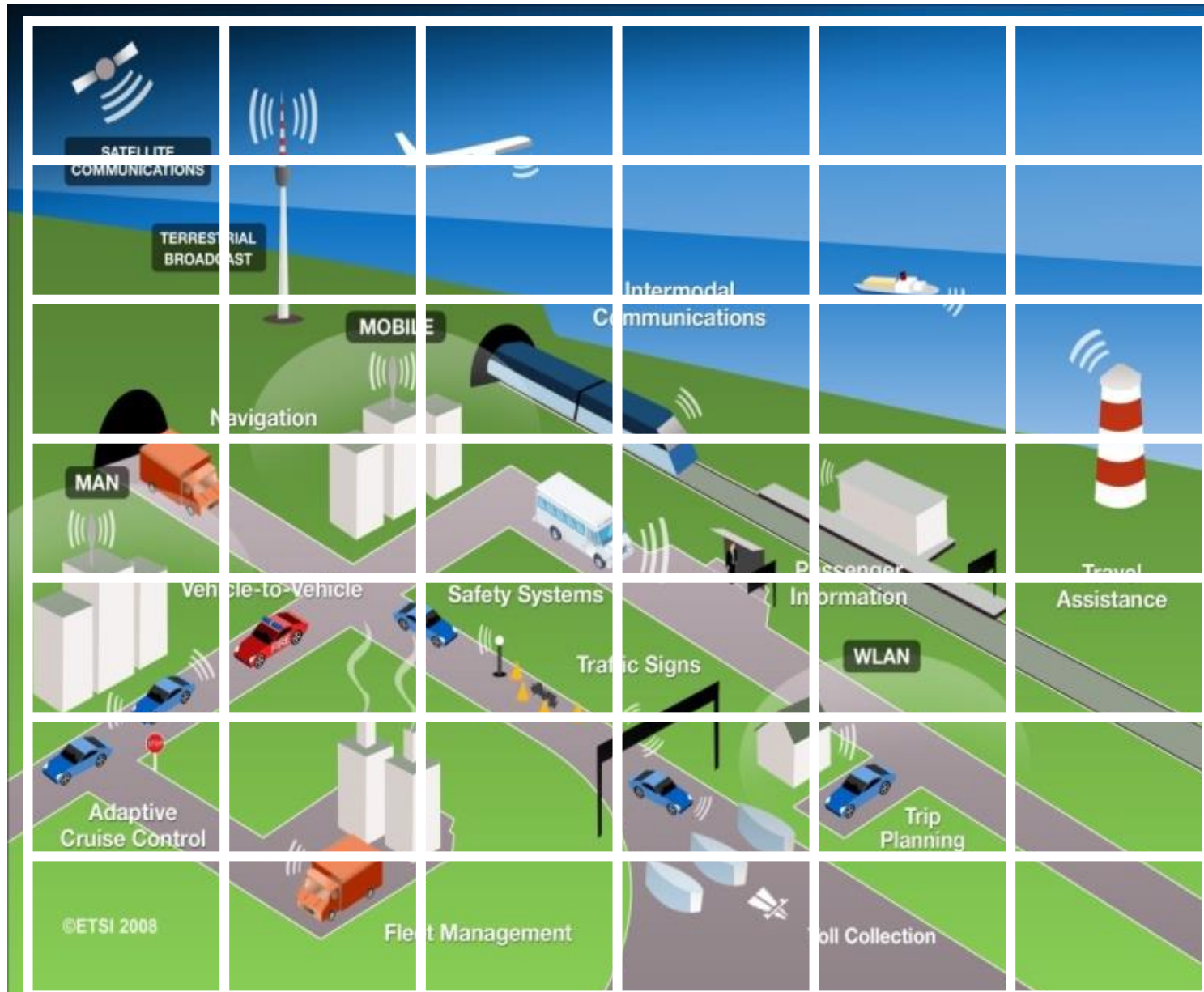
הרצאה באיגוד המהנדסים

ערן ראובני

reran@Technion.ac.il

תוכן ההרצאה:

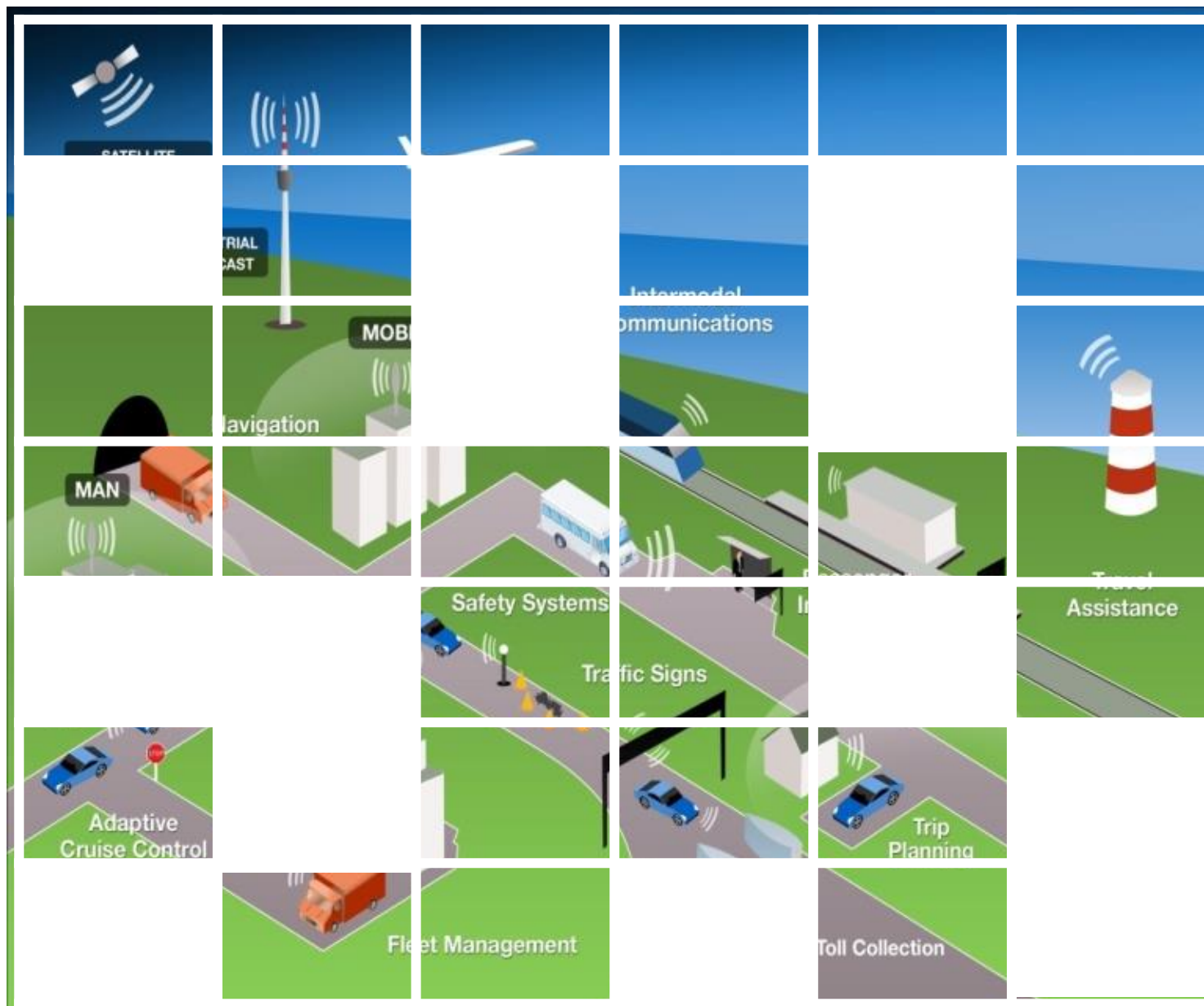
1. מאפייני מערכות תחבורה חכמות
2. התמודדות עם מורכבות
3. ארכיטקטורה של מערכות תחבורה חכמות
4. הקמת תשתית שירות קישוריות Smart Services Connectivity
5. מסגרת (Framework) ניהולית-עסקית- הנדסית



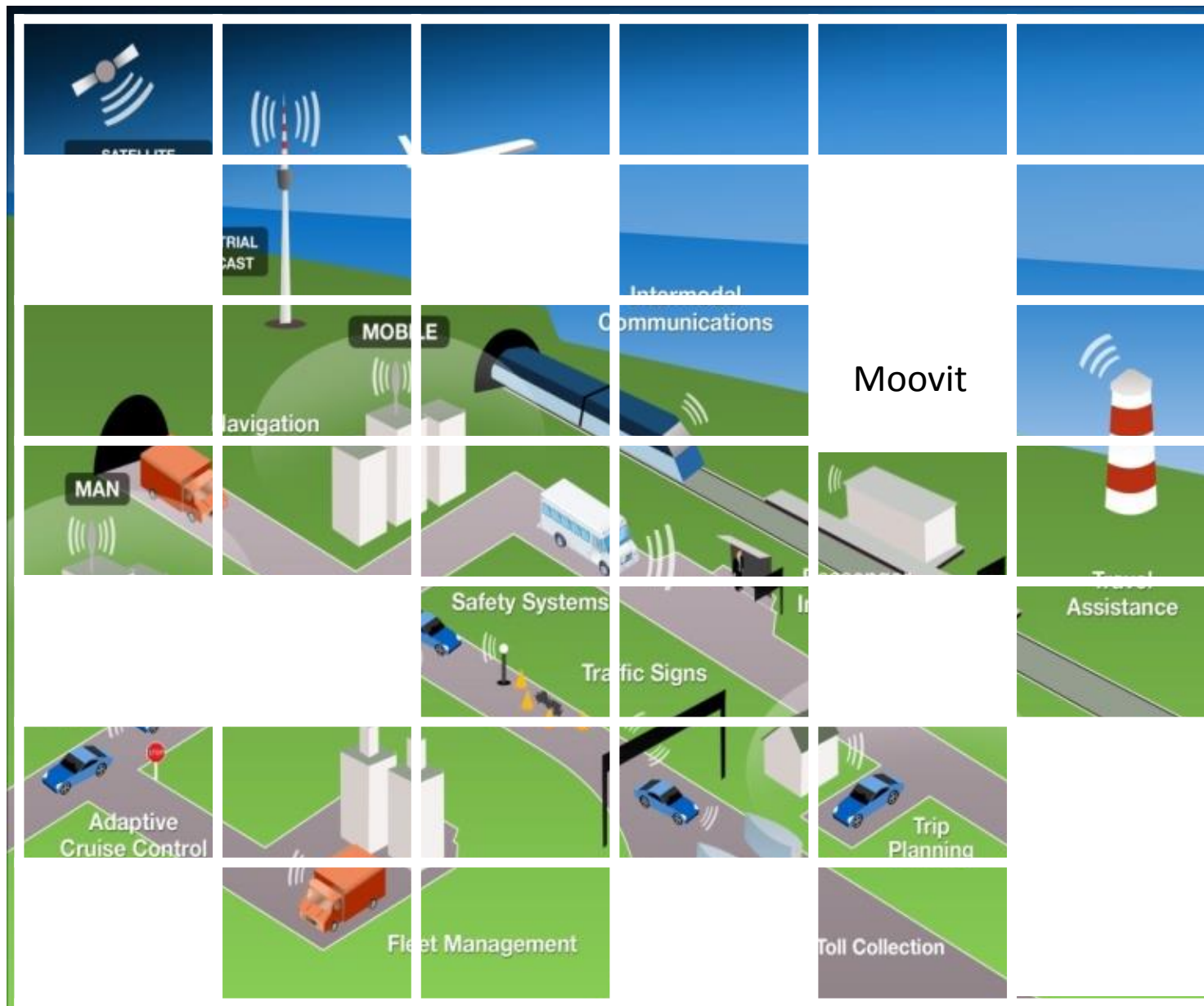
תמונת מצב 2010



תמונת מצב 2014



תמונת מצב 2018

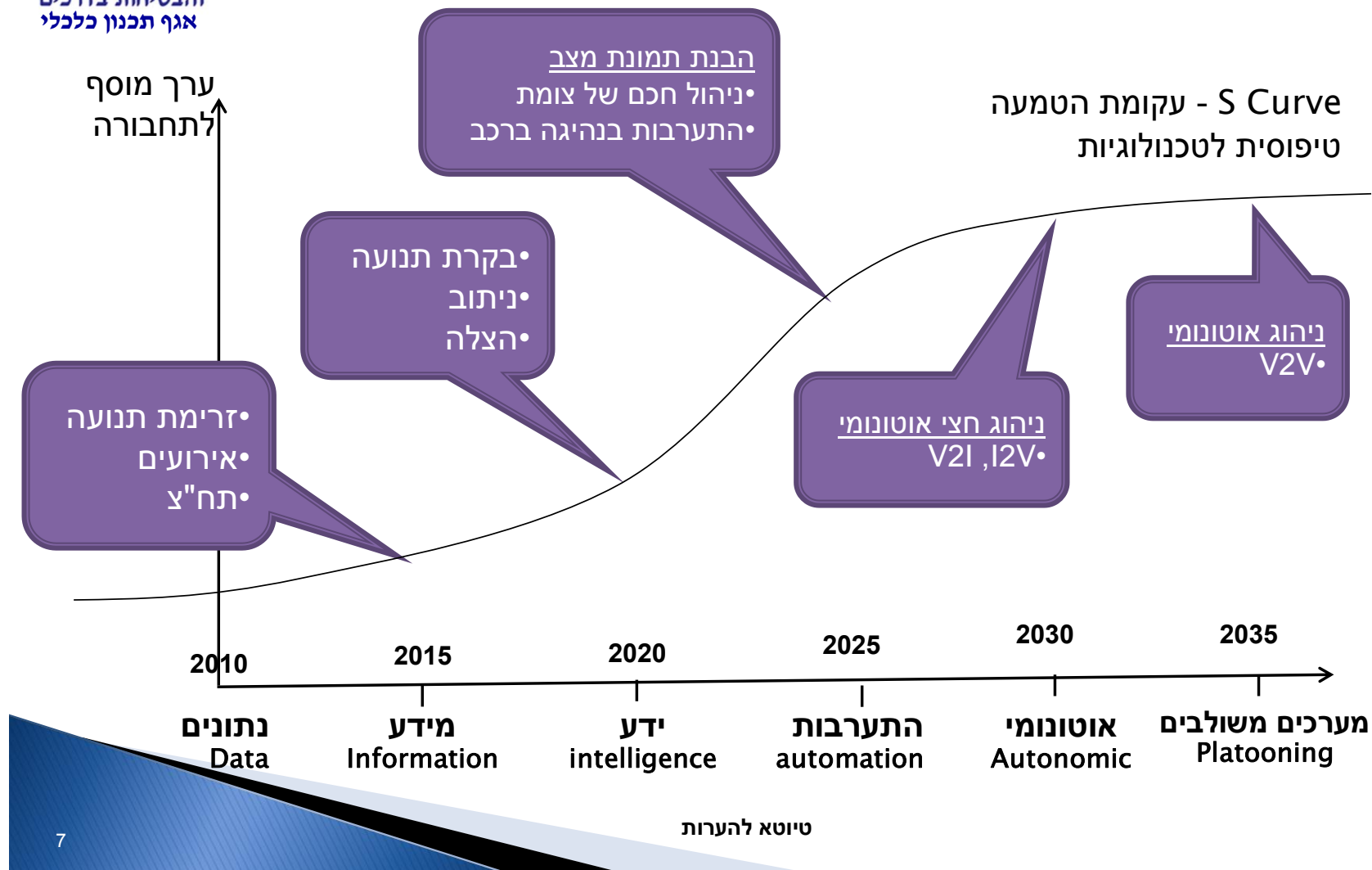




משרד התחבורה
והבטיחות בדרכים
אגף תכנון כלכלי

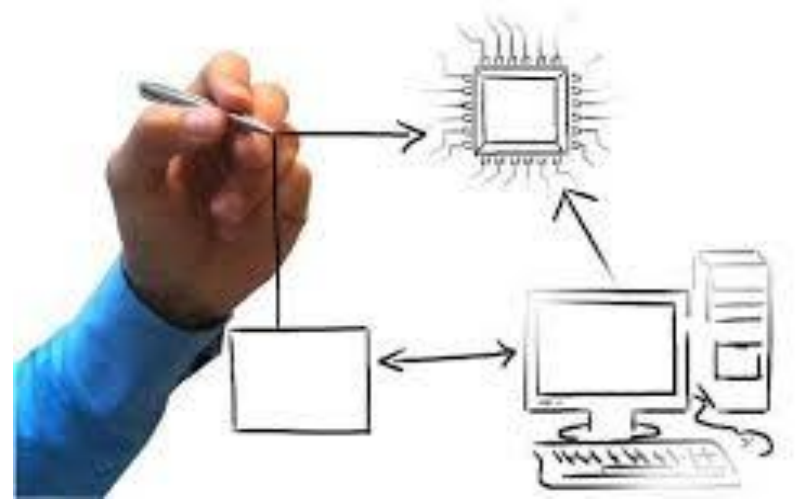
תחזית התפתחויות טכנולוגיות ITS

S Curve - עקומת הטמעה
טיפוסית לטכנולוגיות

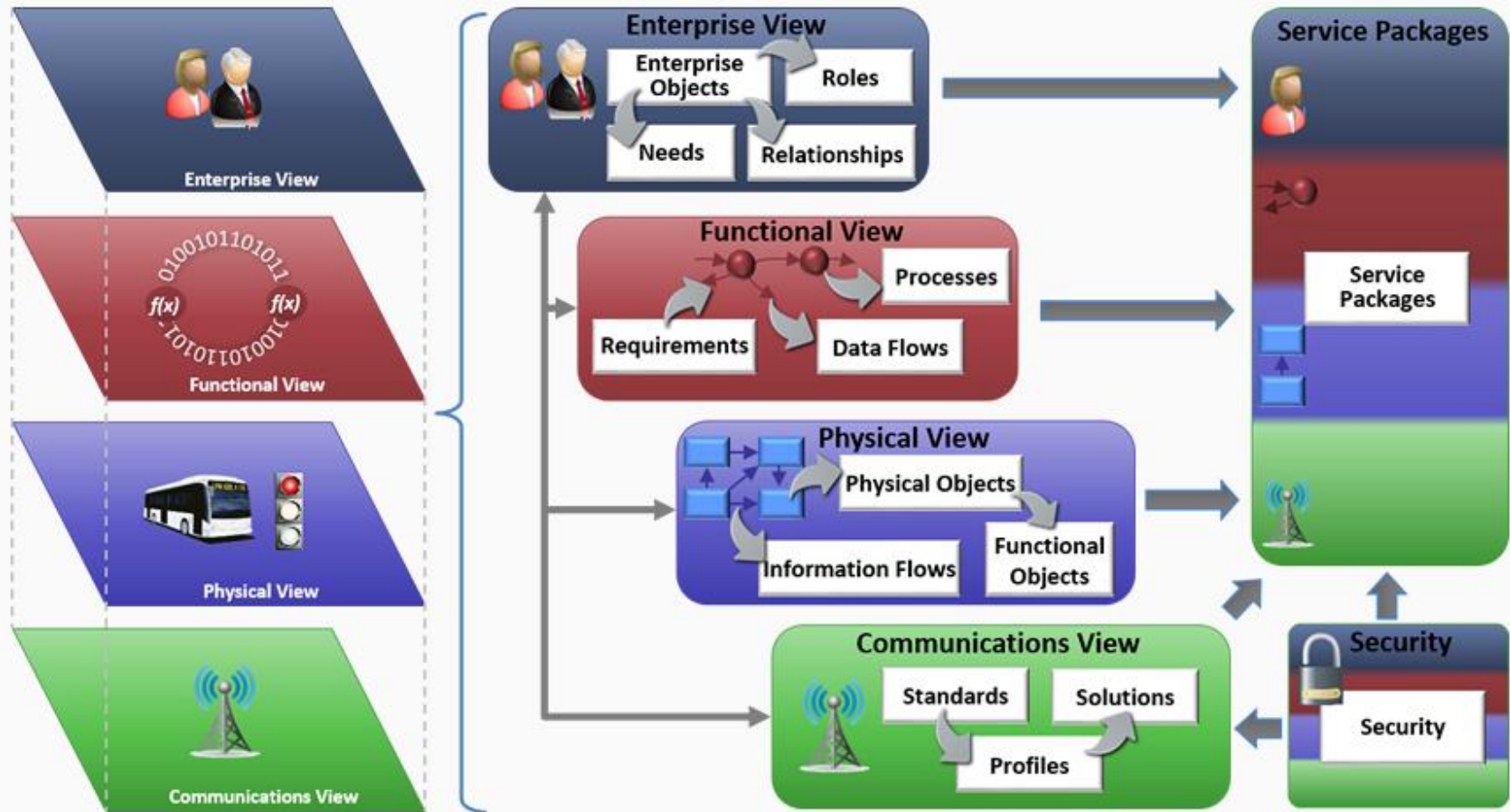


Architecture Management Challenges

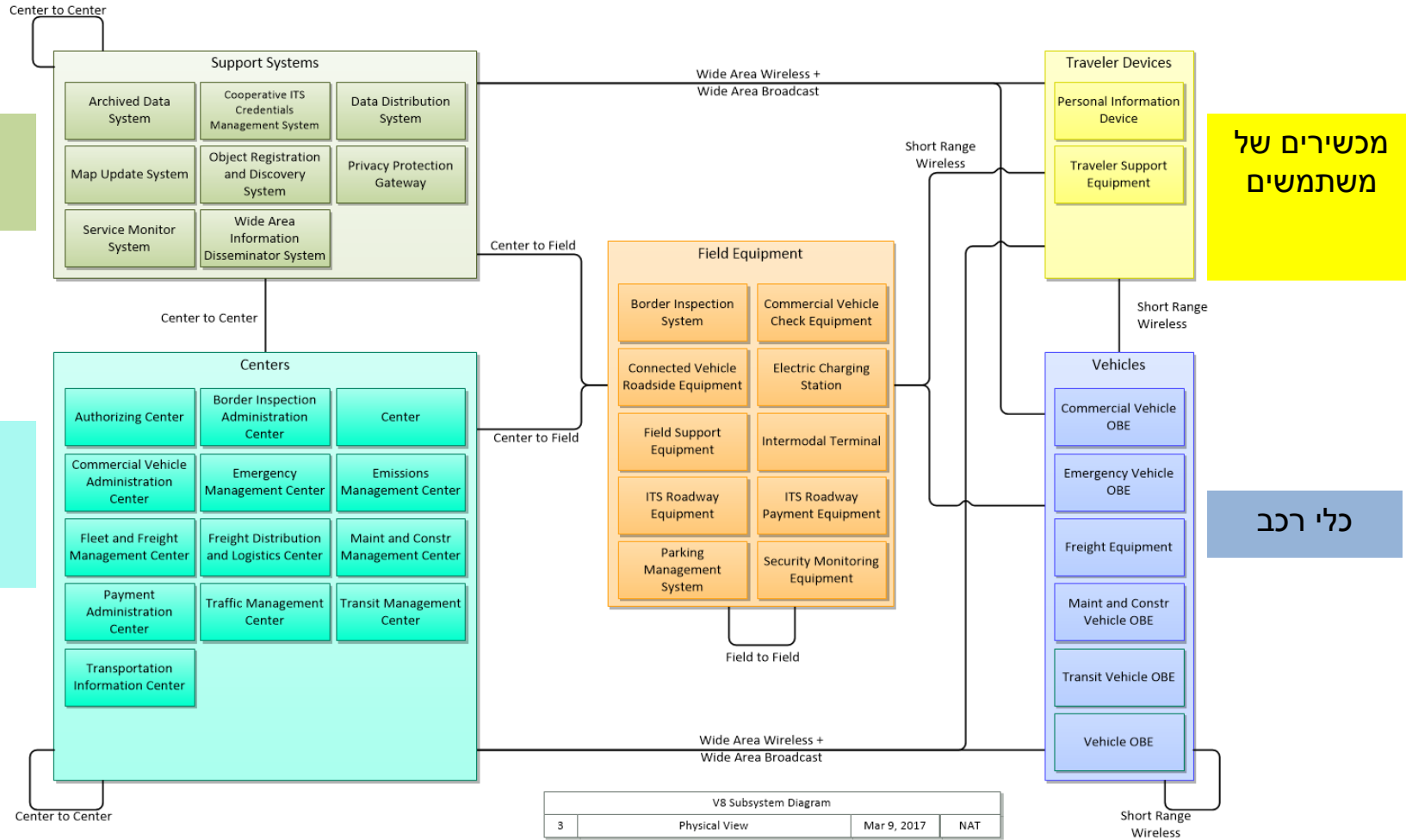
- **Network Architecture**
- **Data flow protocols**
- **Standards API's**
- **Data Orchestration**
- **Operational State logic**
- **Cyber Intelligence**
- **Continuous Dev. Management**



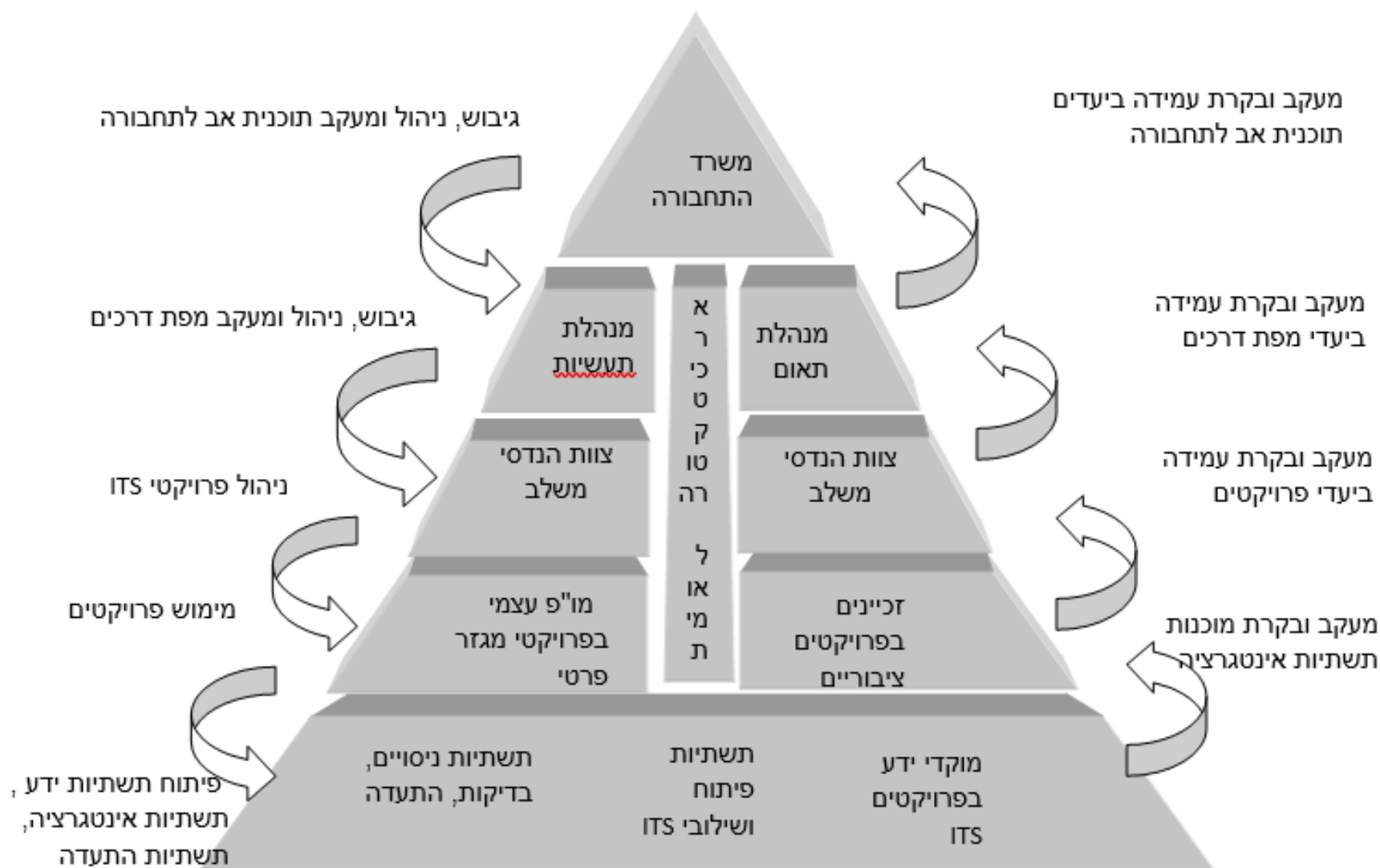
US National ITS Architecture



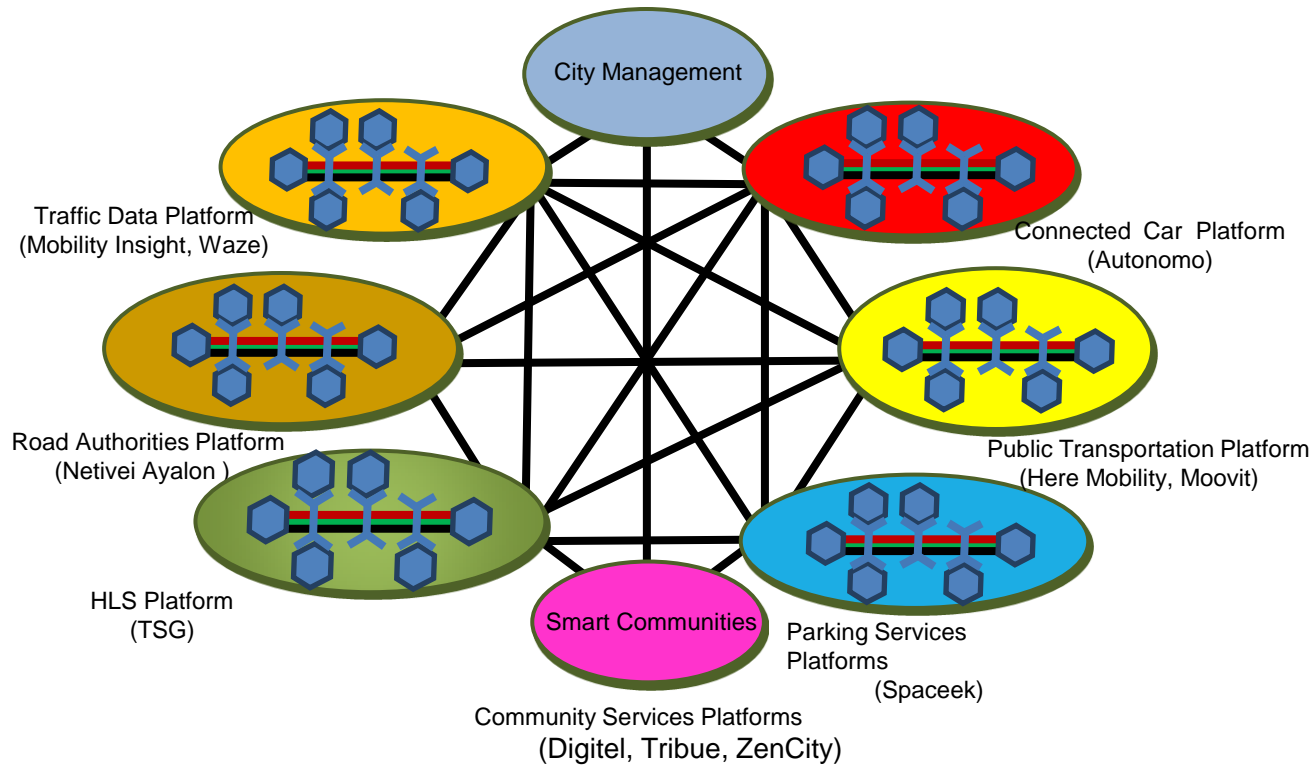
Architecture Reference for Cooperative and Intelligent Transportation ARC-IT 8.1





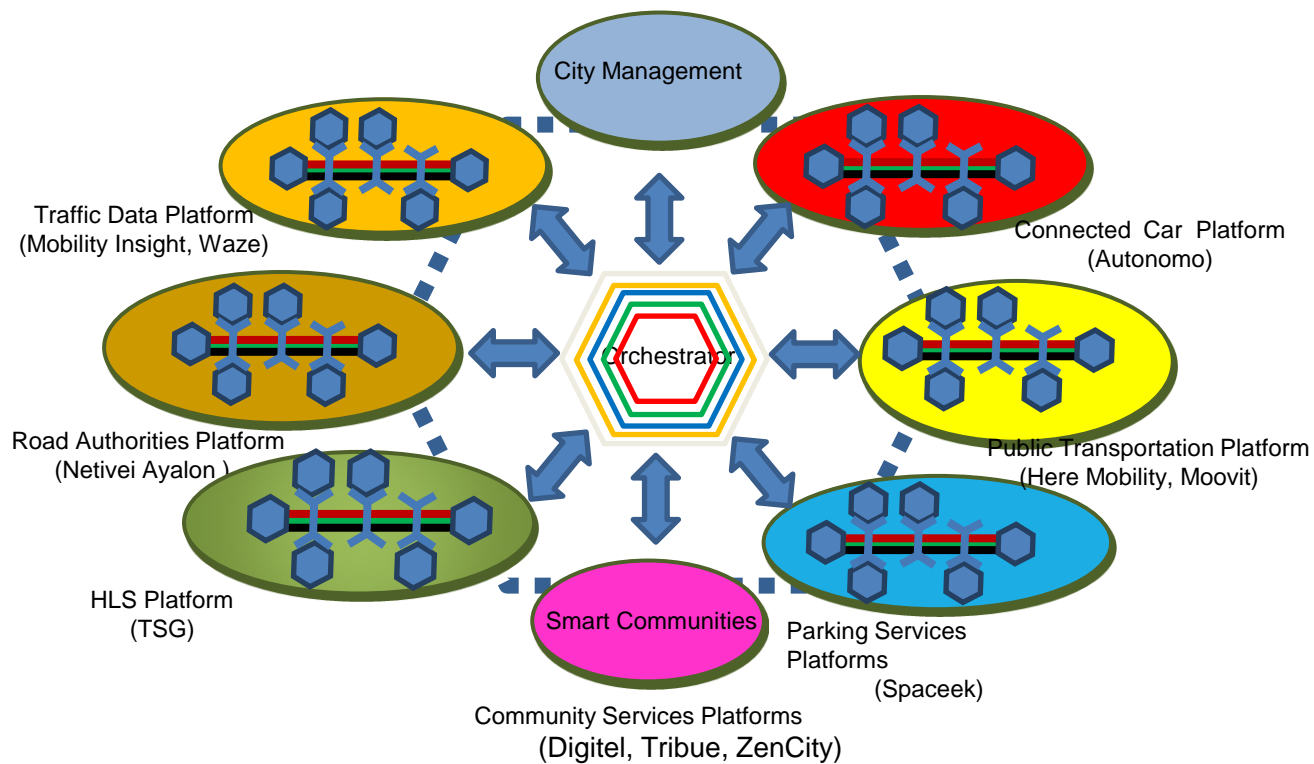


Smart City Connected Platforms



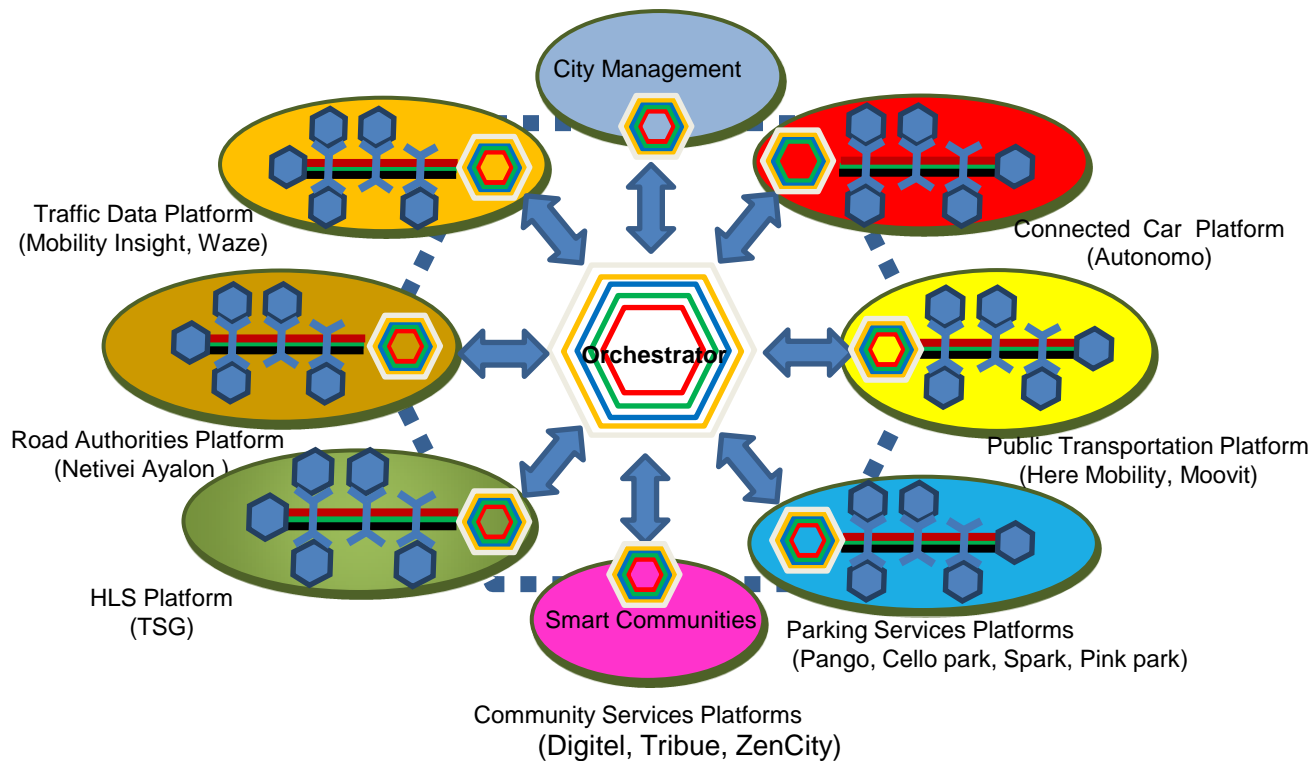
Smart Systems Architecture Design: Eran Reuveny, 2018 ©

Smart City Connected Platforms



Smart Systems Architecture Design: Eran Reuveny, 2018 ©

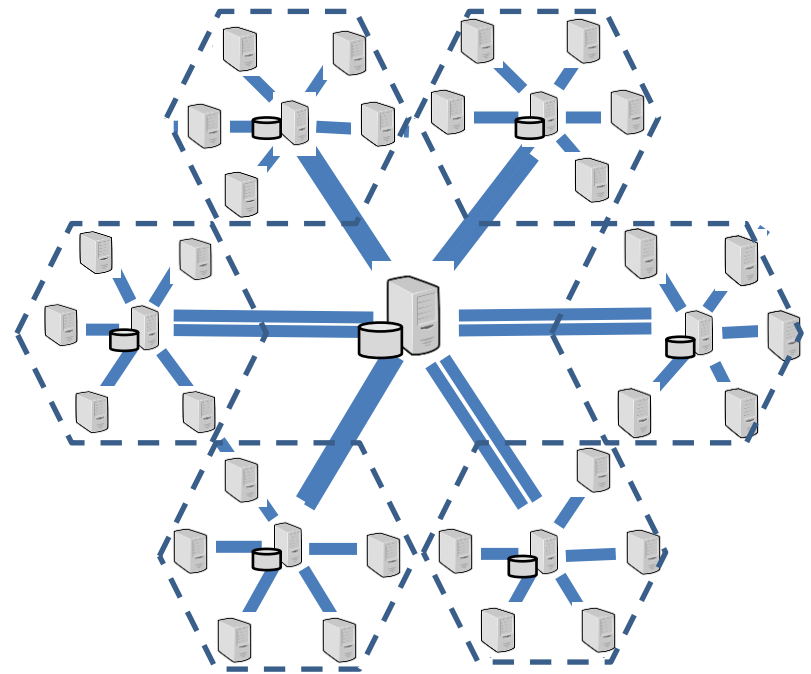
Smart City Connected Platforms



Smart Systems Architecture Design: Eran Reuveny, 2018 ©

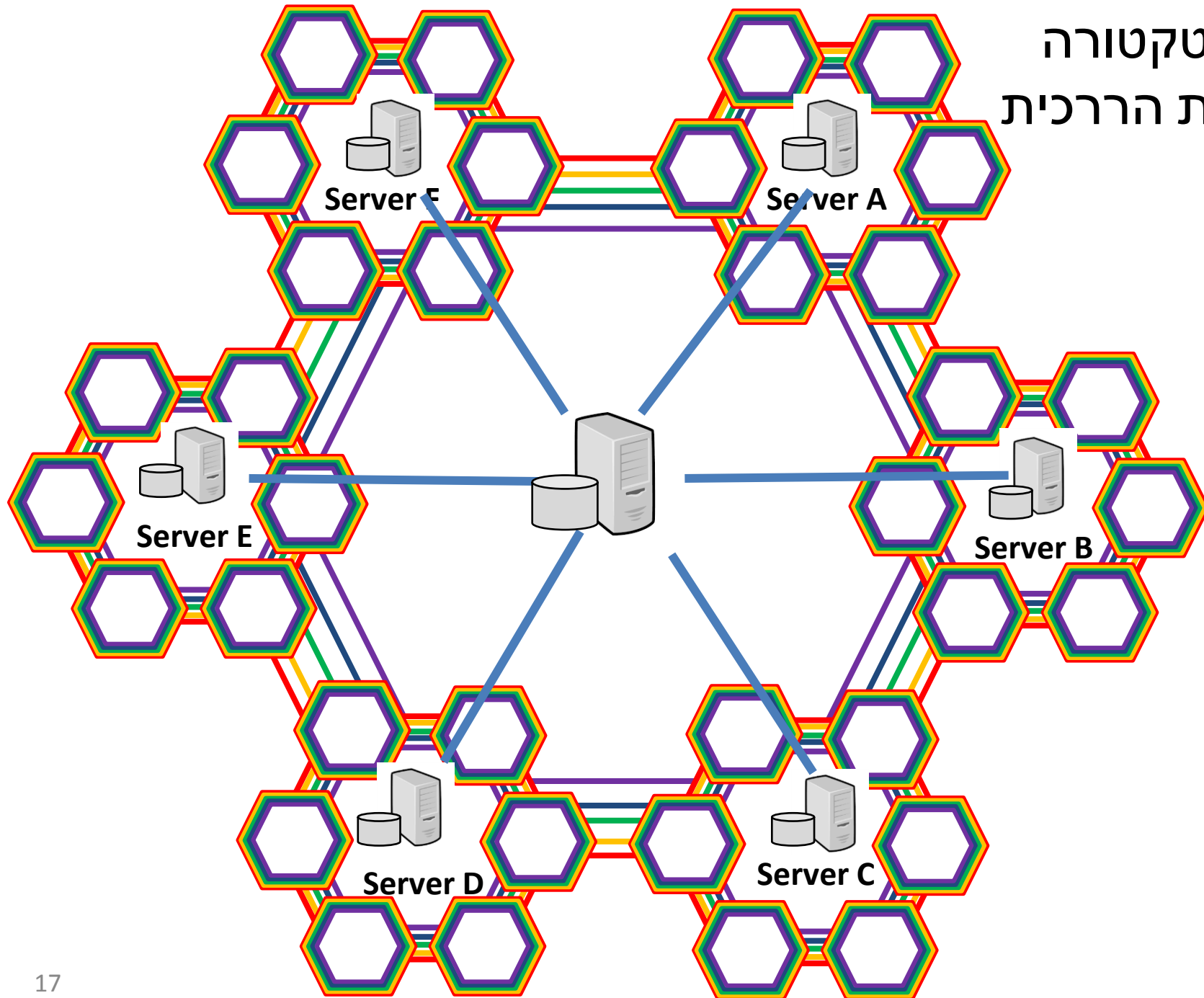
Smart systems Connectivity Network

- Network Architecture
- Data flow protocols
- API's
- Data Orchestration
- Operational State logic
- Cyber Intelligence
- Continuous Dev. Management

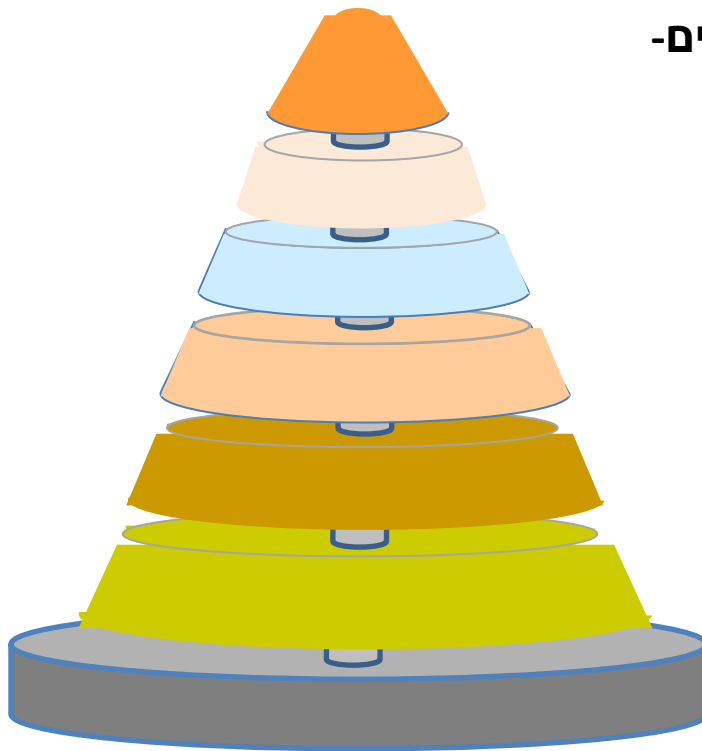


Smart Systems Architecture Design: Eran Reuveny, 2018 ©

ארכיטקטורה מרחבית הרכית



ארכיטקטורה אחודה לכל מערכת / תא שטח



7. רובד המדיניות, מדדים סביבתיים-
חברתיים

6. רובד אוכלוסיות

5. הרובד העסקי

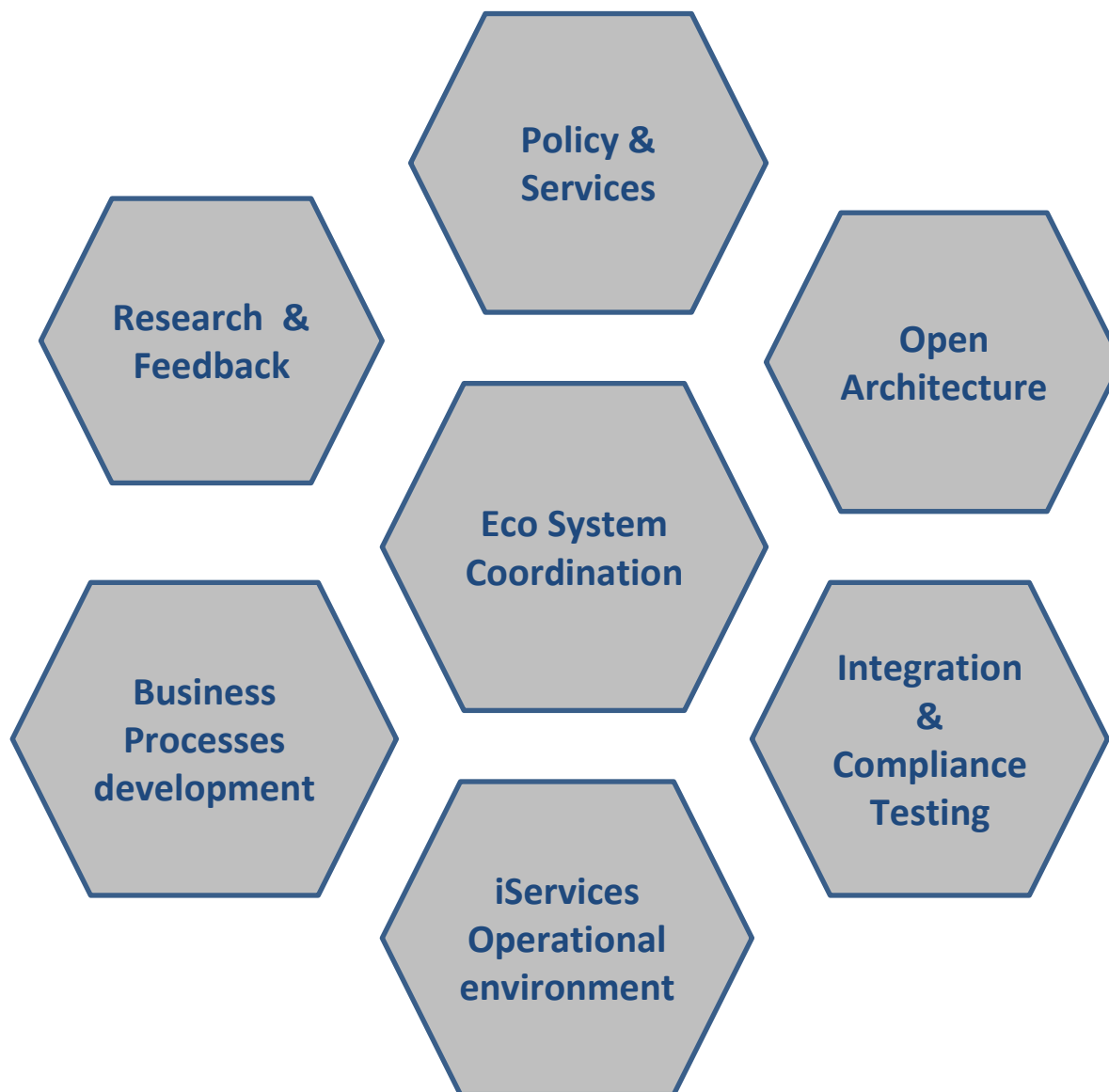
4. הרובד האופרטיבי

3. רובד המערכות

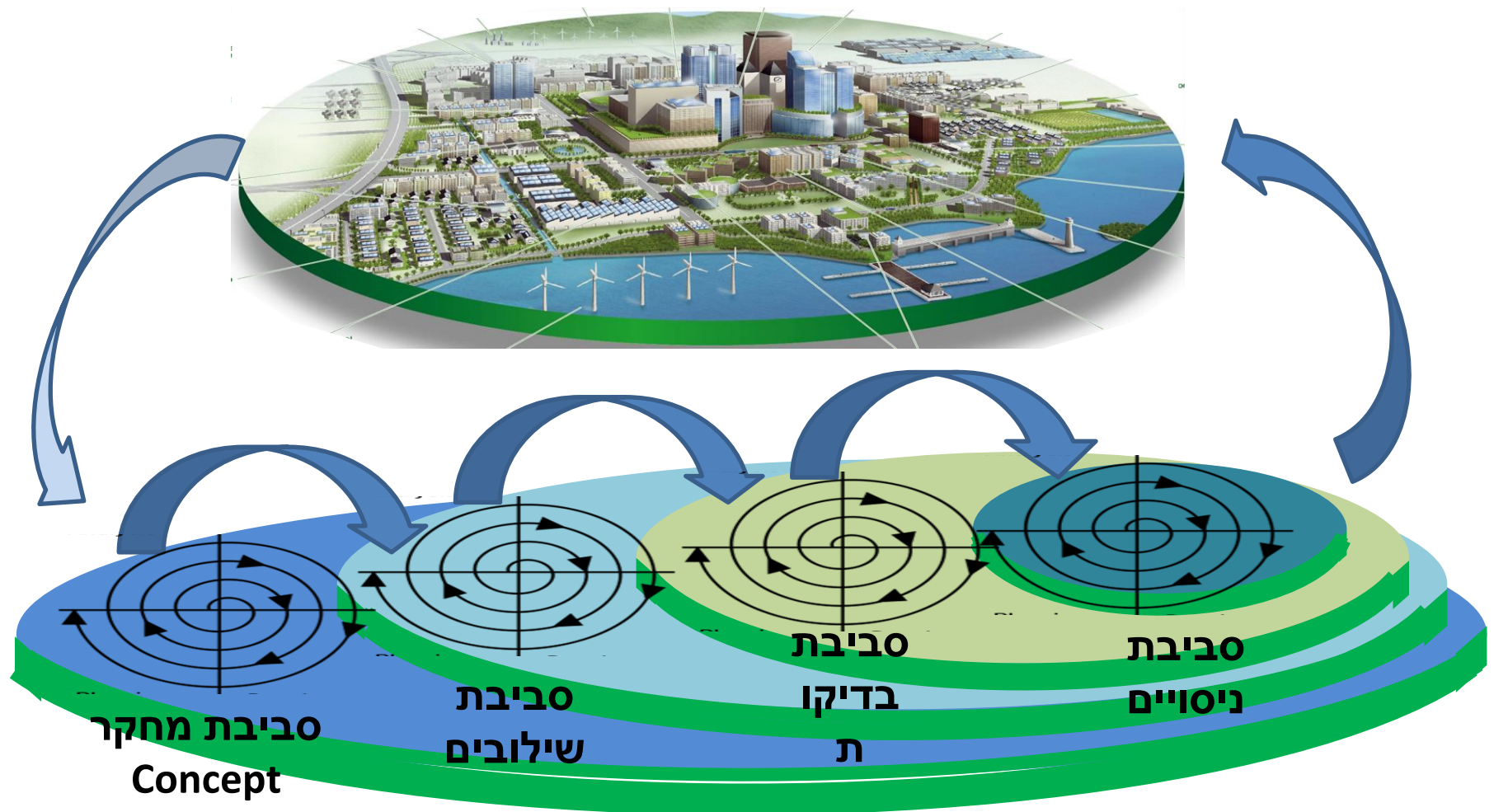
2. רובד השותפויות, תחומי
אחריות

1. הרובד הפיסי / תשתיות

איך מנהלים את המהלך המורכב הזה?



סביבות פיתוח, בדיקות וניסויים למערכות תחבורה חכמות



Smart City Framework

A Systematic Process for Enabling Smart+Connected Communities

"Private and public sectors do not understand how each sector works within the context of city development and operations & do not “speak the same language.”

In particular, the private sector does not comprehend how its technologies fit into this complex environment because it tends to view cities as just physical structures upon which to add ICT. Nor does it understand which city stakeholder, or combination of stakeholders, is responsible for which solution.

Unfortunately, the focus of various groups within the Smart City movement is split: Urban experts and academics think about the “why” at great length, while technology companies and consultants focus on the “what.” Overall, less time is spent discussing the “how,” which ironically is where city leaders need the most assistance.”

A Smart City Framework ultimately can help solve the “how” through a process that enables cities to answer the following questions:

- Who operates the components of the city?
- Who controls and influences the behavior of the organizations that operate the components?
- How do city components interact with each other and with other stakeholders?
- Which business models are required for deploying Smart City solutions
- What is the role of ICT?
- How are cities and initiatives measured?
- What is the role of government?

Systems of Systems: Scaling Up the Development Process

Watts Humphrey, *August 2006*

TECHNICAL REPORT CMU/SEI-2006-TR-017



Receives the 2003 National Medal of
Technology

Large and complex computer-based systems are now critical to the economic and military welfare of the society population worldwide. These systems form the backbone of modern military, business, and governmental operations.

Unfortunately, the development of such systems has been **troubled**, and the systems needed in the future will be vastly more complex and challenging.

If history is any guide, attempting to **develop these future systems with the outmoded methods of the past** will almost certainly yield unsatisfactory results

Why:

Because next decade holds great opportunities for better cities, better transportation & better environment.

Yet, there are several challenges that engineering world still have to overcome.

What:

Develop new methodology to handle Large scale integrated system development, deployment , operation & research.

How:

Large scale vision

Big systems architecture

Small research & implementation steps



תודה רבה