IEEE Guadalajara Pilot Program Experience

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IEEE Smart Cities

UNIVERSIDAD DE GUADALAJARA
Centro Universitario de Ciencias Económico Administrativas
Doctorado en Tecnologías de Información

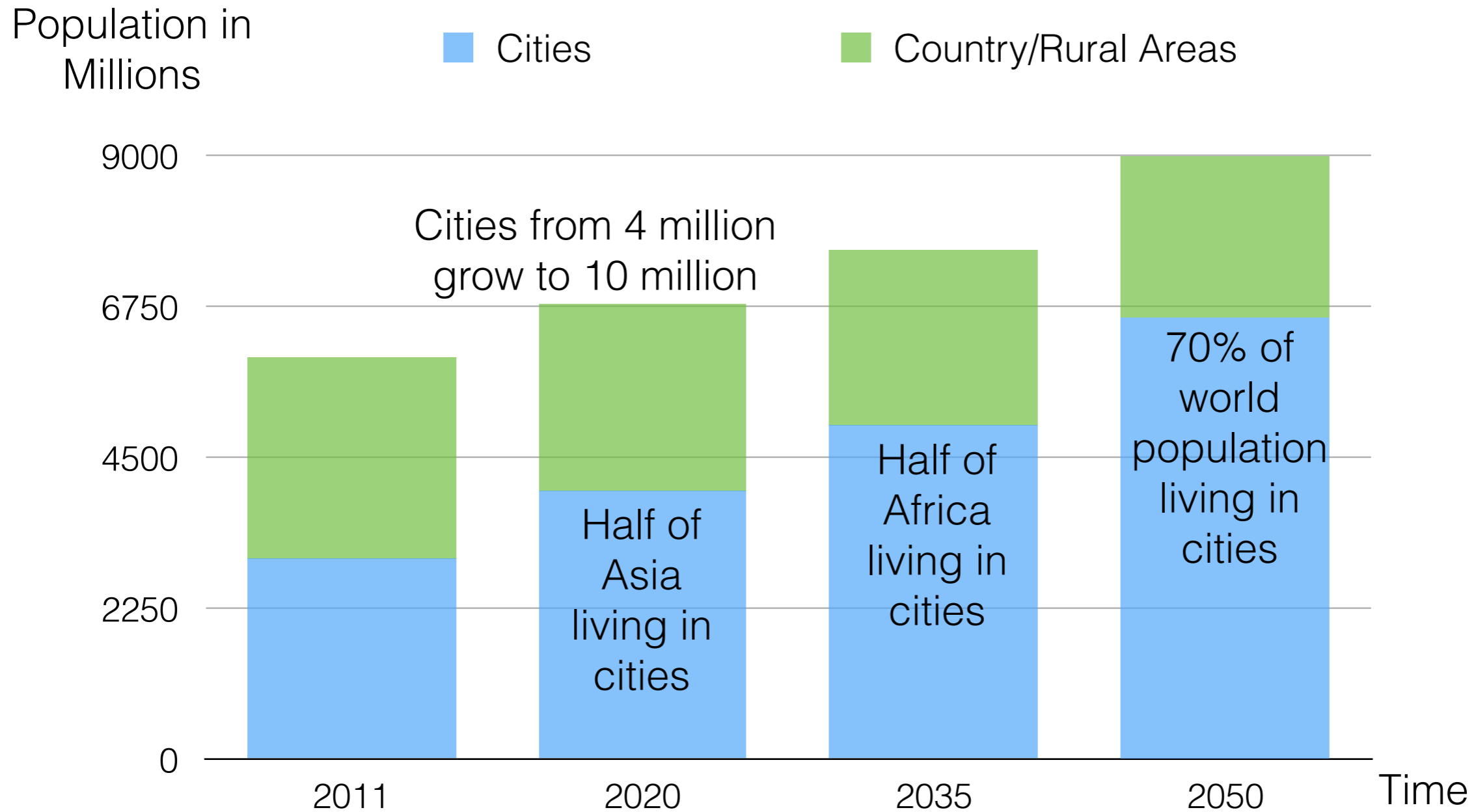IEEE Smart Cities Symposium   Prague Jun 2015

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Agenda

- GDL Smart City Vision

- IEEE Smart Cities Initiative

- Smart Cities Context & importance of Metrics for GDL

- GDL Challenges

- Related Activities for GDL IEEE Smart City Initiative

GDL Smart City Vision

Urbanisation Challenges

United Nations reports 50% of world population living cities since 2012…

Do we expect this vision for the future in cities ?

U.N. Urbanisation Trends

Population in Millions

■ Cities   ■ Country/Rural Areas

Cities from 4 million grow to 10 million

70% of world population living in cities

Half of Africa living in cities

Half of Asia living in cities

9000

6750

4500

2250

0

2011   2020   2035   2050

Time

[UNWorldPopulation09]

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Urbanisation Trends & Technology Solutions

- Exposure to natural disasters

- Population explosion

- High cost of living

- Rising levels of pollution

- Increase of crime rates

- Infrastructure investment

- Exponential growth of data

- Potencial cultural clashes

IEEE is setting the roots for Smart Cities
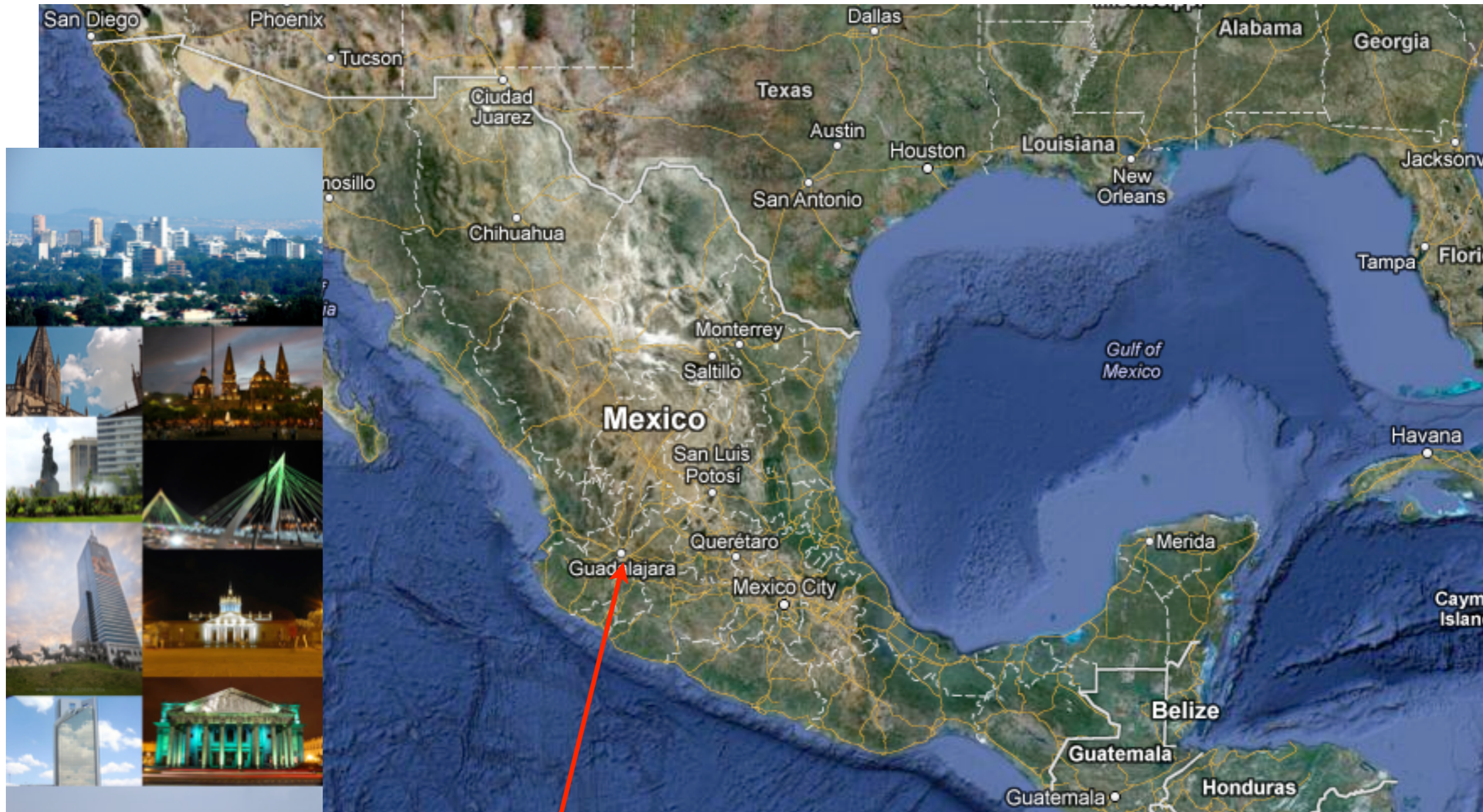
Context
Guadalajara (GDL) City, Jalisco, MEXICO

GDL Facts

- Funded in 1539

- 4.4 Millions People in Metropolitan Area

- x4 growth in past 30 years

- 6 interconnected municipalities

- 17Km from north to south

- 1/5 of Mexico City Size

GDL Metropole compared with other Cities

#	City	Population (millions)
1	Tokyo JP	37.8
2	Mexico City MX	20.6
3	London UK	10.2
4	Wuxi CH	6.6
5	Madrid ES	6.1
6	San Fco-San Jose USA	5.9
7	Guadalajara MX	4.6
8	Prague CH	1.4
9	Trento IT	0.5

[Demographia15]

GDL historic center 2014

GDL historic center 2018

GDL High Tech Ecosystem

Ecosistema de Alta Tecnología de Occidente

GDL CCD Project

- 40 Hectares @ Digital Hub + 380 Hectares of sustainable impact

- Capacity for talent production & attraction

- IEEE volunteers with compromise

- High tech ecosystem supporting

Government

Academy

Society Volunteers

Industry

IEEE
Advancing Technology for Humanity

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GUADALAJARA

http://ccdguadalajara.com/en/

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IEEE Smart Cities Initiative

IEEE Smart Cities is looking to create a network of cities to share knowledge and experiences
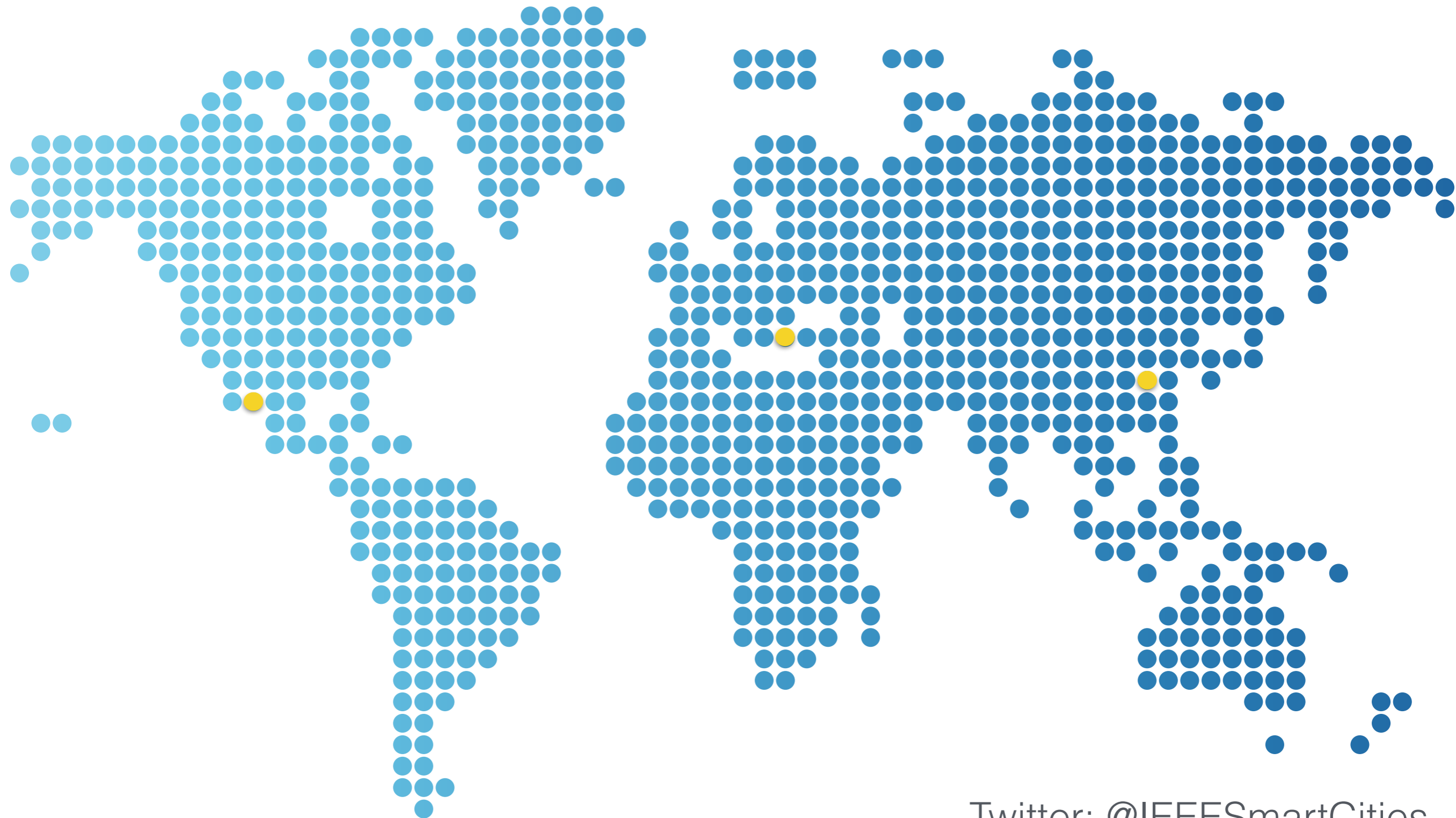
Gudalajara City is the first IEEE world pilot

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Twitter: @IEEESmartCities
http://smartcities.ieee.org

IEEE Kickoff event in Smart Cities of the Future
Guadalajra City
October 1-2, 2013
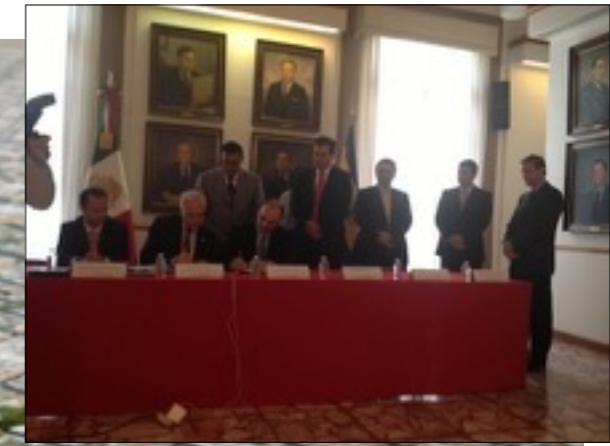
Smart City Context & Importance of Metrics in GDL

Evolution Timeline

Ciber City

Digital City

Intelligent City

Smart City

Mobile Computing

eWorld

IoT Wearables

Web

Virtual Worlds

Social Networks

Crowd Sourcing

Smart Devices

1995   2000   2005   2008   2010   2015
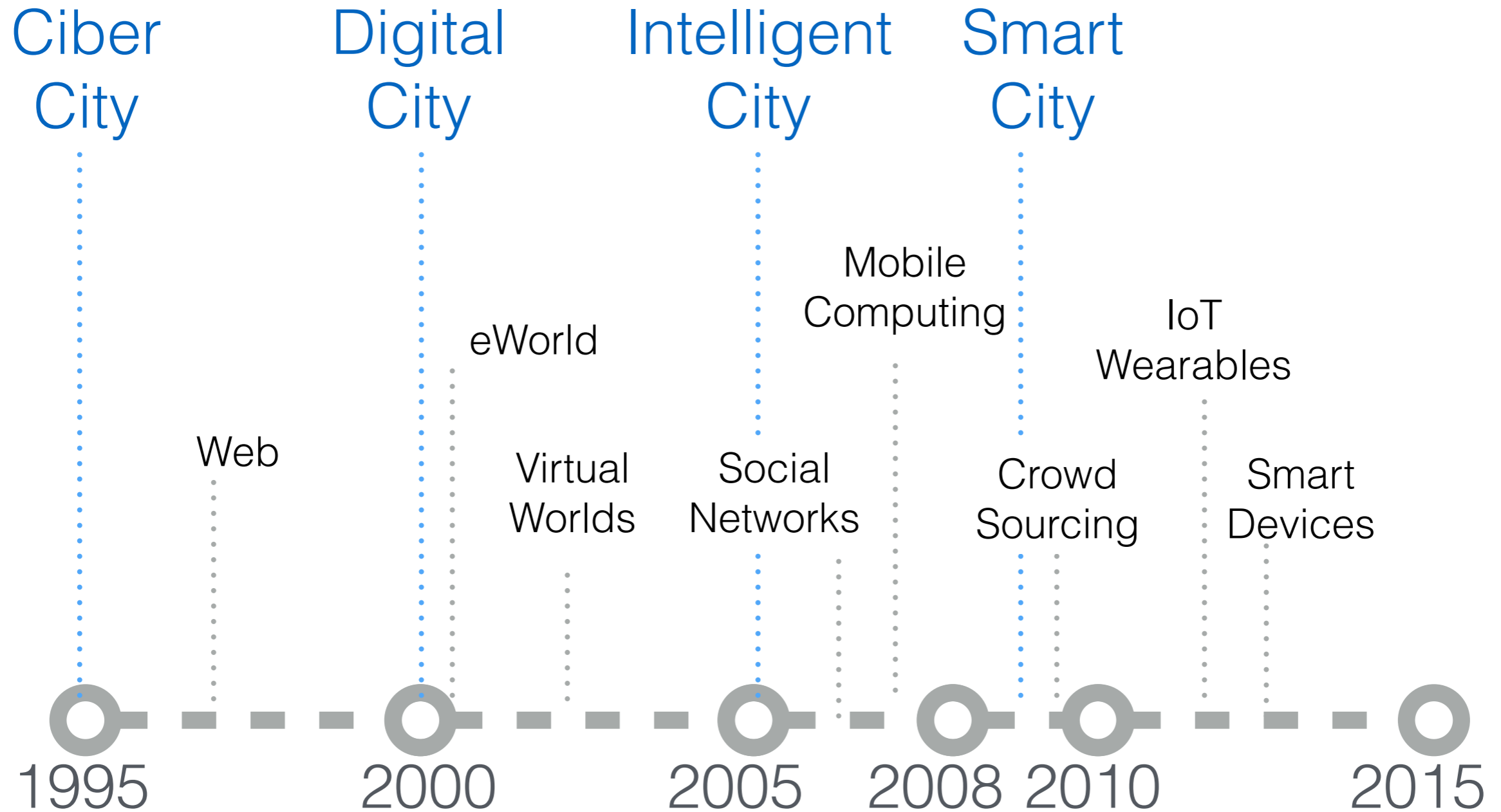
Cities Evolution

Ciber Cities	cyberspace, cybernetics, governance and control based on information space	1995-2000
Digital Cities	digital representation of cities for simulation	2000-2005
Intelligent Cities	collective intelligence emerging from social networks, people driven innovation	2005-2010
Smart Cities	smartphones, sensor networks, **IoT** smart meters sustaining intelligence of cities - **holistic view**	2008- Until Today

[Schaffers:2011kt]

Smart Cities Emerging Models

Panopticon	City control based in a central operation center **Ex. Rio De Janeiro**	
Civic Hackers	Citizens participate in solutions for the city hacking systems & data **Ex. Madrid**	
Collaborative	Government and Society participate investing in projects **Ex. Amsterdam**	
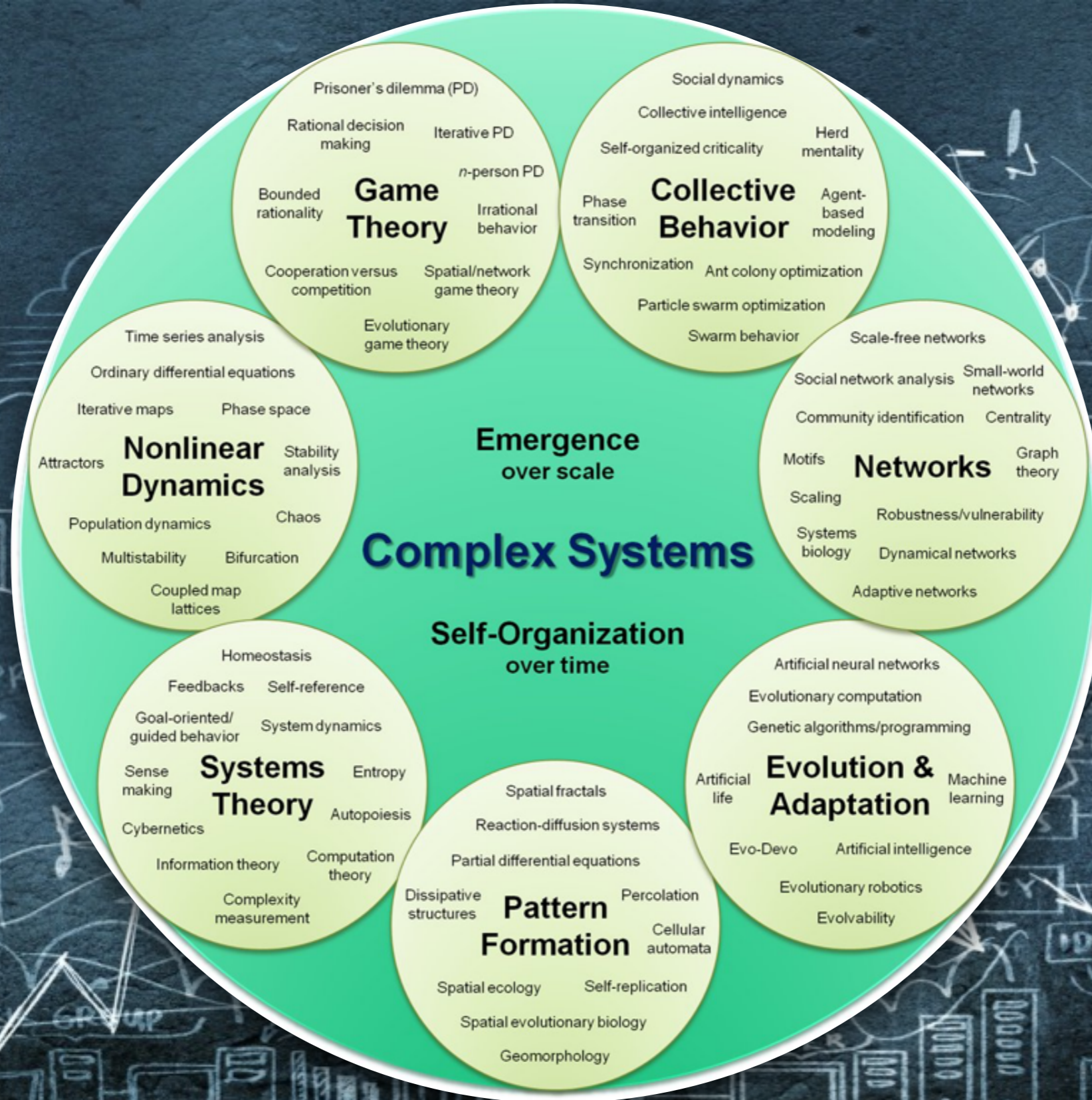
A Smart City is a **Complex System** and need an <u>holistic</u> view

[Harrison:2011uu]

Smart City Metrics

BY BOYD COHEN

Smart Cities Cycles

Analytics & Visualization

Sensor Network

Open Data

Smart Cities Cycles

IEEE Smart Cities Working Groups

PHI - Phisical Infrastructure

IOT - Internet of Things

ODF - Open Data Framework -

DAV - Data Analytics and Visualization

MTX - Metrics for Smart Cities
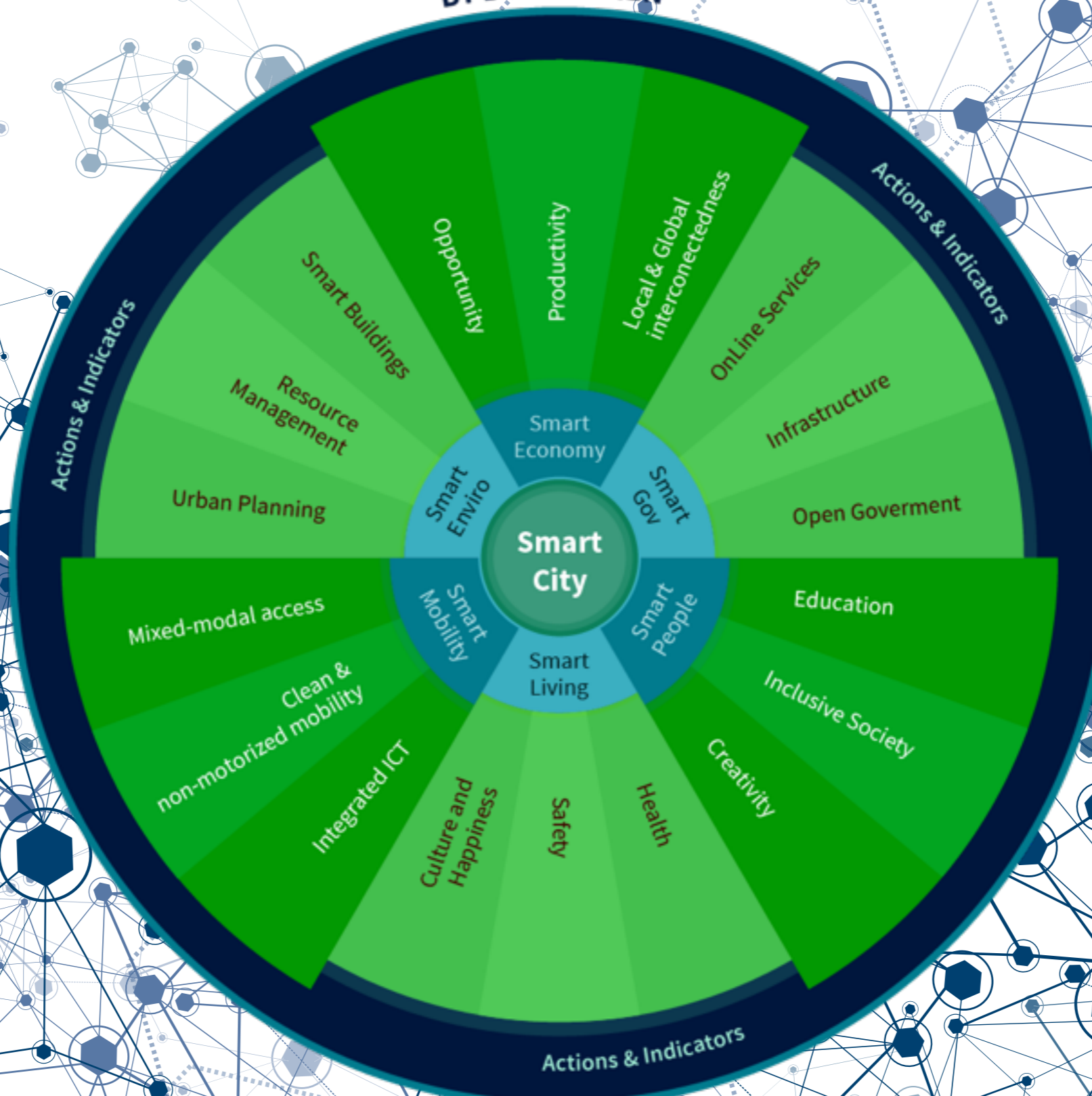
EDU - Education for Smart Cities
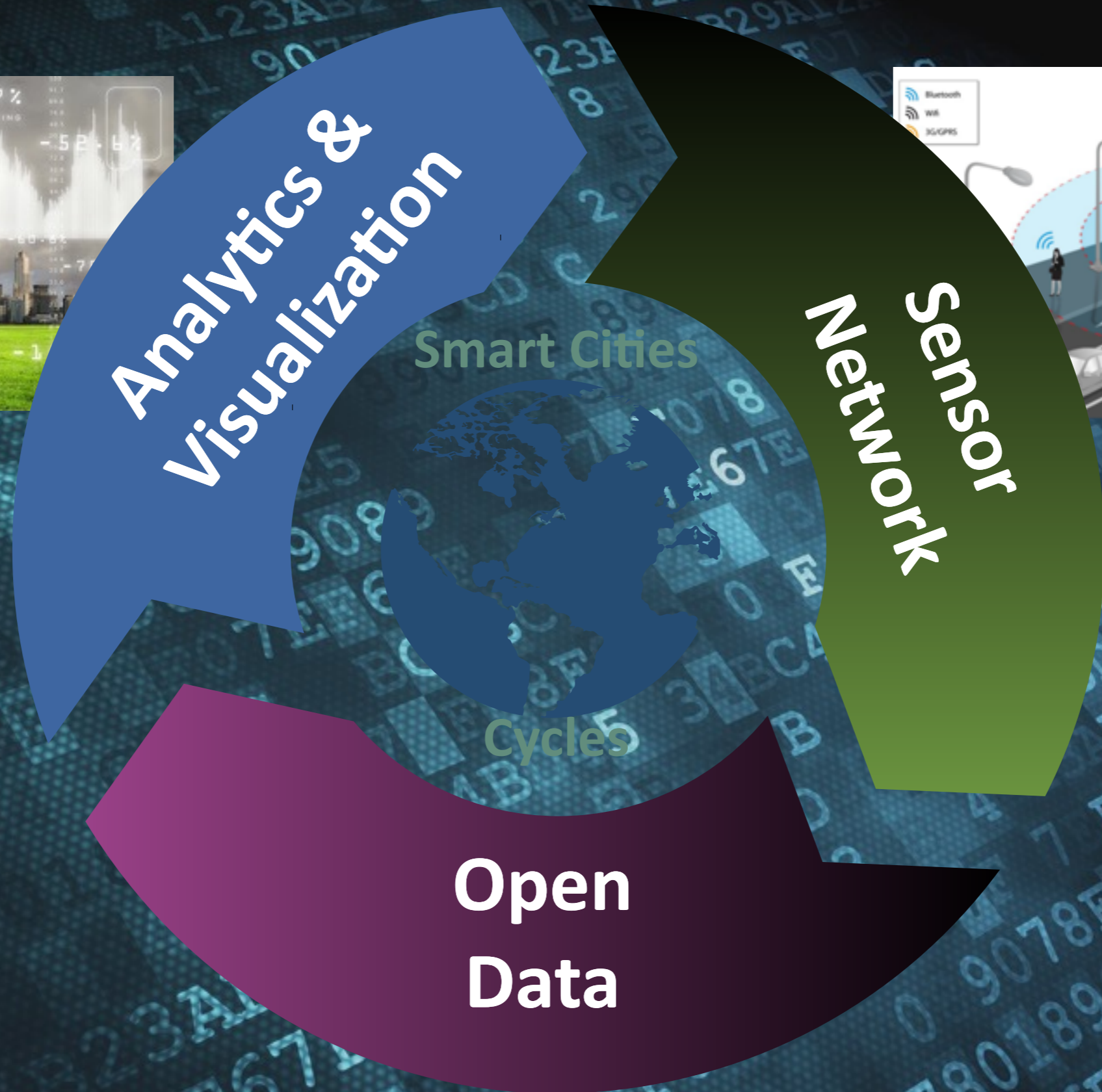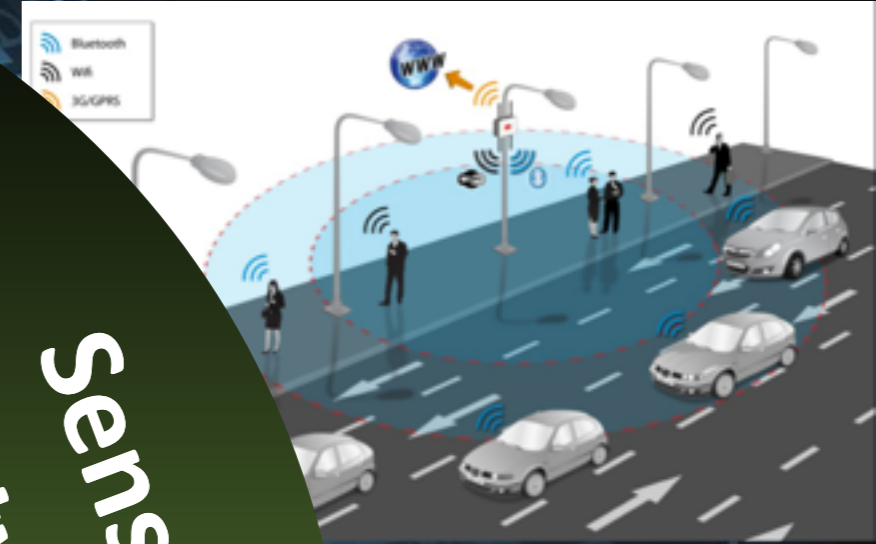
GDL Challenges in Smart Cities

GDL Smart City Challenges

- Massive availability of sensors

- Communication resilience (using power line communication)

- Empower innovation with local talent (Living Labs)

- Support environmental & social sustainability

- Innovate in green devices, recicle as possible

GDL Smart City Design Strategy

- Interoperability

- Modularity

- Scalability

- Support Open Architectures as possible

- Resiliency & Security

Current Activities

Creating communities embracing the initiative

Working Groups Roadmaps

Data analytics & visualization

People: Define indicators & Smart People
Institutions: enable cooperation, quick wins...
Develop, Integrate, get Skills for Analytics Tools
Q1 | Q2 | Q3 | Q4

4 Proposed Roadmap

1 Goals Agreed

2 Elements to integrate Map de Resources

5 Metrics to Use
- 5.1 EC metrics for smart people
- 5.2 Qualification Level
- 5.3 Level of Participation
- 5.4 Quality of Assurance
- 5.5 All must be meassured by
  - 5.5.1 Smart Economy
  - 5.5.2 Smart people
  - 5.5.3 Smart Mobility
  - 5.5.4 Smart Living
  - 5.5.5 Smart Environment
  - 5.5.6 Smart government

*Risk
Area of opportunity
Urbanization

6 Open
- 6.1 Focus on chart?
- 6.2 Create or change?
- 6.3 Scope / methodology?
- 6.4 CFE - Energy planning?

Internet of Things

tanking of Elements

1 Goals Agreed
- 1.1 Create reason for people to visit & interac W/CCD
- 1.2 Develop "living lab" with new technologies & opportunity to interact, experiment in a secure environment
- 1.3 Enought enhancement of development & make CCD point of interaction for GDL

Roadmap

2 Elements To Integrate Map The Resources & Products
- 2.1 CCD SDK for apps or new service development
- 2.2 Explore CCD "money" and tie to local digital economy
- 2.3 Enable the CCD to support the transmedia industry initiative
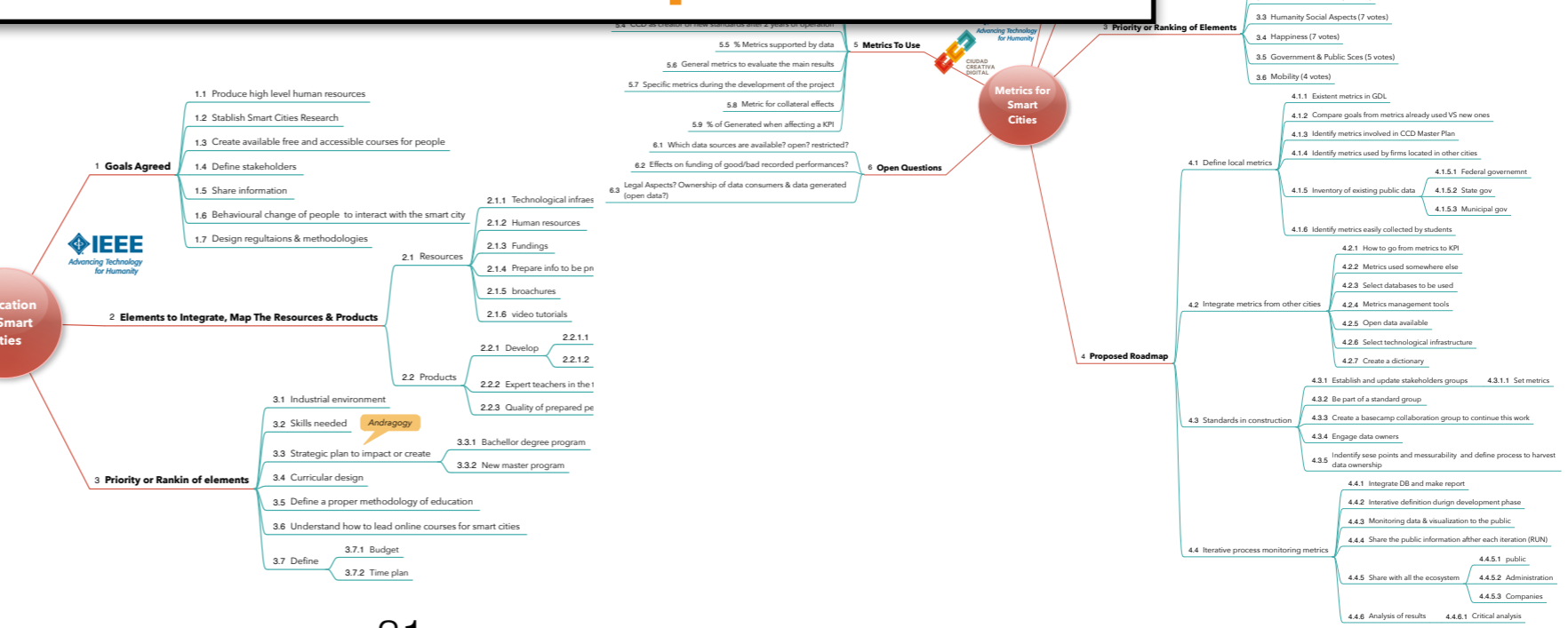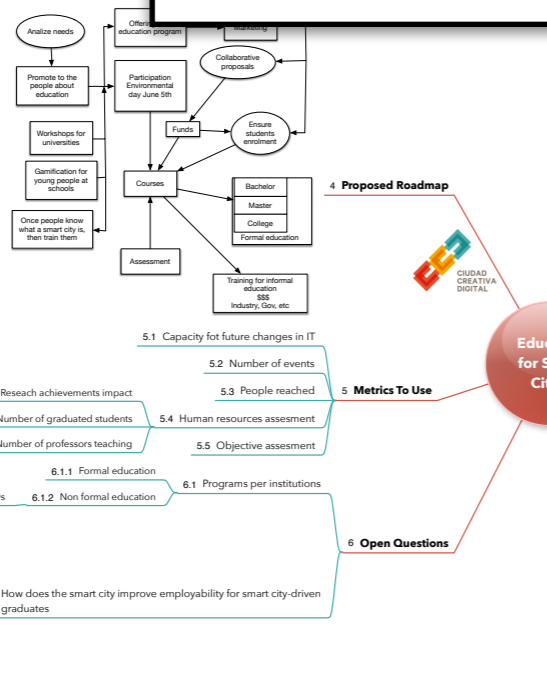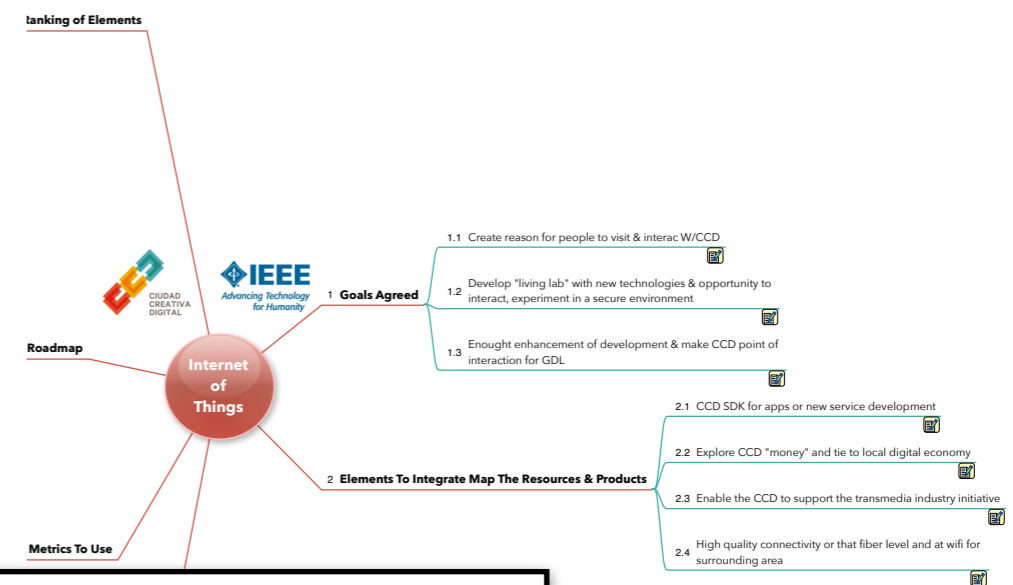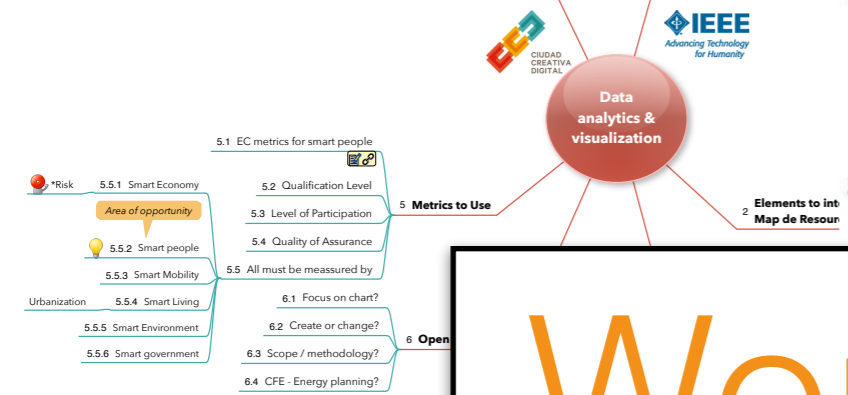- 2.4 High quality connectivity or that fiber level and at wifi for surrounding area

Metrics To Use

Education for Smart Cities

Analyze needs
Promote to the people about education
Workshops for universities
Gamification for young people at schools
Once people know what a smart city is, then train them

Offering education program
Participation Environmental day June 5th
Funds
Courses
Assessment

Collaborative proposals
Ensure students enrolment
Bachelor
Master
College
Formal education
Training for informal education $$$ Industry, Gov, etc

4 Proposed Roadmap

1 Goals Agreed
- 1.1 Produce high level human resources
- 1.2 Stablish Smart Cities Research
- 1.3 Create available free and accessible courses for people
- 1.4 Define stakeholders
- 1.5 Share information
- 1.6 Behavioural change of people to interact with the smart city
- 1.7 Design regultaions & methodologies

2 Elements to Integrate, Map The Resources & Products
- 2.1 Resources
  - 2.1.1 Technological infraes
  - 2.1.2 Human resources
  - 2.1.3 Fundings
  - 2.1.4 Prepare info to be pr
  - 2.1.5 brochures
  - 2.1.6 video tutorials
- 2.2 Products
  - 2.2.1 Develop
    - 2.2.1.1
    - 2.2.1.2
  - 2.2.2 Expert teachers in the
  - 2.2.3 Quality of prepared pe

3 Priority or Rankin of elements
- 3.1 Industrial environment
- 3.2 Skills needed — Andragogy
- 3.3 Strategic plan to impact or create
  - 3.3.1 Bachellor degree program
  - 3.3.2 New master program
- 3.4 Curricular design
- 3.5 Define a proper methodology of education
- 3.6 Understand how to lead online courses for smart cities
- 3.7 Define
  - 3.7.1 Budget
  - 3.7.2 Time plan

5 Metrics To Use
- 5.1 Capacity fot future changes in IT
- 5.2 Number of events
- 5.3 People reached
- 5.4 Human resources assesment
  - 5.4.1 Reseach achievements impact
  - 5.4.2 Number of graduated students
  - 5.4.3 Number of professors teaching
- 5.5 Objective assesment

6 Open Questions
- 6.1 Programs per institutions
  - 6.1.1 Formal education
  - 6.1.2 Non formal education
    - 6.1.2.1 Employs
      - 6.1.2.1.1 Inside smart city
      - 6.1.2.1.2 Outside smart city
- 6.2 How does the smart city improve employability for smart city-driven graduates
  - 6.2.1 Sustentability
  - 6.2.2 Government
  - 6.2.3 People
  - 6.2.4 Environment
  - 6.2.5 Transport
  - 6.2.6 Living

Metrics for Smart Cities

5 Metrics To Use
- ... "CCD as creation of new standards after 2 years of operation"
- 5.5 % Metrics supported by data
- 5.6 General metrics to evaluate the main results
- 5.7 Specific metrics during the development of the project
- 5.8 Metric for collateral effects
- 5.9 % of Generated when affecting a KPI

6 Open Questions
- 6.1 Which data sources are available? open? restricted?
- 6.2 Effects on funding of good/bad recorded performances?
- 6.3 Legal Aspects? Ownership of data consumers & data generated (open data?)

1 Goals Agreed
- 1.1 Define metrics for Guadalajara (GDL)
- 1.2 Assess GDL based on metrics
- 1.3 Identify values as project goals
- 1.4 Benchmarking KPI

2 ...o Integrate, MAP The Resources & Products
- 2.1 Infrastructure Energy Environment
- 2.2 Economy & Innovation
- 2.3 Government & Security Public Education Service
- 2.4 Mobility
- 2.5 Humanity · Societal Aspects
- 2.6 Happiness

3 Priority or Ranking of Elements
- 3.1 Economy & Innovation (11 votes)
- 3.2 Infra & Environment (8 votes)
- 3.3 Humanity Social Aspects (7 votes)
- 3.4 Happiness (7 votes)
- 3.5 Government & Public Sces (5 votes)
- 3.6 Mobility (4 votes)

4.1 Define local metrics
- 4.1.1 Existent metrics in GDL
- 4.1.2 Compare goals from metrics already used VS new ones
- 4.1.3 Identify metrics involved in CCD Master Plan
- 4.1.4 Identify metrics used by firms located in other cities
- 4.1.5 Identify metrics used by firms located in other cities
  - 4.1.5.1 Federal government
  - 4.1.5.2 State gov
  - 4.1.5.3 Municipal gov
- 4.1.6 Identify metrics easily collected by students

4.2 Integrate metrics from other cities
- 4.2.1 How to go from metrics to KPI
- 4.2.2 Metrics used somewhere else
- 4.2.3 Select databases to be used
- 4.2.4 Metrics management tools
- 4.2.5 Open data available
- 4.2.6 Select technological infrastructure
- 4.2.7 Create a dictionary

4.3 Standards in construction
- 4.3.1 Establish and update stakeholders groups — 4.3.1.1 Set metrics
- 4.3.2 Be part of a standard group
- 4.3.3 Create a basecamp collaboration group to continue this work
- 4.3.4 Engage data owners
- 4.3.5 Indentify ease points and mesurability and define process to harvest data ownership

4.4 Iterative process monitoring metrics
- 4.4.1 Integrate DB and make report
- 4.4.2 Iterative definition durign development phase
- 4.4.3 Monitoring data & visualization to the public
- 4.4.4 Share the public information afther each iteration (RUN)
- 4.4.5 Share with all the ecosystem
  - 4.4.5.1 public
  - 4.4.5.2 Administration
  - 4.4.5.3 Companies
- 4.4.6 Analysis of results — 4.4.6.1 Critical analysis

4 Proposed Roadmap

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IEEE Advancing Technology for Humanity

IEEE White Papers

Allows to:

- Communicate experience in process
- Share best practices
- Enable worldwide collaboration

Is a process of working groups

http://smartcities.ieee.org

IEEE Smart Cities Grants for Postgraduate Students

Goal

The plan is to engage both professors and students to create a strong human knowledge base in the area of Smart Cities. This is a two pronged endeavour - involvement of students through PhD and Master theses and the contribution to the development of Massive Open Online Courses.

Allocation Grant

1. Two PhD Students for two years each at US$60,000 per PhD Student (US$15,000 per PhD Student per year); and

2. Ten Student theses – five in the first year and five in the second year at four hundred United States dollars (US$400) per month for ten (10) months per year per Student thesis.

Important dates

Deadline: 15th August.

Decision: 22 August.

Submission

http://smartcities.ieee.org

ieeesmartcity.gdl@ieee.org

vmlr/15072014

Call for Participation

IEEE Smart Cities initiative in order to increase human capital in Guadalara Section as first pilot program, opens their call to postgraduate students to apply for the selection process to receive a grant. The duties for the selected students, will be to support full time, the activities of the working groups developing the Smart City initiative locally in the IEEE Guadalajara Section. As a result, an outstanding thesis work in Smart Cities should be accomplished.

Student eligibility criteria

The following requirements to be covered will be evaluated to apply for the grant:

•IEEE Student active member (mandatory)

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Current Status:

• 4 Master Students (IOT, ODF, DAV)

• 1 PhD (MTX)

• New in 2015: 6 Master + 1 PhD

Empowers Working Groups
+
Core activities
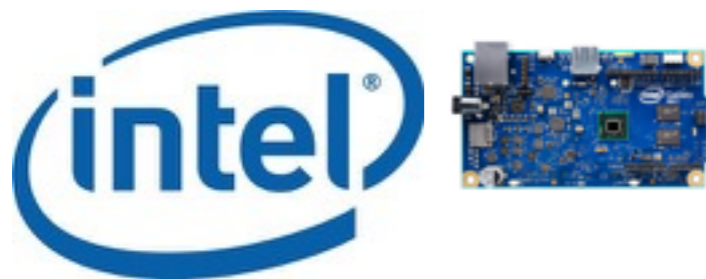
Living Lab For Smart City Solutions

[Veeckman:2014ic]

Open Data Framework

Metrics

IEEE Smart Cities MOOCs EDx Development 2014-2015

Data Analytics & Visualization

IoT

IEEE Smart Cities

7,552
Total Enrolment

149
Countries

15% High School
38.1% College Degree
45.3% Advanced Degree

Age Distribution:
29% Under 25
46.6% 26 to 40
19.2% 41 and Over

edX

HOW IT WORKS   FIND COURSES   SCHOOLS & PARTNERS

REGISTER   SIGN IN

Watch the Course Intro Video

Introduction to Metrics for Smart Cities

Develop a basic understanding of the elements of a Smart City and learn the impact of using metrics to measure its performance.

About this Course

The concept of a Smart City holds much promise for improving the quality of life for city dwellers, but what technologies to citizens' needs in order to and engaging more directly with city at covers different aspects related to big ween channels and entities for essing differences between various lyzed as a complex system. Since a e of its individual sectors to obtain t of life, including: urbanization, useful for estimating consumed reso

s classifications, they will learn to id ortant skill to develop is how to clas urse is to develop participants' bas involved in its creation. Participants also be able to define and establish the necessary metrics to measure the performance of a Smart City.

Estimated effort: 5 - 7 hours per week

Prerequisites:

Recommended for students in their last year of urbanism, architecture, or information technologies, as well as professionals interested in Smart

WAYS TO TAKE THIS EDX COURSE:

Pursue a Verified Certificate

Plan to use your completed coursework for job applications, career advancement, or school applications? Then work toward a Verified Certificate of Achievement to document your accomplishment. A minimum fee applies.

Minimum fee required. See details

Learn more about Verified Certificates

MOOCs Structure

Deliverables:

- Videos

- Learning objects

- Document lectures

- Quizes

- Handbook

- EDx Platform

Time Frame:

4 Weeks 5 lessons per Week = 10 per week of student work = 40 hrs (ADDIE Model)

[Shelton:2011ke]

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![IEEE Smart Cities logo] ◆IEEE

First IEEE International Smart Cities Conference

Hilton Guadalajara - Guadalajara, Mexico
October 25-28, 2015

The First Annual IEEE International Smart Cities Conference (ISC2-2015) is the premier conference sponsored by the IEEE Smart Cities Initiative.

Submit Your Manuscript

The technical areas include, but are not limited to:

- Smart city theory, modeling, and simulation
- Intelligent infrastructure
- Sensors and actuators
- Smart economy development
- Open data and big data analytics
- Safety and security systems
- Smart healthcare & emergency management
- Smart environment and policy development
- Citizen engagement and smart governance
- Connected Vehicle (CV) technologies
- Smart mobility and transportation
- Internet of Things (IoT) and smart cities

- Intelligent vehicle-to-infrastructure integration
- Smart grid
- Environmental capital reduction
- Digital city and smart growth
- Smart traffic system operations
- Smart buildings
- Smart city implementation
- Pedestrian/bicyclist safety; mobility systems
- Smart city for special needs
- Smart manufacturing and logistics
- Environmental monitoring technologies

Call for Papers

Original and innovative contributions in smart city research and advanced implementations and deployments are sought for technical sessions. Please submit articles conveying new developments in theory, analytics, numerical simulation and modeling, experimentation, advanced deployment and case studies, results of laboratory or field operational tests, and other related creative endeavors as well as special educational developments for smart city curricula.

The conference theme is *Smart City for Sustainability*.

Organizing Committee

General Co-Chairs:

Mr. Gilles Betis
EIT ICT Lab, France

Dianna Valadez
IEEE GDL Section Chair

Program Co-Chairs:

Prof. Yinhai Wang
University of Washington, USA

Victor M. Larios,
University of Guadalajara, Mexico

Important Dates

Special Session proposal submission deadline:	**March 31, 2015**
Full-paper submission deadline	
Workshop/Tutorial proposal s	
Notification of acceptance:	
Final paper submission deadline:	**July 1, 2015**

Extended Deadline 30th June

Conference + Exhibition + Workshops + Hackathon

Thank you !

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References

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