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Smart Cities and Nations in One Digital Cooperative World.

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From an Internet of Things to an Internet of Cooperation

During the **IEEE World Forum 2018 of Singapore**, in a specified Vertical about Smart City and Nations, we held several sessions not only from a technological or architectural point of view but more on the business level and stakeholders requirements to make City Smarter, so let's not only see the technology as a goal but as a useful tool.

But what the term 'Smart City' stands for?

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With the term Smart City we mean a community with a series of additional advantages compared to a traditional or not digitally integrated city.

The following picture shows the essential "smart services" a "smart city" should rely on:



But taking some interesting views from some of my distinguished colleagues in Singapore like Prof. Derrick de Kerckhove and Dr. Nahum Gershon, I'd like to focus on what makes a City not only Smart but likely an Happy place for its citizen.

All the different speakers coming from all over the world and who have spoken like me in Vertical "Smart City and Nation" agreed that especially when you think to mobile efficiency or intermodal services you may have different perception depending on your culture and the place where you live so that if you have a look to this video <https://www.youtube.com/watch?v=7cLB0VlrS6Q> you can imagine that even a simple traffic light in the middle of that crowd cross could be Smart for that city, but It then happens that inserting technology if not widely adopted could result in worse results. Infact, if you watch the following video <https://www.youtube.com/watch?v=hFOo3e0nxSI> you can see that long queues happen soon after the cross was regulated by traffic lights!

An Happy Citizen **is** a Smart Citizen?

Are now those Citizen happier than before? Is there any difference between being happy and satisfied given that when one is happy one should also be satisfied!

Intelligent Transport Systems can surely help in augment efficiency, save lives and improve City Services but is it all we need? Sometimes we techs are so focused in making technology working that we forget to give people what they really need and like.

We Can define KPI to measure Smart City Effectiveness, Dr. Bilel Jamoussi, ITU

regarding the KPI to measure City Smartness using a series of indicators to size City Progress to "Smartness".

So, if you can measure how smart a city is, what is it that makes a city really smart and what do we need to really have smart nations?

First of all, we need to focus on the Smart City and Nations Stakeholders and in the first instance we need to implement a "message broker" among all of them. Without a message correctly sent between service components in each service and domain, no Smart City and Nations can take place.

We must therefore consider that we must allow the stakeholders to have access to individual Smart Cities services (eg. where am I, how can I reach the theatre, how can I change my doctor, How can I get my birth certificate etc.) and to the single domain (mobility, network, health, e-gov , etc.).

Top level domain are Nations that should be cross-cooperative among all different cities.

But which are the services we're talking about? We can think of it as different Citizen needs or Cities Manager and Mayors requirements.

From a citizen perspective we may have:

- How to get my birth certificate?
- How can I transfer my Residence?
- How can I get a driving licence duplication?
- How can I get to a certain place and how long it will take?
- Which health services can be brought to me?
- Are my kid at home safe and all rights?
- Is my house green and am' I saving energy?

From a Mayor Point of view:

- It' my city too noisy?
- How Can I reduce noise level for residents?
- Are my citizen happy and satisfied? And if not, why?
- How Can I reduce tax for my citizen and make the city healthier and safer?

employees?

- Which is the satisfaction level among citizen of my work?

With all these questions in mind, Digital Technology could be a powerful resource to create large communities of cooperative stakeholders moving Smart Cities projects from mere Internet of Thing technical projects to a more successful **Internet of Cooperation**.

In Europe, eg, we're talking of Cooperative Transport Systems (ETSI TR 102 638), but we've now to move further and talk not only of "cooperative roads" but of Cities and Nations, so we must now have a top level domain approach on all the services and domains that build Nations:

- Smart Grid
- Smart Health
- Smart Transportation
- Smart Health
- Smart Environment
- Smart Agriculture
- ...

In the following picture you may see this framework applied to the Digital Solutions of some of the verticals involved:

While in this other picture Smart Cities stakeholders needs and goals are summarized:

If we'd like to make Smart Cities and Nations an whole thing, stakeholders should talk and cooperate together. In this process we've to standardize not only the way of measuring the City Progress in becoming "Smart" but the way Things in the Cities (Lamps, Vehicles, Traffic Lights, Pedestrians, gauges metering, etc) and Stakeholders can talk securely on the Internet to build a Smarter Planet.

Are not "Sustainable Cities and Communities", "Do more with Less", "Affordable and Clean Energy", "Industry Innovation and Infrastructure" all of these part of the [UN Global Goals](#)?

It's not Technology something to use to let humanity advance?

others and we've to do so for each single service in each single domain. This set of the so called Microservices are to "announce" their capabilities to the external world. Every info moving between services of different domains should be sent encrypted to protect the payload.

We've so an envelope where the payload is inserted and can be opened by addressee only.

This approach is coherent with the IEEE P2431 and its top down approach.

More, this Standard provides the architectural framework to captures the commonalities across different domains and provides a basis for instantiation of concrete IoT architectures.

This standard is very helpful in designing Architectural Framework for the Internet of Things as:

- it promotes cross-domain interaction
- definition of different IOT Domains
- includes protection, security, privacy and safety

but in all of our final work many other things have to be considered like:

- handling the message envelope
- tracking
- delivery of the envelope, messages and attachment should be guaranteed (acknowledge)

The following pictures well describes the message handling.

Going from South to North we have the things and stakeholders' devices (Pc, Smartphone, laptop, Wearables, etc), then the communication layer, the aggregation layer, the Event Processor where decision, forecasting and Analytics are performed mostly on the Cloud but even in a Roof closer Computing Farm according to the IEEE Standard 1931.1

From East to West we have all the Identity Trusting Services and Device Management.

For every services "available" in each domain we should define:

- Addressable Users

- Service Name
- Actions
- Payload

All of these are XML messages handled by the Infobroker, a sort of “Message Dispatching Service” that mainly take into account the Message Routing (Local, Cloud, Roof).

The challenge is now to make this framework widely available and coded for nation wide use in all the domains.

In this way true Smart Nations may emerge and rapidly diffuse to a better world sustainability and help to gain UN global goals



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