FIG Commission 7 and 9
Annual Conference and Meeting
4th – 8th December 2017 - Cartagena Colombia

Integrating geospatial & statistical standards using Fintech (English)

Manohar Velpuri

Universidad de los Andes

Integrating geospatial & statistical standards using Fintech

- **Fintech - Definition - Introduction**
- **FIG Working group 9.2 & UNGGIM policy framework**
- **Coastlines and Islands - 2030 Agenda - Disaster risk reduction**
- **Cadastre 4.0 and Fintech 4.0**
- **UNECE meeting - report - Statistics vs Geospatial data for real estate market study**
  i. Introduction to Statistical and Geospatial Standards and Models
  ii. Examples of integrating Statistical and Geospatial Standards and Models
  iii. Challenges and solutions for creating Geospatial Statistical Outputs
  iv. Future Work relevant to Statistical and Geospatial Standards
- **Geospatial architecture - centralized vs Ownership on Blockchain**
- **Framework for universal financial access using blockchain**
- **Role of Blockchain in Real estate markets - current implementations**
- **Cost saving for a valuable property due to Smart contracts**
- **Brief report of ISO TC 307**
- **Existing datasets - ISRO, NASA, China - Dubai Declaration (Nov 7-9, 2017)**
- **UNGGIM HLPF - Mexican Declaration (Nov 28- Dec 1, 2017)**
- **Conclusion and Reference**

CADASTRE FOR EMERGENCIES AND DISASTERS : Challenges and opportunities for islands and Coastlines

Working Group 9.2 (Sep 2016...)

Valuation and Real estate management through **Fin-tech**

1. Does Fin-tech advance the professional practice of valuers and property managers working in most areas of real estate valuation and management;

1. Research and publish "best practice use cases of Blockchain" for the benefit of surveyors in different jurisdictions and sectors of the industry. This will benefit the surveying community and improve our services to the wider public;

1. Does Fin-tech's third and fourth wave facilitate and generate the exchange of information, knowledge and experience between surveyors for the benefit of the profession, our clients and the wider public in relation to the World Bank's fourth generation technologies on land engagements

1. Block-chain's role in publicizing and promoting the work of surveyors to the public, particularly to young people, governments and non-government organizations. Additionally, to enhance the value and perception of surveyors and the services they can deliver, especially in support of the *global sustainability agenda and the UN Millennium Development Goals;*

1. Does Fintech 3.0 and 4.0 lead to better alternative financing and sustainable real estate markets while also enabling better policy framework through reforms.

Scope : Integrating geospatial and statistical standards

Integrating geospatial & statistical standards using Fintech

CADASTRE FOR EMERGENCIES AND DISASTERS : Challenges and opportunities for islands and Coastlines

Integrating geospatial & statistical standards using Fintech

7 Dec 2015 00:00 UTC - 6 Dec 2017 15:31 UTC   XBT/COP close:38560600.63574
low:**1206229.14760** high:**38581068.39687**

CADASTRE FOR EMERGENCIES AND DISASTERS : Challenges and opportunities for islands and Coastlines

Framework - Universal financial access @ Blockchain
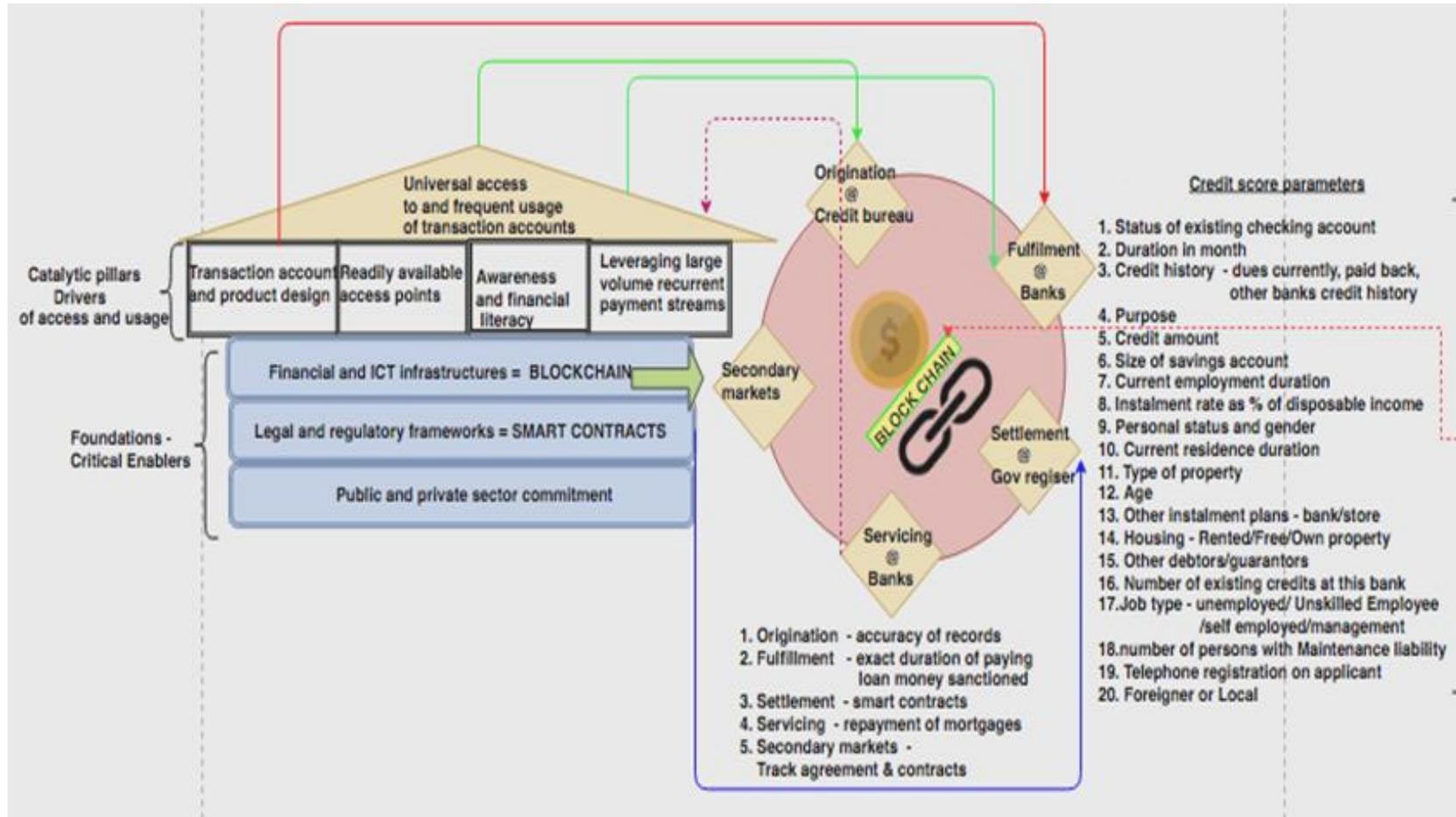
"Developing and accelerating electronic merchant payments at the broader level can help countries advance financial access and financial inclusion…. Using basic payment or savings accounts can gradually lead to access to and usage of other financial services, such as credit, insurance or pensions. The three foundational enablers are also highly relevant levers for helping to improve the usage and adoption of electronic payments by merchants" (WorldBank, 2016).

GLOBAL DEVELOPMENT POLICY FRAMEWORK

Global development policy framework				
The 2030 agenda for SD	Sendai Framework for Disaster risk reduction 2015-2030	SIDS accelerated modalities of action (SAMAO) pathway	Paris agreement on climate change	Habitat III Urban agenda

UN-GGIM: Global geospatial policy framework

UN-GGIM
2017-2021 Strategic Framework

CONTEXT	VISION	Positioning geospatial information to address global challenges				
	MISSION	Operating within agreed policies and institutional arrangements, and as an interconnected global community of practice, the Committee of Experts will ensure that geospatial information and resources are coordinated, maintained, accessible, and able to be used effectively and efficiently by Member States and society to address key global challenges in a timely manner				
	MANDATED STRATEGIC OBJECTIVES	Provide leadership in setting the agenda for the development of global geospatial information and to promote its use to address key global challenges	Provide a forum for coordination and dialogue with and among Member States and relevant international organizations on enhanced cooperation	Provide a platform for the development of effective strategies to build and strengthen national capacity and capability concerning geospatial information, especially in developing countries	Propose work-plans, frameworks and guidelines to promote common principles, policies, methods, standards and mechanisms for the interoperability and use of geospatial data and services	Make joint decisions and set the direction for the production and use of geospatial information within and across national, regional and global policy frameworks

Shared goal for UNISPACE+50 (61st session of COPUOS, Vienna, Jun 20-21, 2018)::

To build, together with all stakeholders, a comprehensive Space-2030 agenda for the contribution of space activities to the achievement of the SDG, addressing overarching, long-term development concerns, and which is based on the peaceful exploration and uses of outer space.

- *The integration of statistics and geospatial information including identity data are key considerations in the data flow and knowledge for cities - 17 goals and 169 targets of the Sustainable Development Goals (SDGs).*

Coastlines and Islands : Facts and Figures   (source : wiki)

Country	The World Factbook		World Resources Institute	
	#	km	#	km
World[Note 2]	—	1,162,306	—	1,634,701
Others[Note 3]	—	356,000		
Canada	1	202,080	1	265,523
Norway	2	103,000	7	53,199
Indonesia	3	54,720	4	95,181
Greenland[Note 4]	—	44,087		
Russia	4	37,653[Note 5]	3	110,310
Philippines	5	36,289	8	33,900
Japan	6	29,751	12	29,020
Australia	7	25,760	6	66,530
United States	8	19,924	2	133,312
Antarctica	—	17,968		
Colombia	**36**	**3,208**	**41**	**5,875**

87% victims in rural areas - Peace treaty - 2016

Colombian govt, FARC and a political mission of the United Nations composed by observers from member states of the Community of Latin American and Caribbean States (CELAC).

SDG's - Disaster risk reduction - 25 targets - Goal 1,2,3,4

There are 25 targets related to disaster risk reduction in 10 of the 17 sustainable development goals, establishing the role of disaster risk reduction as a core development strategy.

Goal 1. End poverty in all its forms everywhere

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnera[bility to] climate-related extreme events and other economic, social and environmental shocks and disasters

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase p[roductivity] and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme we[ather,] drought, flooding and other disasters and that progressively improve land and soil quality

Goal 3. Ensure healthy lives and promote well-being for all at all ages

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

source : http://www.preventionweb.net/drr-framework/sdg/target

SDG's - Disaster risk reduction - 25 targets - Goal 1,2,3,4 - Colombia

G	Tar	Indic	Indicator Description		Series Description	Freque	Source typ	Unit	2010	FN
1	1.5	1.5.1	Number of deaths, missing persons and directly affe	+	Number of persons affected by c	Annual	Not available	Number		
1	1.5	1.5.1	Number of deaths, missing persons and directly affe	+	Missing persons due to disaster	Annual	Not available	Number		
1	1.5	1.5.1	Number of deaths, missing persons and directly affe	+	Number of deaths due to disaste	Annual	Not available	Number		
1	1.5	1.5.2	Direct economic loss attributed to disasters in relati	+	Direct economic loss attributed t	Annual	Not available	USD		
1	1.5	1.5.3	Number of countries that adopt and implement nat	+	Number of countries with legisla	Annual	Not available	Number		
3	3.d	3.d.1	International Health Regulations (IHR) capacity and	SD	International Health Regulations	Annual	Not available	Index	89	NA, 27
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in lower s	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in lower s	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in lower s	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in pre-pri	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in pre-pri	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in pre-pri	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in primar	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in primar	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in primar	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in upper	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in upper	Annual	Not available	Percent		
4	4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) prima	SD	Proportion of teachers in upper	Annual	Not available	Percent		

source : https://unstats.un.org/sdgs/indicators/database/?area=COL

SDG's - Disaster risk reduction - 25 targets - Goal 6,9,11

Goal 6. Ensure availability & sustainable management of water & sanitation for all

6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 Develop quality, reliable, sustainable & resilient infrastructure, including regional & transborder infrastructure, to economic development & human well-being, with a focus on affordable & equitable access for all.

Target 9.a: Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island development states.

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1: By 2030, ensure access for all to adequate, safe and affordable and basic services and upgrade slums.

11.3: By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

11.4: Strengthen efforts to protect and safeguard the world's cultural and natural heritage

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels

11.c: Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials   source : http://www.preventionweb.net/drr-framework/sdg/target

SDG's - Disaster risk reduction - 25 targets - Goal 6,9,11 -Colombia

G	Tar	Indic	Indicator Description			Series Description	Freque	Source typ	Unit	2010	FN
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Freight volume (tonne kilometre	Annual	Other	Tonne kilometres		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Passenger volume (passenger kil	Annual	Other	Kilometres		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Freight volume (tonne kilometre	Annual	Other	Tonne kilometres		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Freight volume, by air transport	Annual	Not available	Metric Tons		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Freight volume (tonne kilometre	Annual	Not available	Tonne kilometres		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Mail volume (tonne kilometres),	Annual	Not available	Tonne kilometres		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Passenger volume, by air transpo	Annual	Not available	Number		
9	9.1	9.1.2	Passenger and freight volumes, by mode of transpo	SD		Passenger volume (passenger kil	Annual	Not available	Kilometres		
9	9.a	9.a.1	Total official international support (official developr	SD		Total official flows for infrastruct	Annual	Not available	Constant USD		
11	11.5	11.5.2	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	SD		Direct disaster economic loss, average annual loss in relation to global GDP	Annual	Not available	Per 1,000 USD	9.94	E, 27, 6!
11	11.5	11.5.2	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	SD		Damage to critical infrastructure, education facilities	Annual	Not available	Number		
11	11.5	11.5.2	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	SD		Damage to critical infrastructure. health facilities	Annual	Not available	Number		

source : https://unstats.un.org/sdgs/indicators/database/?area=COL

SDG's - Disaster risk reduction - 25 targets - Goal 13,14,15

13 CLIMATE ACTION

Goal 13. Take urgent action to combat climate change and its impacts

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

13.2 Integrate climate change measures into national policies, strategies and planning.

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible.

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries, including focusing on women, youth and local and marginalized communities

14 LIFE BELOW WATER

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15 LIFE ON LAND

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and striveto achieve a land degradation-neutral world

15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for 19 sustainable development.

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

SDG's - Disaster risk reduction - 25 targets - Goal 13,14,15 - colombia

G	Tar	Indic	Indicator Description		Series Description	Freque	Source typ	Unit	2010	FN
14	14.5	14.5.1	Coverage of protected areas in relation to marine a	SD	Coverage of protected areas in r	Annual	Not available	Percent	2.06	NA, 27,
15	15.1	15.1.1	Forest area as a proportion of total land area	SD	Forest area as a proportion of to	Annual	Not available	Percent		
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	33.61	C, 27, 1
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	33.61	C, 27, 1
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	33.61	C, 27, 1
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	38.6	C, 27, 1
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	38.6	C, 27, 1
15	15.1	15.1.2	Proportion of important sites for terrestrial and fres	SD	Proportion of important sites for	Annual	Not available	Percent	38.6	C, 27, 1
15	15.4	15.4.1	Coverage by protected areas of important sites for	SD	Coverage by protected areas of i	Annual	Not available	Percent	40.1	C, 27, 1
15	15.4	15.4.1	Coverage by protected areas of important sites for	SD	Coverage by protected areas of i	Annual	Not available	Percent	40.1	C, 27, 1
15	15.4	15.4.1	Coverage by protected areas of important sites for	SD	Coverage by protected areas of i	Annual	Not available	Percent	40.1	C, 27, 1
15	15.4	15.4.2	Mountain Green Cover Index	SD	Mountain Green Cover Index	Annual	Not available	Percent		

source : https://unstats.un.org/sdgs/indicators/database/?area=COL

Cadastre - current state vs pilots
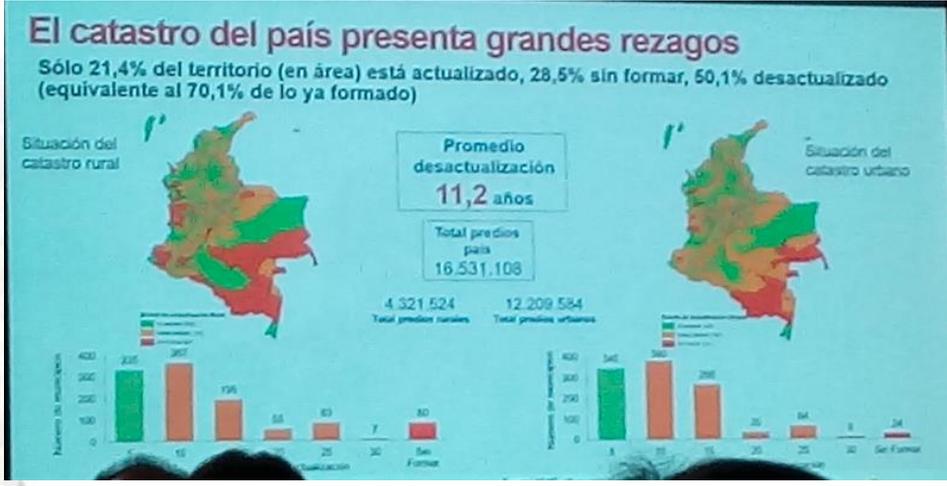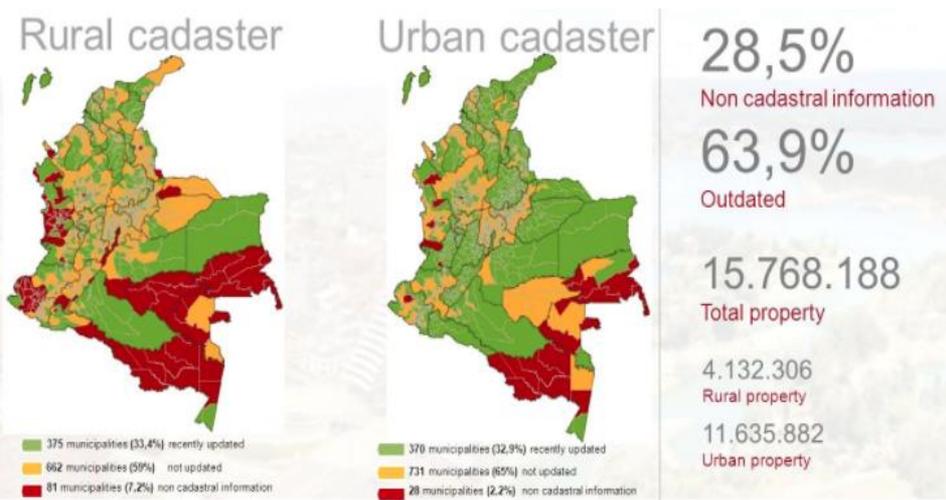
Source : Mauricio Iregui - www.fig717.net
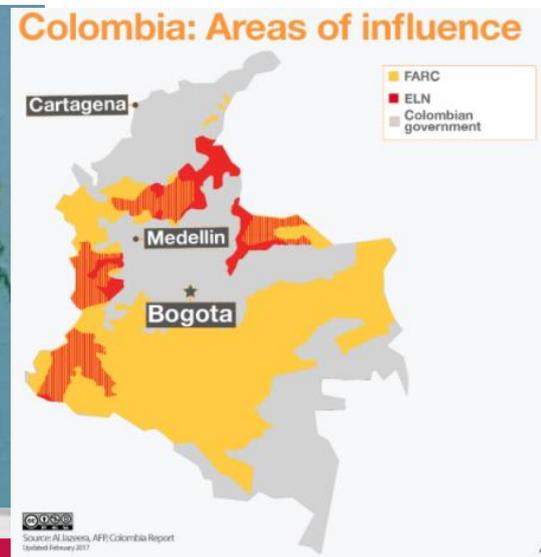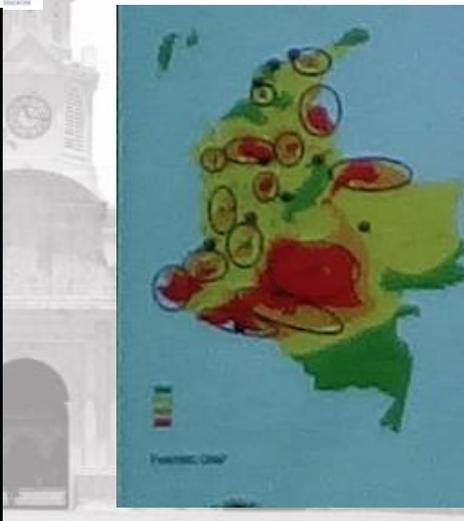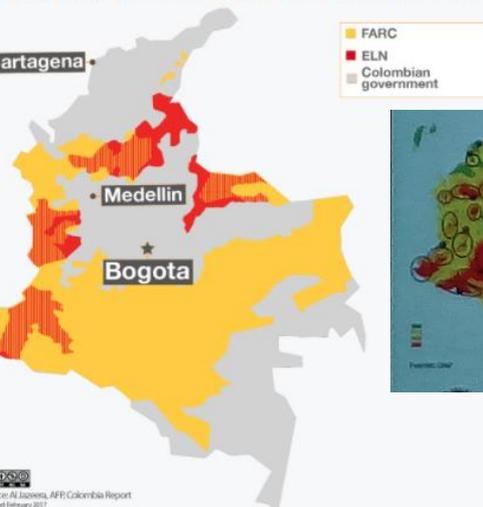
Cadastre 4.0
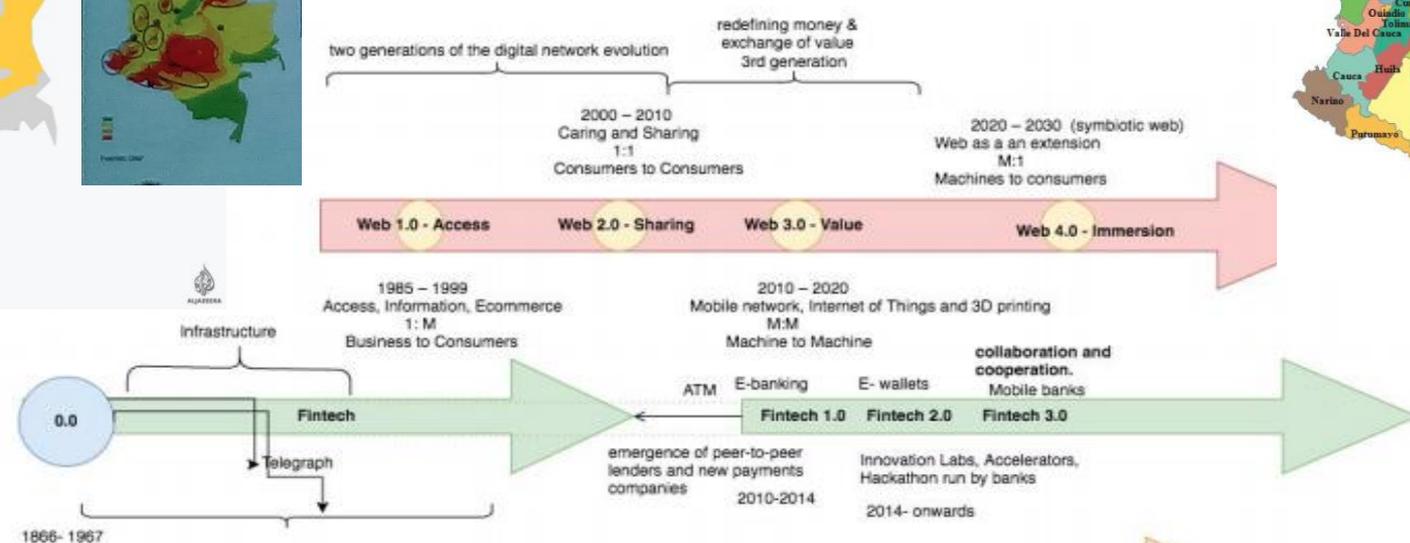
Working Group 9.2 - Jul-Aug 2017

INTERVENTION :

7th session of UN Economic and Social council, Dave Lovell, chair of the UNGGIM- geo spatial societies made the following statement -

"GGIM Geospatial Societies thanks the standards community for their vitally important work in developing standards and fully supports the use of existing international standards applicable to the creation, management and use of geospatial information, infrastructures and delivery arrangements. GGIM Geospatial Societies would like to highlight the importance of accelerating the process of developing new international standards given the rapid development of new technologies applicable to the achievement of the SDGs. In this regard we wish to draw attention to the importance of the work of ISO/TC 307 dealing with Blockchain and Electronic Distributed Ledger Technologies. A technology which has been hailed by custodians as being the future of the real estate management industry with potential to streamline processes such as land and property registration, valuation of property and many more digital actions."
source : http://ggim.un.org/meetings/GGIM-committee/7th-session/
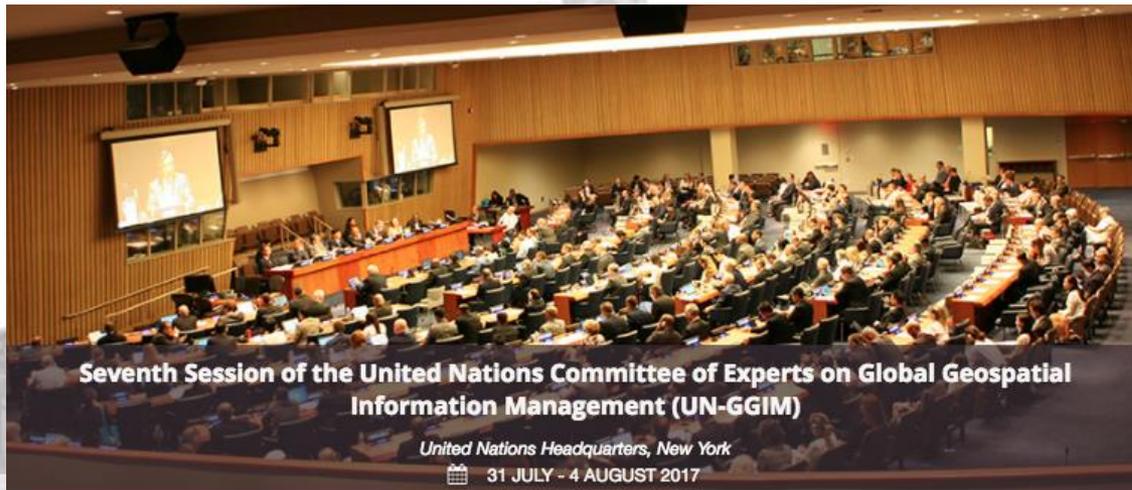
Seventh Session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)

United Nations Headquarters, New York
📅 31 JULY - 4 AUGUST 2017

EO4SDGs and WGGI (Working Group on. Geospatial Information)

- **CEOS**
- **ESA**
- **JAXA**
- **NASA**
- **INEGI**
- **GPSDD**
- **UN-GGIM - Globeland 30**

http://www.globallandcover.com/GLC30Download/index.aspx

National Land Use / Land Cover mapping on
1:50,000 scale using temporal
LISS III Data: Third Cycle Under NR-CENSUS
program, the third cycle of mapping of Land Use
Land Cover at 23m resolution, using multi-temporal
LISSIII satellite data, is in progress.
Out of 706 grids of 100km X 100km dimension at
 the national level, mapping is progressing in 80 grids
Source : ISRO Annual report 2016-2017

Disaster risk reduction indicators in measuring the 2030 Agenda for Sustainable Development

- IAEG-SDGs recognizes the OIEWG. Identifies UNISDR as custodian agency, December 2015
- UN Statistical Commission, 48th Session, March 2017: endorsed Report of the IAEG-SDGs | Note by the Secretary-General - E/CN.3/2017/2* proposing the recommended indicators of the OIEWG
  - 3 SDGs:
    - Goal 1. End poverty in all its forms everywhere
    - Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.
    - Goal 13. Take urgent action to combat climate change and its impacts
 - 4 SDG Targets
  - 11 SDG indicators

https://unstats.un.org/unsd/statcom/48th-session/documents/2017-2-IAEG-SDGs-E.pdf

Space For The Climate
The One Permanent Observatory

New Delhi - 3 April 2016
Heads of Space Agencies Meeting

GLC30 (China) & ISRO - India

National Land Use / Land Cover mapping on 1:50,000 scale using temporal LISS III Data: Third Cycle Under NR-CENSUS program, the third cycle of mapping of Land Use Land Cover at 23m resolution, using multi-temporal LISSIII satellite data, is in progress.

Out of 706 grids of 100km X 100km dimension at the national level, mapping is progressing in 80 grids

Source : ISRO Annual report 2016-2017

UNECE workshop - Nov 2017

- **https://www.unece.org/index.php?id=45404**

  Details are available published in the aforesaid website

- Workshop on Integrating Geospatial and Statistical Standards 6 - 8 November 2017

Examples of Integrating Statistical and Geospatial Standards and Models

UNECA - Strategic framework : Integration of statistical & geospatial information in Africa

European Commission - Integration of INSPIRE & SDMX data infrastructures

Mexico - integrating geographic and statistical information

Germany - Integrating GSGF and GSBPM

Australia - Location information in statistical modernisation transformation

Finland - Towards connecting geospatial information and statistical standards in statistical production (2 cases)

Italy - Reusing WebGIS application templates applied to the integration of statistical and geospatial information

Poland - Harmonization of statistical and geodetic divisions in the context of 10 level model, to develop a common framework as a standard of geospatial data production

Mongolia - Integrating satellite imagery and geo-spatial data with administrative registration to produce official statistics

Switzerland - The collaborative approach between the Federal Statistical Office and the Federal Office of Topography for maintaining a geocoded building and dwelling register used as a base for the production of geostatistical data

Source : UNECE summary report of workshop on integrating statistics and geospatial standards and models

Examples of challenges in Geospatial statistical outputs ...

Canada - Integrating socio-economic & environmental statistics with geo-spatial information

Poland – Investigation of linked open data technologies for purposes of publishing geo-referenced statistical data.

Japan – World Grid Square Statistics and their application to data analytics.

Portugal – Location analytics in administrative data to produce House Price Statistics

United States – Innovative effort to transform and expand dissemination of Census Bureau content to improve service to internal and external customers

Finland – OCG Table Joining Service standard revision

Institute for Employment Research - Enabling spatial research using German administrative data – A grid-cell approach.

Source : UNECE summary report of workshop on integrating statistics and geospatial standards and models

Challenges ...Opportunities

Concepts - agreement on conceptual issues - reflected in the standards.

Technology can bring conceptual models together.

Standards – M2M exchange involves, standards are important. Geospatial dimension is missing in SDMX (require discussion)

Data - Integration - ensure combining the correct values, persistent identifiers

Culture - build understanding – statistical & geospatial communities, people in standards governance & technical people.

Communication - clear to find information on the standards, how they relate to each other and how to begin using them.

Management – raise the importance of this work with the senior management, to build high level support. Census 2020 and the SDGs are a key driver, so benefits can be linked to them.

Timeliness – The standards development process is not necessarily a fast process.

Working method – the communities should identify concrete projects and use cases, worked in an iterative or agile way. - show the value of the work.

Source : UNECE summary report of workshop on integrating statistics and geospatial standards and models

FI|G

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Proposal for Future work..

A pitch statement to present to senior managers and leaders to gain buy-in and funding

A beginner's guide to using standards from both communities.

Both communities to develop communication materials that simply describe the interrelationships between their frameworks, models and standards.

Pilot to determine options for persistent ids to link aggregate statistical outputs to standard geographies.

Look for opportunities to work on semantic interoperability issues (for example, ontology for addresses and buildings).

Improve the discoverability of geospatial tools that are based on standards.

Guidance on how to store geospatial objects references/links in existing statistical databases

Map the data exchange process between statistical and geospatial organisations

Examine comparative use cases for application of traditional geography and emerging grid technologies, particularly for dissemination of statistics.

Examine pathways and interest within Statistical Community to move to formal ISO Standards for models and frameworks in addition to existing ones (e.g. ISO/TC 154).

Source : UNECE summary report of workshop on integrating statistics and geospatial standards and models

Proposal for Future work..
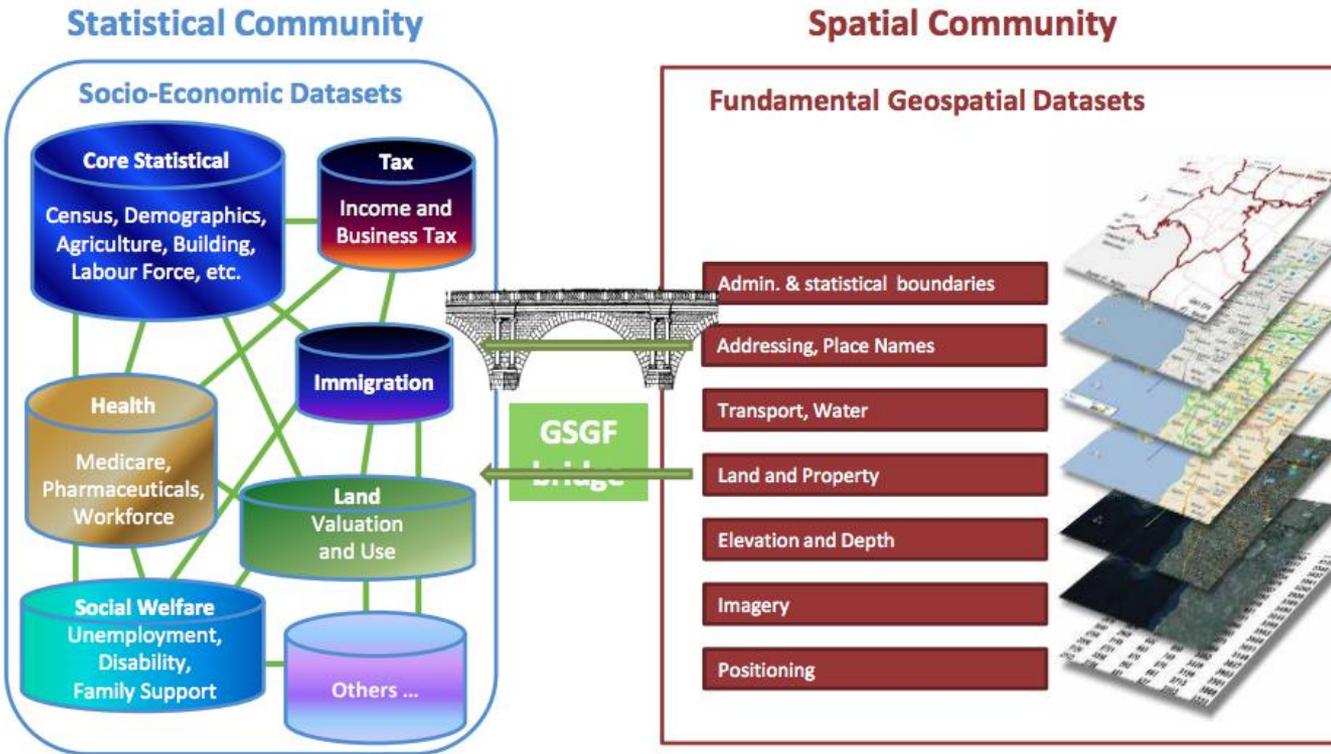
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UNGGIM - 5th High level political forum

- **http**://ggim.un.org/meetings/2017-Mexico

- Mexican declaration

ISO TC 307 - II plenary

- 8 more countries as participating members (Brazil, Croatia, India, Ireland, Jamaica, Portugal, Sweden, and Switzerland) FIG is one of the 5 Liaison organisations. TC 307 is a liaison to 15 other standardization committees, and 13 other standardization committees are liaison to TC 307. There was a total of ~137 delegates at this second meeting of TC 307, up from ~89 at the first meeting.

- WG1 (Working Group 1) on Terminology - WG1 will be renamed to "Foundations" as 2 (NWIPs) from SG1 on "Reference architecture, Taxonomy and Ontology"

- NWIP ("Blockchain and distributed ledger technologies – Reference architecture") - (US) as the Project Leader.China,Korea and France) volunteered too.

- NWIP ("Blockchain and distributed ledger technologies – Taxonomy and Ontology) -China as the Project leader, France volunteered to participate.

Statistics vs Geospatial data for Property markets

WORLD

Geospatial

stics

WORLD

COUNTRY

LOCAL

servations

ther data

PIXEL
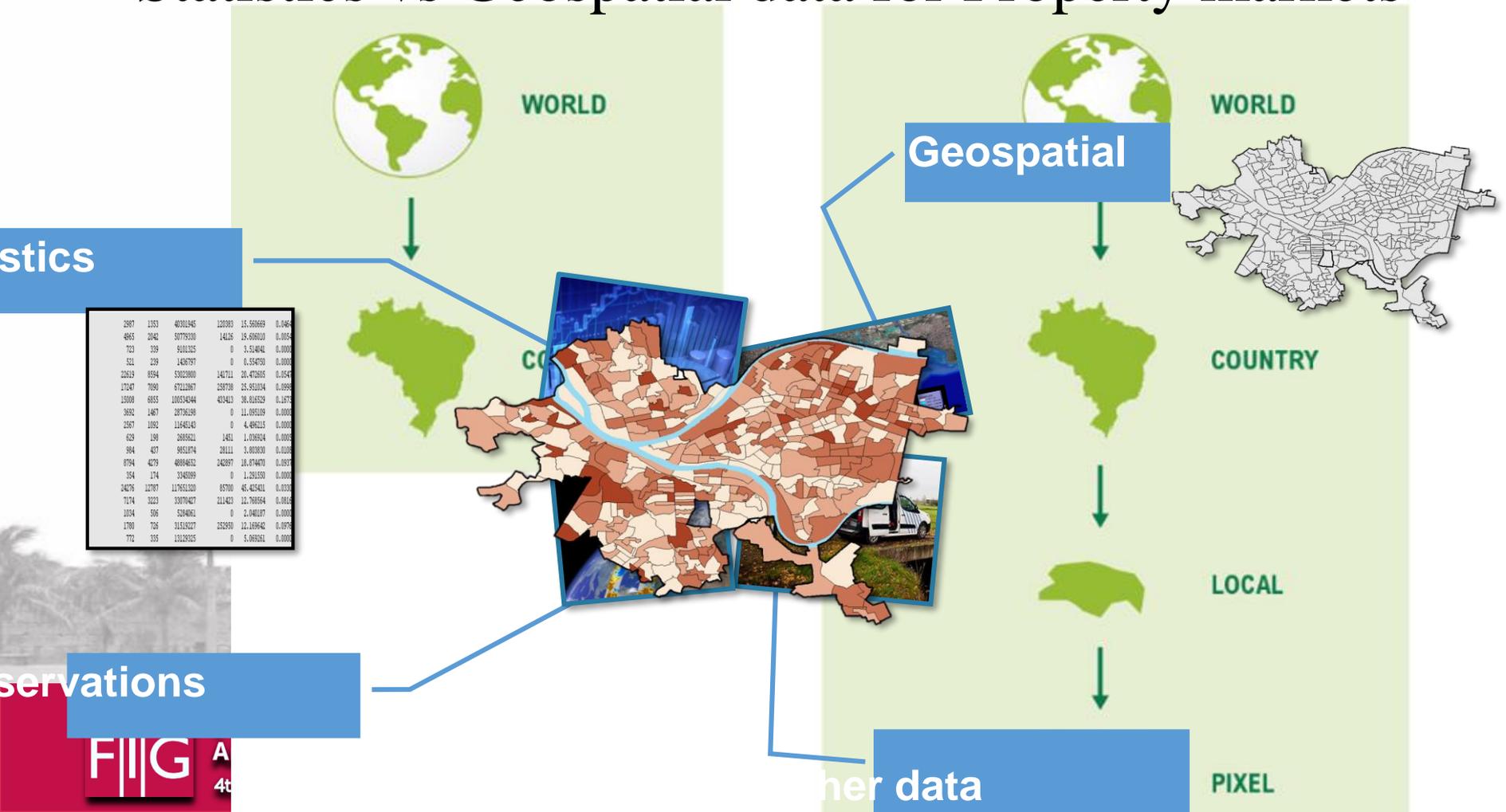
Integration and disaggregation by geographic location
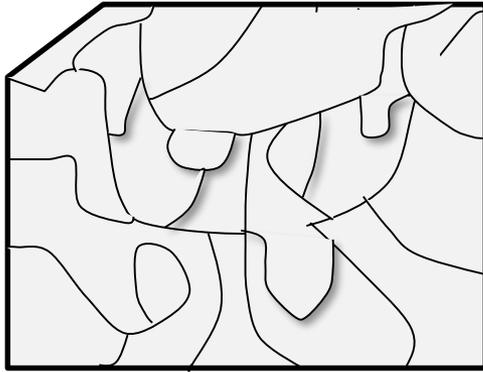
Administrative areas
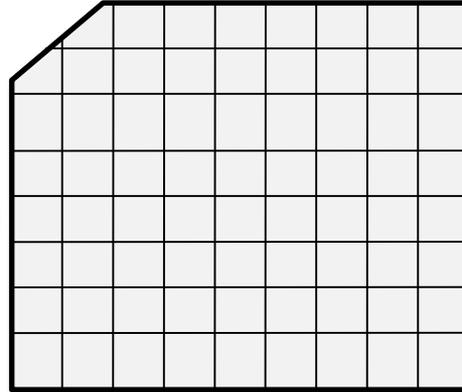
Gridded datasets

Geospatial base layers

Lowest level/small area geography differs greatly from country to country

Gridded data is often the only geospatial solution available to achieve uniformity and integration on a global scale

Combined base layer information (i.e. small area geography and imagery) is useful to validate human settlement patterns and geographical features

Existing Software

- spatial DB
  - PostGIS
  - Oracle Spatial
  - MS SQL spatial
  - ArcSDE
- middleware
  - GeoServer
  - MapServer
  - ArcGis Server
- GeoDjango
- ORG / GDAL
- Python
  - bindings to most geo systems
- Open Geospatial Consortium
  - OGC standards / services
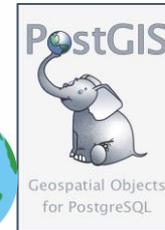
Positioning geospatial information to address global challenges

What is a blockchain?

"blockchain is a distributed, decentralized, immutable, peer-to-peer, trustless and anonymous ledger / database"

DAPPs - decentralized applications
DAOs - decentralized autonomous organizations,
DACs - decentralized autonomous corporations

Block Depth

Block 277318
Transactions

Block 277317
Transactions

Block 277316
Alice's Transaction

Block Height

Block 277315
Transactions

Block 277314
Transactions

Difficulty
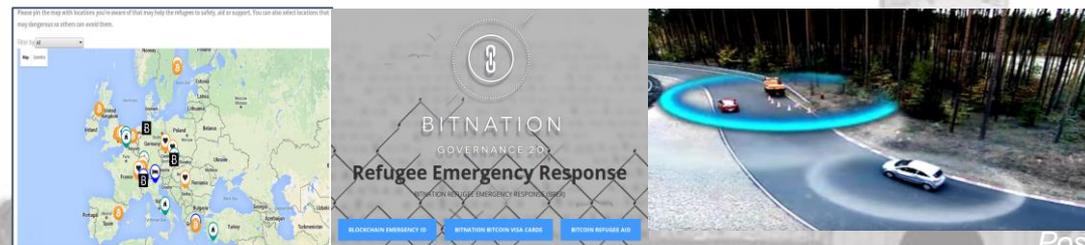
Positioning geospatial information to address global challenges

Need for Distributed Ledger

- privacy
  - sensitive geolocation data from mobile to centralized servers

- autonomy
  - control of own data

- innovation
  - big monopolies on e.g. geospatial data / land owner registry prevent better solutions

- economy
  - provide better / cheaper solutions

- land ownership
  - proof, cheaper transfer, easier acquisition
    http://awesomemap.tools/
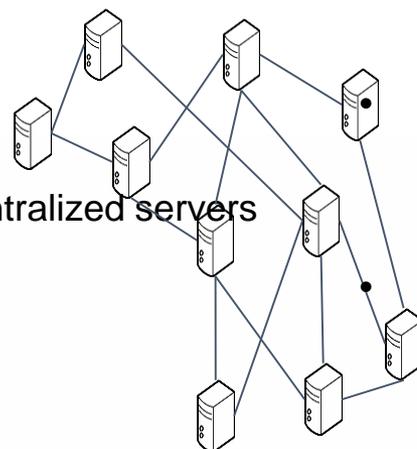
All nodes are **equal** and have a full copy of the blockchain

~ each 10 min a **new block** of transactions is added to the chain

Anyone can install the software and become a node in the network

Anonymous and encrypte

Positioning geospatial information to address global challenges

Property parcel on blockchain

- A parcel / cadastre is a geometry
- geometry as WKT:
  ```
  POLYGON ((50 150, 100 150, 100 100, 50 100, 50 150)), PROJCS["ETRS89 / UTM
  zone 33N", ...
  ```
- Unique hash of the geometry entered along with transaction:
  ```
  a2ea8a034f1dec198f74404e619c80e9
  ```

```
jonas@nas2 ~/tmp $ md5sum cadastrals_as_wkt.csv
880832c826f3eb9b0bb70d17b23e38fc  cadastrals_as_wkt.csv
jonas@nas2 ~/tmp $
```

Transaction View information about a bitcoin transaction

0627052b6f28912f2703066a912ea577f2ce4da4caa5a5fbd8a57286c345c2f2

1Cdid9KFAaatwczBwBttQcwXYCpvK8h7FK	→	1GdK9UzpHBzqzX2A9JFP3Di4weBwqgmoQA
		0.015 BTC
		1Cdid9KFAaatwczBwBttQcwXYCpvK8h7FK
		0.0845 BTC

0.0995 BTC

https://blockchain.info/tx/0627052b6f28912f2703066a912ea577f2ce4da4caa5a5fbd8a57286c345c2f2

Positioning geospatial information to address global challenges
Positioning geospatial information to address global challenges

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Geospatial architecture - centralized

- data storage
  - spatial databases / repositories
- data distribution
  - web services / download
- data processing
  - query / analyse big data sets on large DB / services
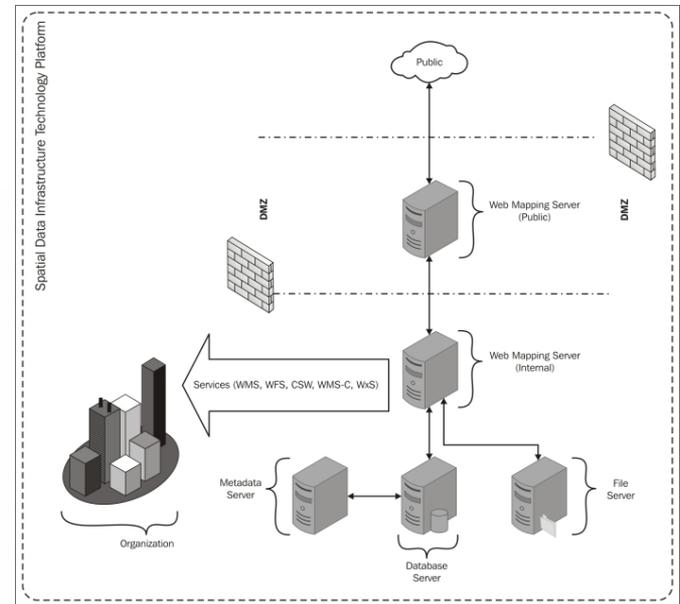
EXTRA COST

SINGLE POINT OF FAILURE

REQUIRES UNIVERSAL TRUST

Transfer of land ownership (cadastre / parcel represented by a geometry)
Need for proof of ownership

Blockchain Existing Platforms

- [Ethereum](#)
- [BigchainDB](#)
- [IPFS](#)

WHAT IS ETHEREUM?

Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third party interference.

Ethereum is how the Internet was supposed to work.

Ethereum was crowdfunded during August 2014 by fans all around the world. It is developed by ETHDEV with contributions from great minds across the globe.

IPFS is The Permanent Web

A new peer-to-peer hypermedia protocol

BIGCHAINDB

Meet BigchainDB. The scalable blockchain database.

LEARN MORE

This is BigchainDB

1 million writes/s, petabytes of capacity and rich permissioning to power both open and private blockchain networks.

Architecture   ::: Regular vs Blockchain

admin
root access

read, write,
update, delete

user

user

user

admin
root access

read & write
only!

user
root access

user
root access

user
root access

no-one can update/delete!
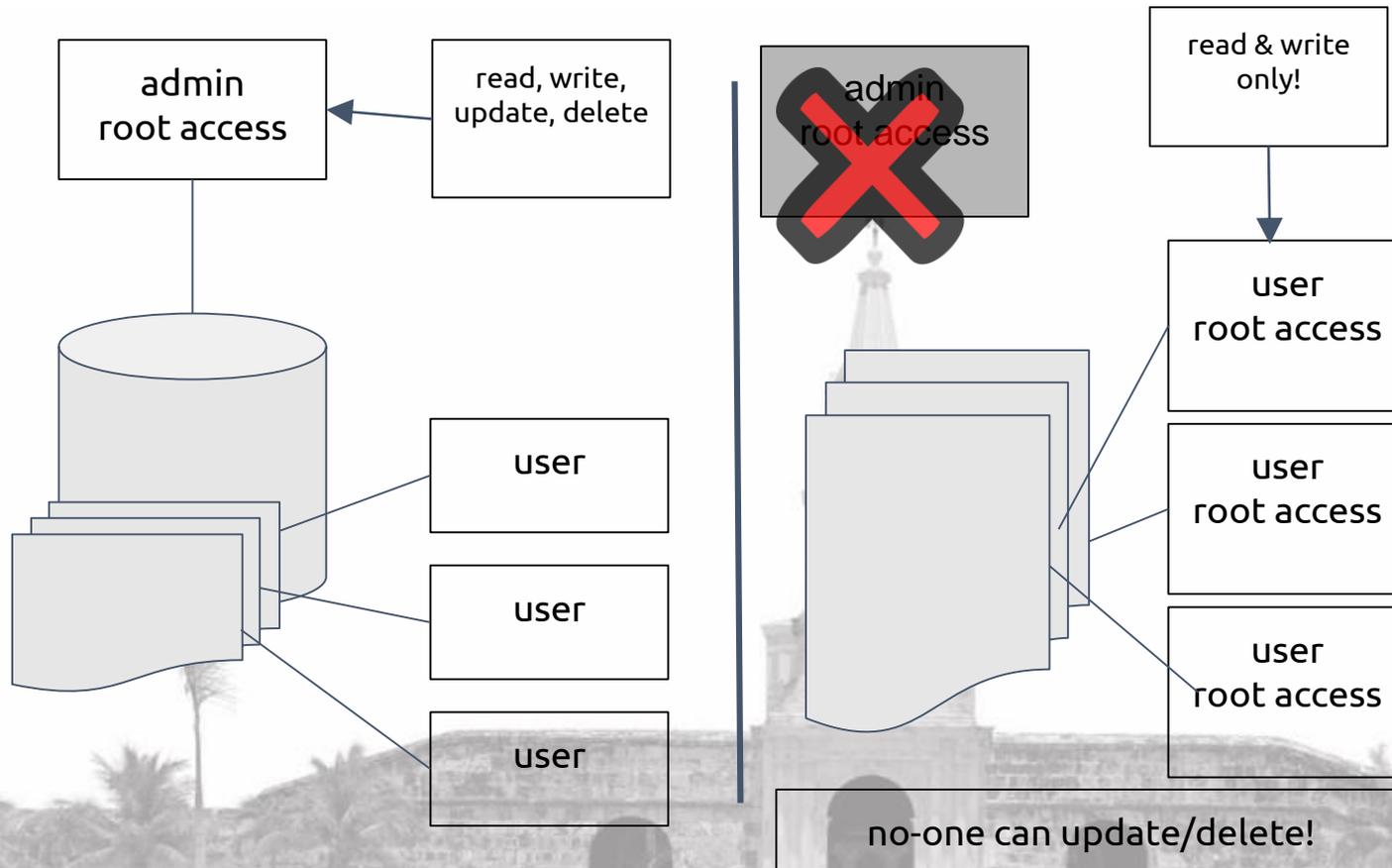
Colombia ….towards Blockchain

COLOMBIA 4.0 REVEALS EXPECTATIONS OF THE COLOMBIAN GOVERNMENT IN **BLOCK**CHAIN DEVELOPMENT

Posted by Diana Aguilar | Sep 29, 2017 | Events | 0 ⚫ | ★★★★★

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THE BLOCKCHAIN-SECURED PLATFORM FOR REAL ESTATE TRANSACTIONS.

Securely recording, tracking, and transferring of title. Increase transparency, reduce search time & fraud with our revolutionary Software-as-a-Service (SaaS) Platform.

ALPHA RELEASE: SUMMER 2016

Request Early Access

Republic of Georgia to Develop Blockchain Land Registry

Stan Higgins | Published on April 22, 2016 at 16:44 BST

🐦 332   f 5,991   g+ 8   in 48   🔴 1   ✉

Bitcoin mining company BitFury has inked a deal with the Georgian government to develop a system for registering land titles using the blockchain.

BitFury will help develop the platform for the National Agency of Public Registry (NAPR), an office of the Georgian Ministry of Justice. Economist Hernando de Soto will assist in the development of the platform. Today de Soto is set to give a lecture on related issues during an event in Georgia's capital, Tbilisi.

LATIN AMERICAN BITCOIN & BLOCKCHAIN CONFERENCE

COLOMBIA | 4 & 5 DE DICIEMBRE

COLBITEX
EXCHANGE COLOMBIANO DE BITCOIN

3. BITINKA/INKAPAY

bitINKA

Founded in 2013, Bitinka is a platform that facilitates bitcoin purchasing and selling across Latin America. Bitinka currently operates in Argentina, Bolivia, Brazil, Chile, Colombia, Spain, Peru, Venezuela, and the United States, and offers bitcoin trading in native currencies. The

SURBTC

SurBTC is a technology company that develops and operates services using bitcoin technology in Chile and Colombia. The bitcoin exchange recently raised $300K in seed funding, adding to the $100K the company already raised through CORFO, a business innovation incubator operated by the Chilean government.

SATOSHITANGO

Founded in 2014, SatoshiTango is an online platform that enables its users to buy and sell bitcoins. Users have the ability to pay through an international wire transfer or with local means of payment in Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru. With SatoshiTango, users can also pay any bill in Argentina with bitcoin.

SDG platform 2020 and Distributed ledger Technology
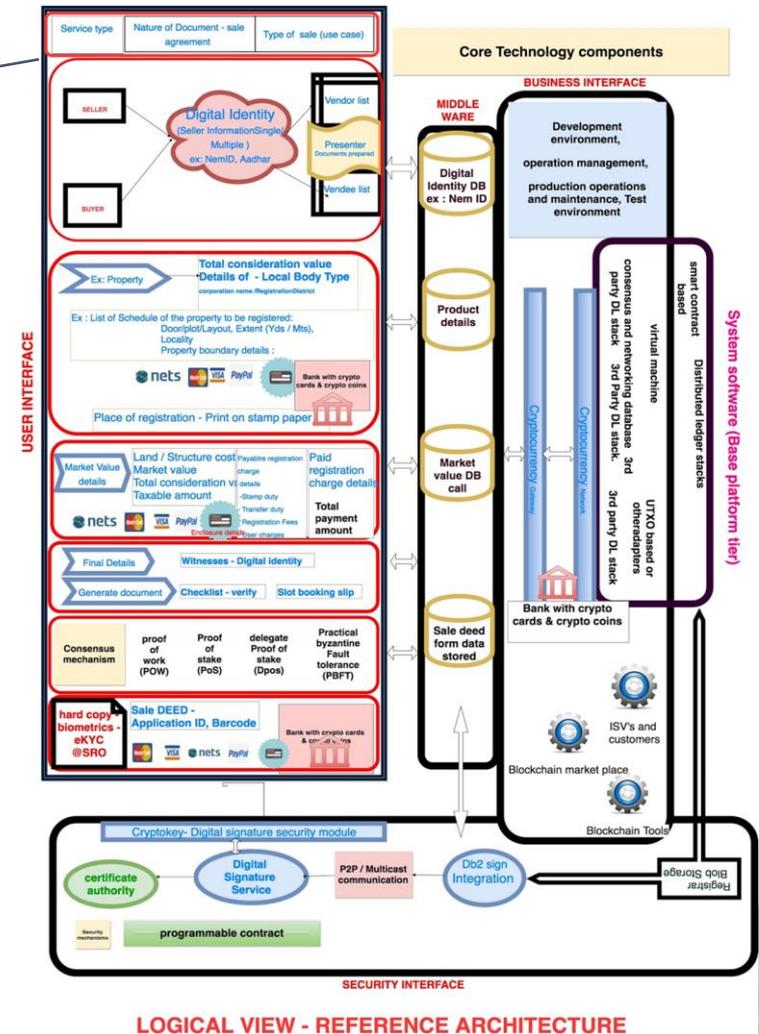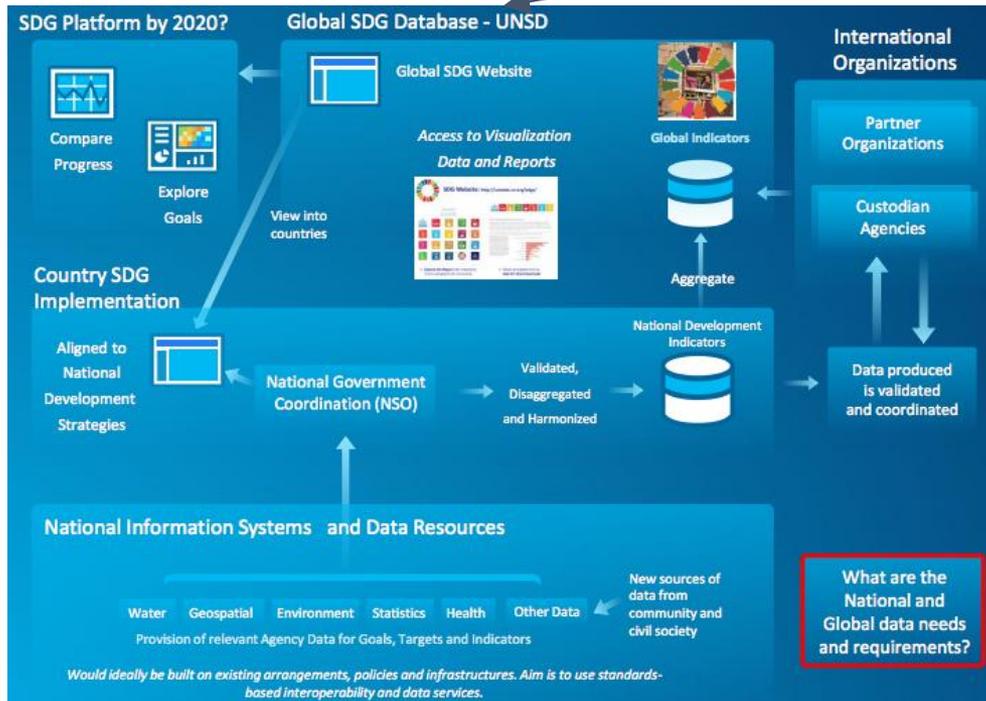
The Distribution and Integration of the Statistical datasets and Spatial Datasets are important to the formation of SDG platform.
National Mapping agencies must be sharing the data in a Distributed form - thinking "beyond Silos"

Perspectives on Smart Contracts

legal view

There are legal and contractual activities which can be automated or which cannot/should not.

legal contracts

smart contracts

distributed applications

Smart contracts are distributed applications with a legal binding result.
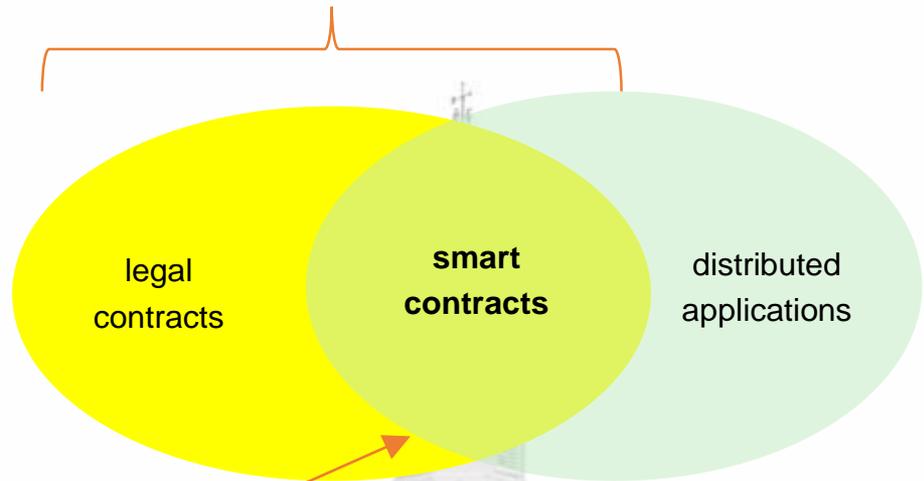
There are distributed applications with or without legal binding character.

technical view

Spatial database and Query

```
CREATE TABLE staging.mytable (
    id serial primary key
    , name char(10) NOT NULL
    , geom1 geometry(multipoint,3857)
    , geom2 geometry(multilinestring,3857)
    , geom3 geometry(multipolygon,3857)
    , geom4 geography(point,4326)
);
```
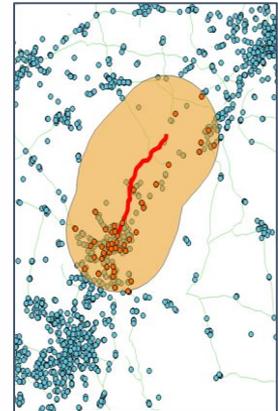


```
SELECT distinct r.id as rid, r.geom
as rgeom FROM ch01.restaurants As r
            INNER JOIN ch01.highways
As h
            ON ST_DWithin(r.geom,
h.geom, 1609*20)
WHERE r.franchise = 'KFC'
        AND h.name  = 'US Route 1'
        AND h.state = 'MD';
```

```
SELECT 123 as id,
ST_Union(ST_Buffer(geom, 1609*20)) as _geom
FROM ch01.highways
WHERE name = 'US Route 1' AND state = 'MD'
```

```
INSERT INTO staging.mytable (name, geom1, geom2, geom3, geom4) VALUES ( 'MyName'
    , ST_SetSRID( ST_GeomFromText('MULTIPOINT ((10 40), (40 30), (20 20), (30 10))'), 3857)

    , ST_SetSRID( ST_GeomFromText('MULTILINESTRING ((10 10, 20 20, 10 40),(40 40, 30 30, 40 20, 30
    10))'), 3857)

    , ST_SetSRID( ST_GeomFromText('MULTIPOLYGON (((40 40, 20 45, 45 30, 40 40)), ((20 35, 10 30, 10 10,
    30 5, 45 20, 20 35), (30 20, 20 15, 20 25, 30 20)))'), 3857)

    , ST_SetSRID( ST_GeogFromText('POINT(10 56)'), 4326)
```

# Cryptography - Secure Property

- public key:
  `1hvzSofGwT8cjb8JU7nBsCSfEVQX5u9CL`
- private key: `1E99423A4ED27608A15A2616A2B0E9E52CED330AC530EDCC32C8FFC6A526AEDD`
- only the one with the private key has the control of a resource. A private key can be converted into a public key, but a ▨ key cannot be converted back into a private key because the math only ▨s one way.
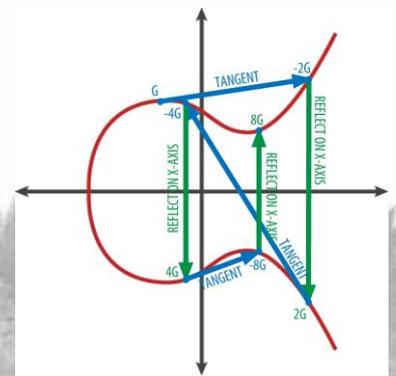
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Cost saving for a valuable property due to Smart contracts
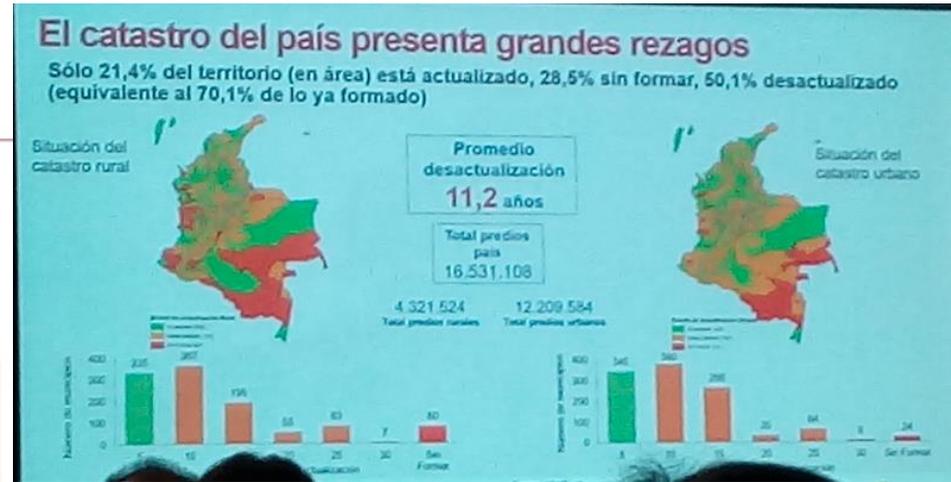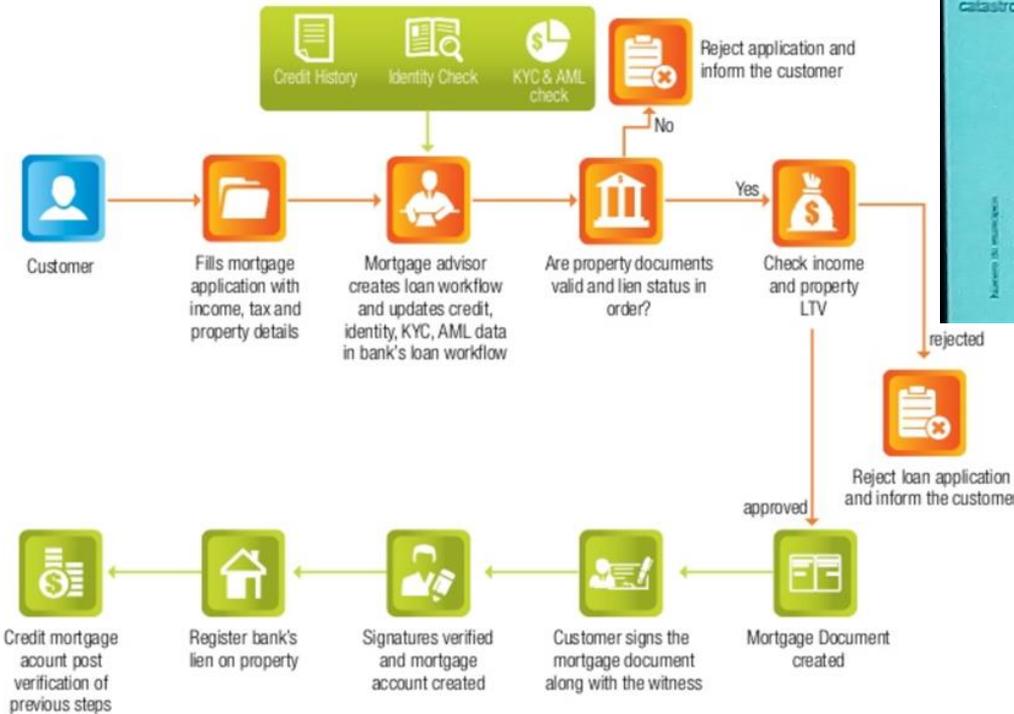
Calculation of the cost savings potential from the use of smart contracts in the US mortgage industry

El catastro del país presenta grandes rezagos
Sólo 21,4% del territorio (en área) está actualizado, 28,5% sin formar, 50,1% desactualizado (equivalente al 70,1% de lo ya formado)

Source : Mauricio Iregui - www.fig717.net

Libertad 1
[Universidad Sergio Arboleda]

Libertad 1 is the first Colombian satellite. It is designed and built by students of the Universidad Sergio Arboleda. The satellite was successfully deployed in orbit, but no signals were received.

Conclusion and further research

- **Location is seen as the fundamental element of single logical geographical view of the *Real estate Market study***
- **Spatial information is crucial to derive patterns not readily apparent to the observer by using Geospatial Information System and Technology (GIST).**
- **Geodesic grids of discrete cells to register land ownership using secure unique identifier on a blockchain -** It allows to create for more than a passive registry of entries or transactions..

Technology Convergence and Sharing Economy in Space

- A space-based, shared infrastructure connecting physical, digital and biological spheres for the 4th industrial revolution on a truly global scale could be possible by innovation through blockchain on Earth observatory operations.

standardized valuation of space resources - New Real estate markets?

- Common space currency and valuation methods and a methodology is developed to value space resources and the legal framework exists to recognize a claim.

Space resources (New Real estate market) basis for financing the development and also aid in terrestrial resource (Existing Real estate market) development for financing development of the resource itself.

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Contact

Dr Manohar Velpuri
Chair of Working group 9.2
Vice chair , Commission 9
FIG Office
Kalvebod Brygge 31-33
DK-1780 Copenhagen V
1)manohar.velpuri@gmail.com

Steven Nystrom
Chair of Commission 9
Commission 9
FIG Office
Kalvebod Brygge 31-33
DK-1780 Copenhagen V

Chin Yee Hoong
MIT Fintech specialist and
Geography Enthusiast from
University of London
Director - Absolutum Soleil,
Singapore

Dr Chetan Mariganti, FRM
Credit Suisse, Zurich, Switzerland
Email: chetan.maringanti@gmail.com

Anusha Pidugu
Director, Absolutum consultancy Pvt Ltd
USA
Email: anusha.chandrika@gmail.com

Dr Madhu Aman Sharma
Director, CEO, K2A Management incorporated
331, Elmonwood drive - #4-11Canada
Email: madhu.sharma@k2amanagement.com

Jyothsna Velpuri
IBM
email: jyothsnav@gmail.com

Working Group 9.2

- SG2 (Study Group 2) on "Use Cases" showed only limited results, extended to the III meeting of TC 307 (in about six months).

- A new WG2 on "Security, privacy and identity" on the following Technical Reports: „Overview of privacy and PII protection" – this will be led byUK , "Security risks and vulnerabilities" – this will be led by Japan „Overview of identity" N189 – this will be led by UK - (subject to ballot approvals)

- A new WG3 on "Smart contracts and their applications" (subject to a ballot) taking over from the previous SG4 on "Smart contracts". to begin "Overview of and interactions between Smart Contracts in blockchain and distributed ledger technology systems". NWIP ballot for a Technical Specification on "Legally binding smart contracts" . Australia as the Project Leader. If successful, a new WG (WG3) called „Smart contracts and their applications" and Germany as Convenor.

- A new SG6 on "Governance of blockchain and distributed ledger technology systems" - Denmark.

- A new SG7 on "Interoperability of blockchain and distributed ledger technology systems" - Canada as Convenor

- III meeting- in London, May 14-18, 2018. IV meeting- May 2019 and V meeting : November 2019. The exact dates and locations of the fourth and fifth meetings will be decided within 4 weeks.