

FIG  
2018  
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# XXVI FIG CONGRESS

6-11 May 2018, Istanbul

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Presented at the FIG Congress 2018,  
May 6-11, 2018 in Istanbul, Turkey



EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:  
ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES

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## Fintech for Geo-spatial Transformation and Real Estate Management

**Authors :** Rapporteur: Mr. **Manohar Velpuri**, Denmark

**TS01I: Technological Change in Land Administration, Valuation and Financial Technology**

Commission: 9

Chair: Mr. **Steven Nystrom**, United States

Disclaimer : The findings, interpretations and conclusions expressed herein this presentation are those of the authors and do not necessarily reflect the view of the organisations, sponsors, its Board of Directors or the governments they represent



## Introduction

## INDUSTRY 4.0

- Global geospatial policy framework
- Policies - Geospatial (global) - Industry 4.0
- Fintech and Geography
- UN system and FINTECH
- IMF - FINTECH (Tech timeline, Global Financial stability report, Fintech trends)
- Real estate markets - Access to credit
- Policy implications - FINTECH (Industry 4.0)
- Evidence of Fintech impacting Access to credit
- Blockchain -challenges and opportunities
- Enabling policies for FINTECH (UNECOSOC)
- Open and ISO standards Policy - NWIP
- Geospatial readiness index modified
- Further work

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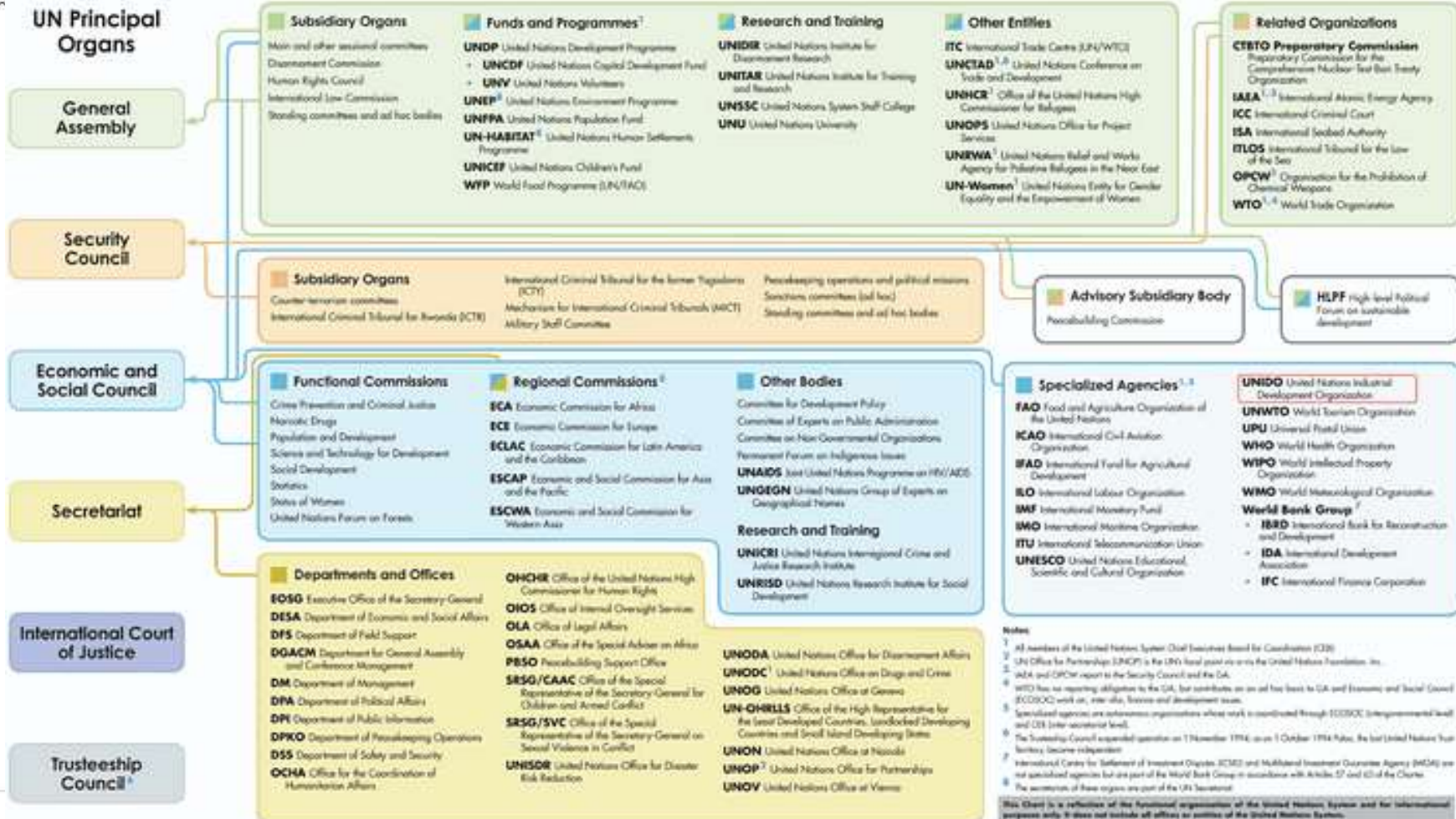


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Global development policy framework				
<b>The agenda for SD</b>	<b>2030</b>	<b>Sendai Framework for Disaster risk reduction 2015-2030</b>	<b>SIDS accelerated modalities of action (SAMA) pathway</b>	<b>Paris agreement on climate change</b>
				<b>Habitat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

**Geospatial policy framework ::**

**2017-2021 Strategic Framework**

CONTEXT	VISION	<i>Positioning geospatial information to address global challenges</i>				
	MISSION	<i>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</i>				
	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

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# Policies - Geo spatial



- China's geospatial policy is in parliament for approval
- USA submit- National geospatial bill (2018) parliament with higher maturity.
- Geospatial policies in place - USA, Canada, European Union (Norway, The Netherlands (Spatial planning Environmental protection Act), Finland, Sweden), Thailand, South Korea, New Zealand, Philippines, Nigeria, Ghana
- Japan, Indonesia, Switzerland, Germany, Russia geospatial legislation/rules regulations aiming for more maturity. (Sanjay 2017) .
- UK announced for Geospatial Data commission in 2017.
- India has 2 draft bills -
  - 1) ISRO's space activities bill 2017
  - 2) Geospatial information regulation bill 2016.
- Malaysia proposed National Geospatial Master plan 2018.
- HLPF, Mexico (Nov 2017) - 64% of countries need policies on ppp for commercial adoption of Geospatial information & technology for economic



growth



# FINTECH AND GEOGRAPHY

## DNA bases of Fintech

- Redefining accounting for value
- Higher competition
- Efficiency, speed and automation
- Risk management and diversification
- Transparency, accountability and collaboration
- Access and decentralization



## DNA bases of Sustainable Development

- Intergenerational
- Social, economic and environmental resilience
- Circularity
- Natural resource productivity
- Solidarity
- Inclusive prosperity

~ 15 unintended consequences that can be grouped into eight structural and seven transitional types

FINTECH'S UNINTENDED CONSEQUENCES



**DNA double helix analogy - fundamental attributes of fintech sustainable development, as information is coded, processed, interpreted and stored in the 2-way interactions between the real economy and the financial system.**

**FINTECH Disruptions - core functions (financial systems)**

- Moving value
- Storing value
- Lending value
- Exchanging value
- Funding and investing in value creation
- Insuring value and managing risk

# UNSYSTEM and Fintech - Blockchain

## Proof of Concepts and Scale up

UN Entity	Description	Source :
UNDP	Remittances, Car Fleet Mgmt., considering fund transfers and tracking	
WFP	Blockchain backbone for a variety of use cases, current application to cash based transfer programmes	
UNCTAD	Teamed up with Alibaba Group co-founder for planned “e-Trade for All” application	

## Events and Workshops

UNWOMEN	Blockchain Hackathon event
UNICRI	Emerging Technology & Security
ITU	Security Aspects of Blockchain
DESA	RemTech Awards
UNODC	Cryptocurrency Investigation Train-the-Trainers

## Publication Investments

UNEP	Fintech and Sustainable Development Assessing the Implications
UNECE	Blockchain White Paper
UNOPS	Unite all UN Agencies, Funds and Programmes working on their own Blockchain projects
OCHA	Prospects for Blockchain-based Settlement Frameworks as a Resolution to the Threat of De-risking to Caribbean Financial Systems
	How Can Cryptocurrency and Blockchain Technology Play a Role in Building Social and Solidarity Finance?
UNICEF	Blockchain for Humanitarian Sector: Future Opportunities

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## 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

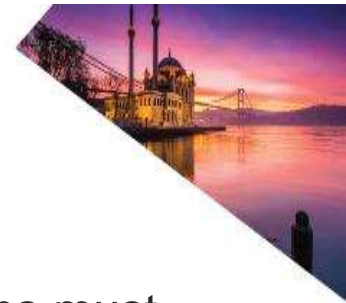
**Source : ISRO Annual report 2016-2017**







# IMF - Fintech



Crypto-assets exemplify why policymakers and international institutions must coordinate more closely than ever. Cooperation and coordination are needed to meet every aspect of the fintech challenge

Crypto-assets / cryptography, cloud computing, and AI/ML offer opportunities to improve financial services (“regtech”), financial supervision (“suptech”), financial inclusion (“edtech”), and central banking

The market capitalization of crypto-assets reached more than \$900 billion early this year – a five-fold increase over the last year.

There are now about 1,600 types of crypto-assets being traded worldwide. In 2017, there were 880 Initial Coin Offerings, which raised about \$6 billion—a vast increase over the previous year, when there were only 43 ICOs, which raised just \$95 million. (Tobias Adrian, 2018)

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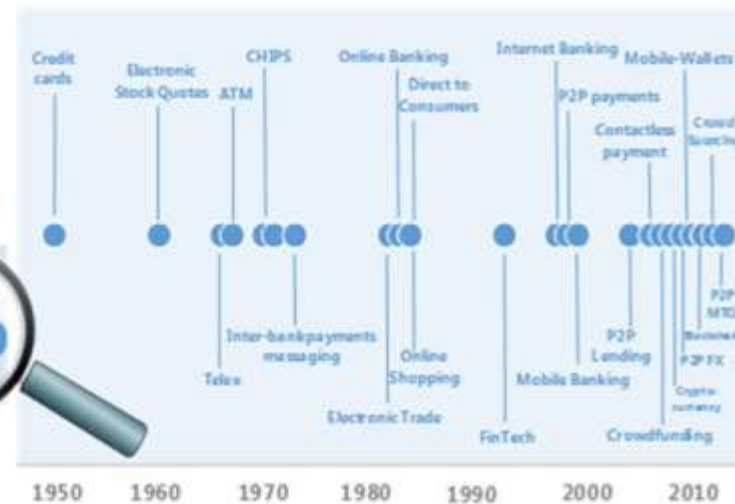
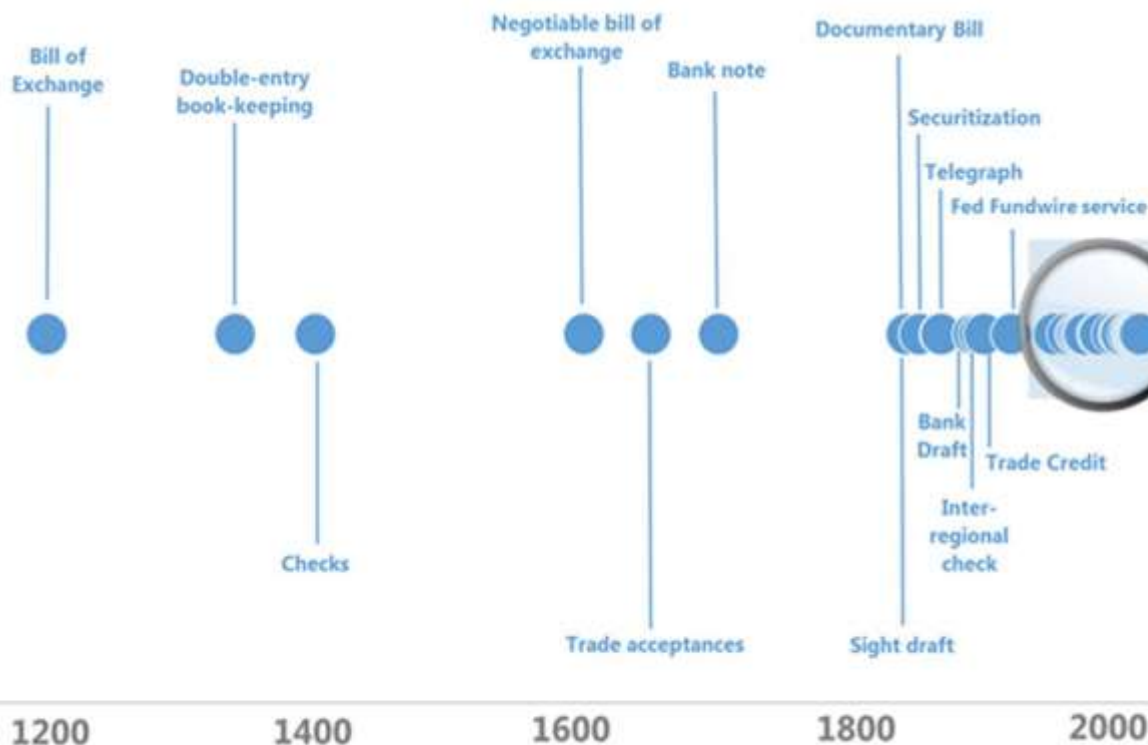
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# Innovations - Inclusion



Fintech and Financial Services: Initial Considerations, IMF staff discussion note 17/05

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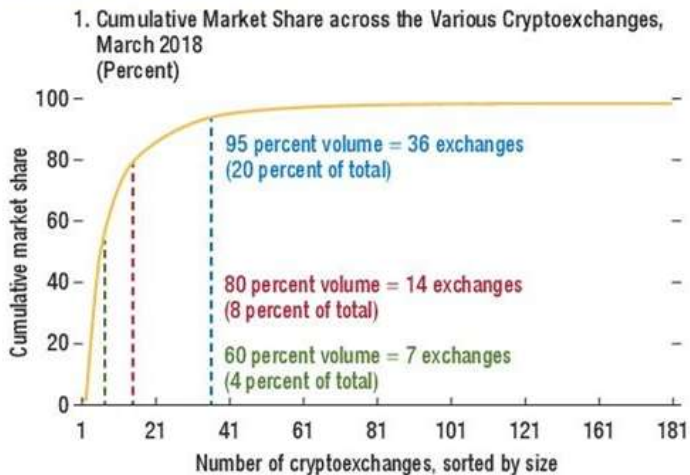
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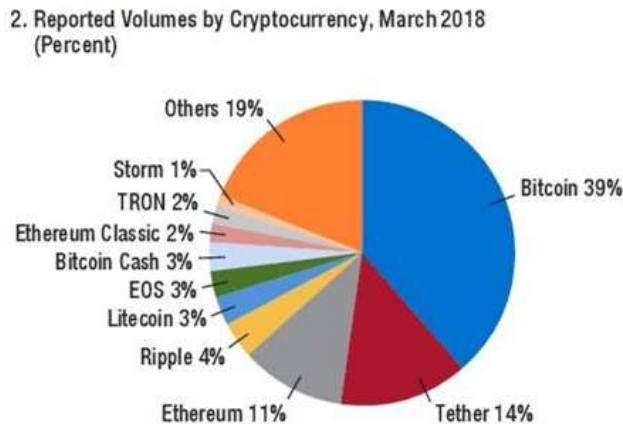
# Crypto Assets (Currency)

Figure 1.14. Share of Trading Volumes across Exchanges, Crypto Assets, and Fiat Currencies

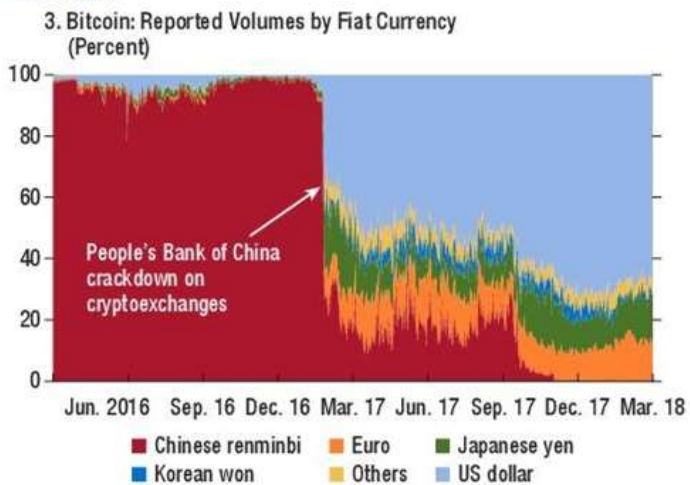
Trading volume is highly concentrated, with 80 percent of volume traded on just 14 exchanges.



Volume share across crypto assets is led by Bitcoin, Ethereum, Ripple, and Tether.



Composition of reported volumes has shifted away from the Chinese exchanges.



Bitcoin futures volumes remain low.

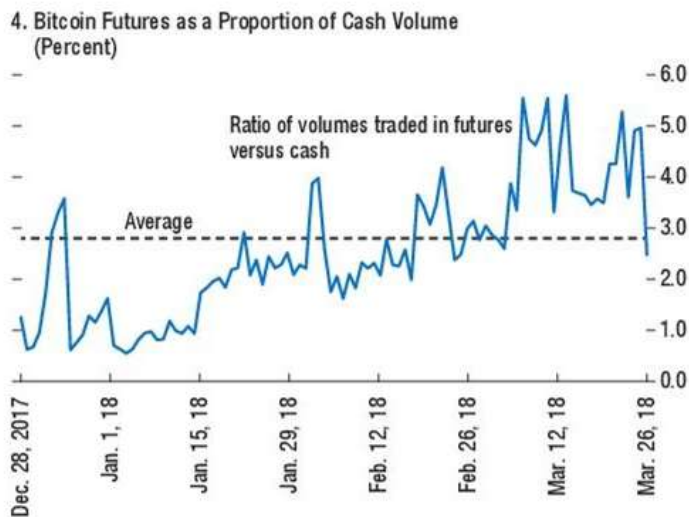


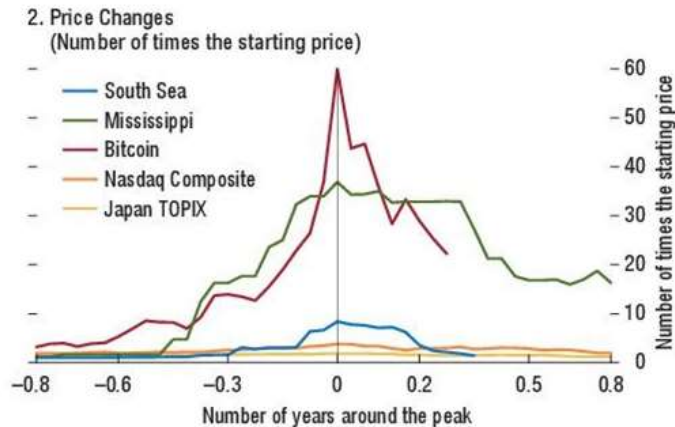


Figure 1.13. Crypto Assets: Size, Price Appreciation, Realized Volatility, and Sharpe Ratio

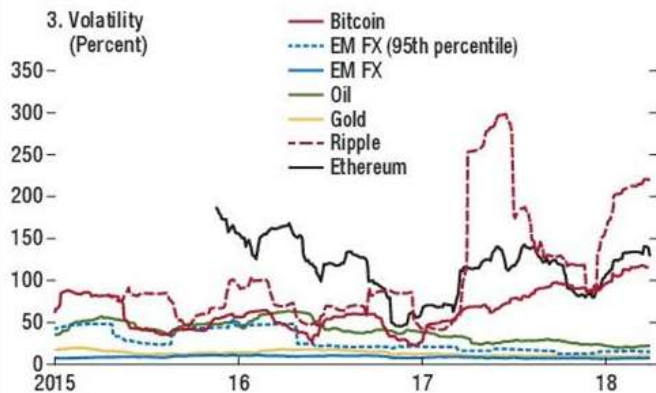
Crypto assets account for a small fraction of G4 central bank balance sheets.



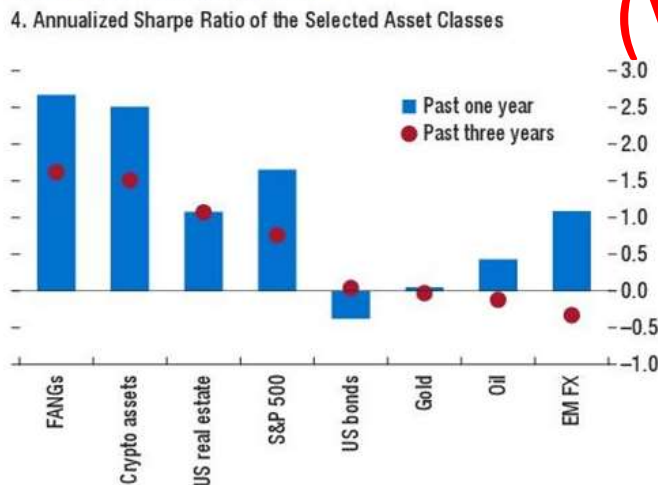
Comparison with historical bubbles.



Bitcoin's realized volatility is much higher than that of other asset classes.



Risk-adjusted returns of crypto assets have not dramatically exceeded those of other mainstream assets.



Crypto Assets (Volatility)

Sources: Bloomberg Finance L.P.; CoinDance; CoinMetrics; European Central Bank; Haver Analytics; national central banks; Yale International Center for Finance; and IMF staff estimates.

Note: Panel 3 is based on 90-day realized volatility. In panel 4, crypto assets is an average across Bitcoin, Ethereum, Litecoin, and Ripple. The Sharpe ratio is the average return earned in excess of the risk-free rate per unit of total risk. EM = emerging market; FANGs = equal-weighted index of highly traded stocks of technology and tech-enabled companies such as Facebook, Amazon, Netflix, and Alphabet's Google; FX = foreign exchange; G4 = Group of Four (euro area, Japan, United Kingdom, United States); TOPIX = Tokyo Stock Price Index.

# Factors contributing to Real estate markets



Factors contributing to better property markets

Source : International property markets scorecard methodology by Center of International Private Enterprise (CIPE) and International Real Property Foundation (IRPF)

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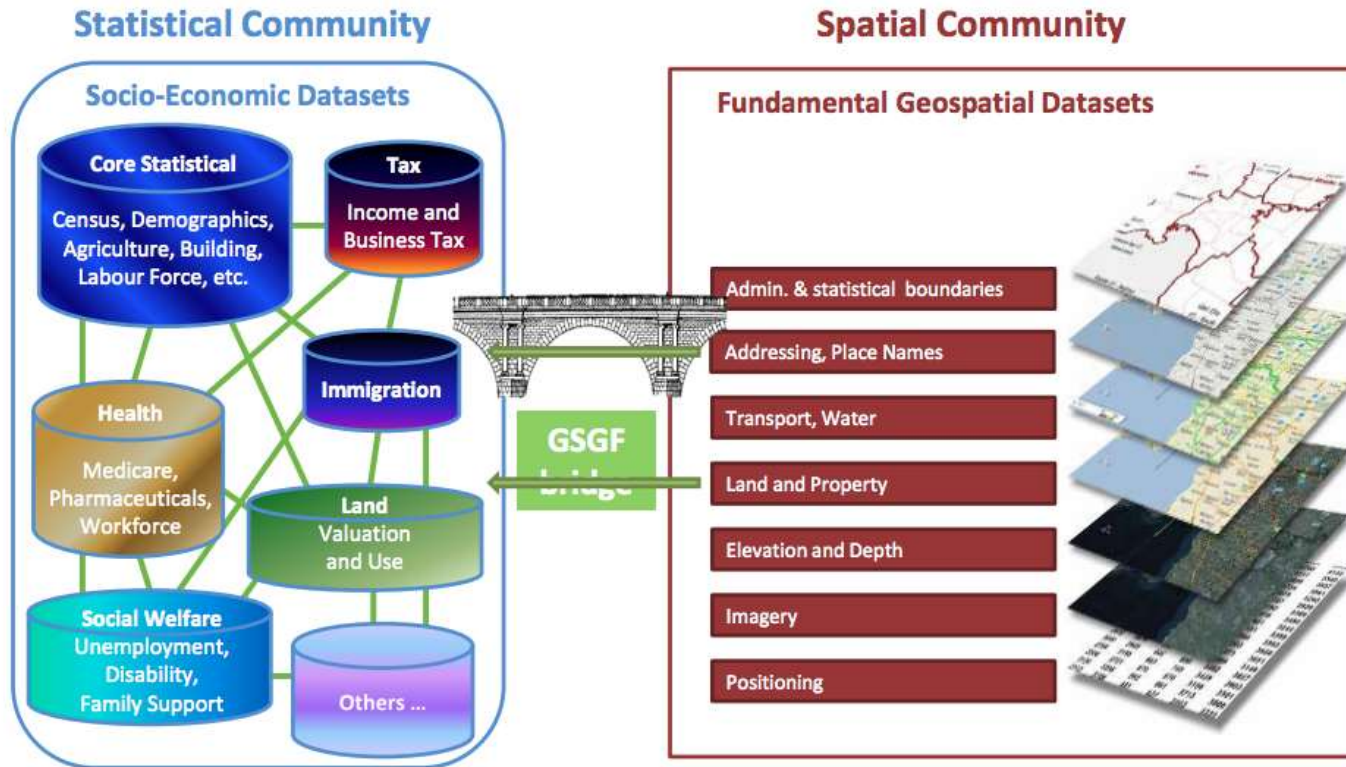
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# Bridging between two communities



*Source : UNECE summary report of workshop on integrating statistics and geospatial standards and models  
Martin Brady Co-Chair UN Expert Group for the Integration of Statistical and Geospatial Information*

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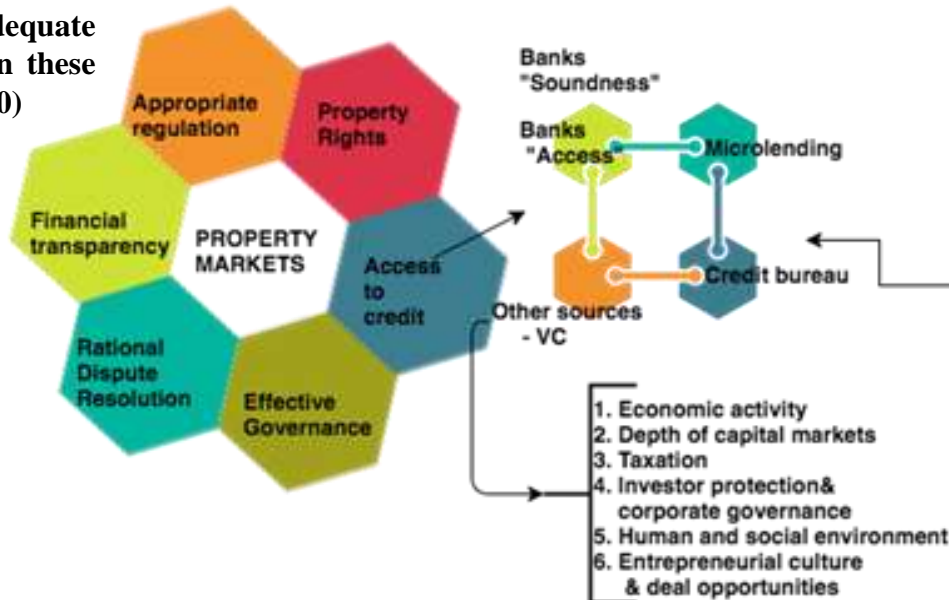
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# Parameters of Access to Credit

The credit gap is very high in the regions Africa and Asia with over-59% requirement and this can be also correlated to lack of adequate number of credit bureaus in these regions (Stein, Peer et al 2010)



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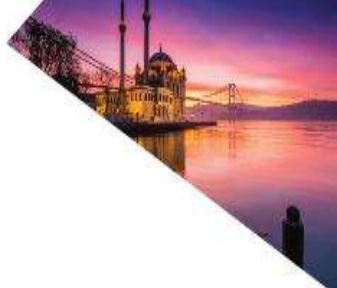
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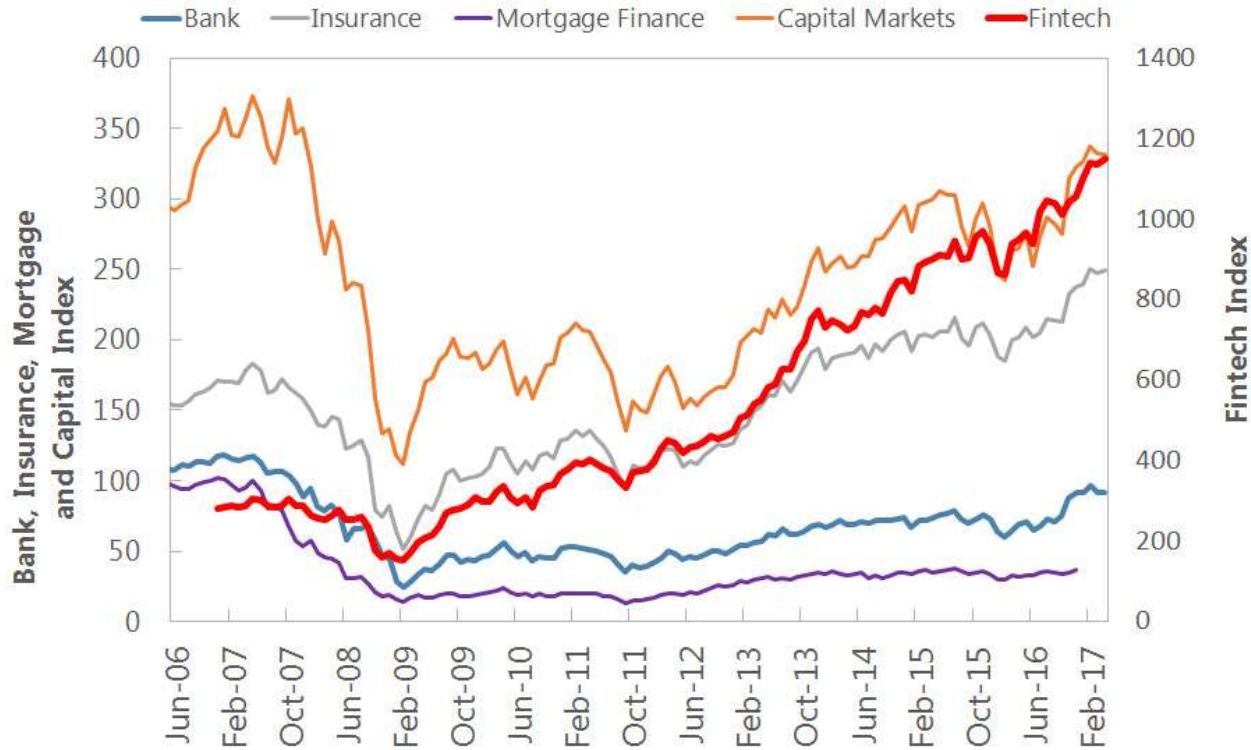
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# Fintech vs Capital markets



## Stock Market Index of Financial Services



Source : Fintech and Financial Services: Initial Considerations, IMF staff discussion note 17/05

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# Fintech Firms and Services

Services	Financial institutions	Central Banks	Fintech firms
Regulation			
Back-office operations			
Currency and payments			
Lending			
Insurance			
Savings			
Advice			

Source : Fintech and Financial Services: Initial Considerations, IMF staff discussion note 17/05

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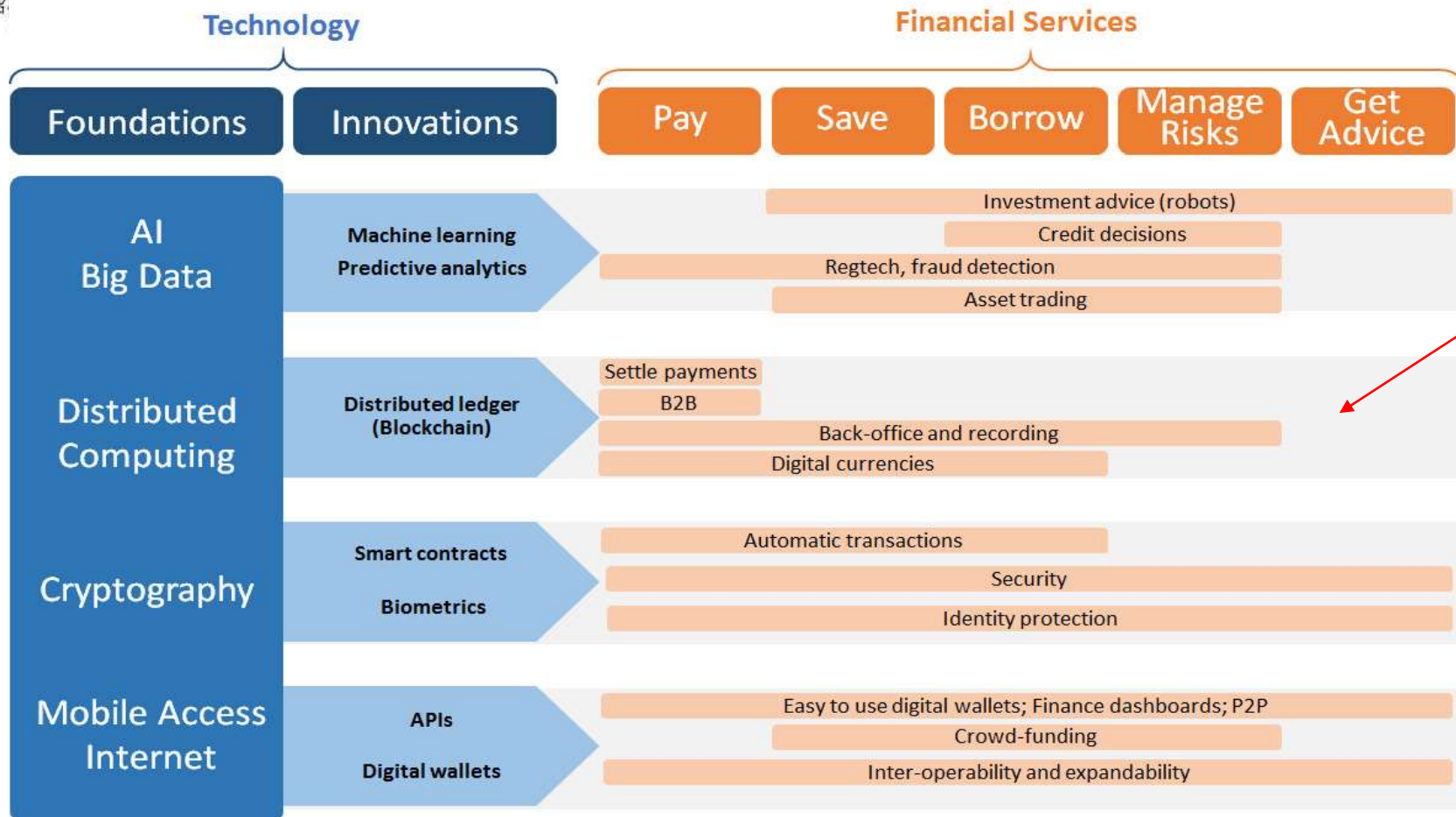
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# Fintech vs Financial services



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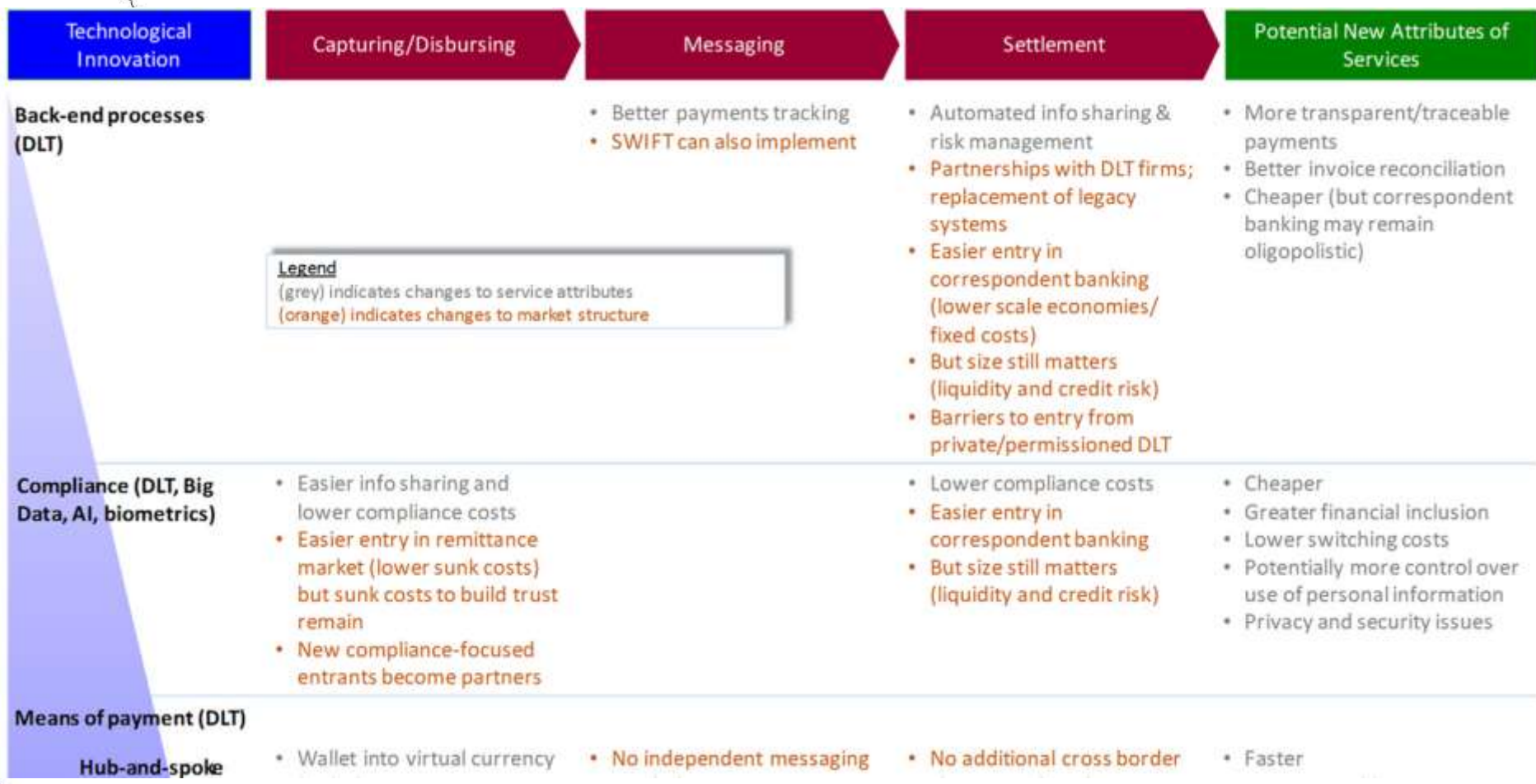
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# Fintech initial considerations



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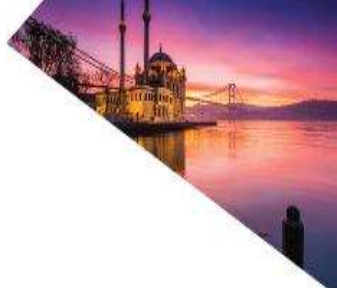
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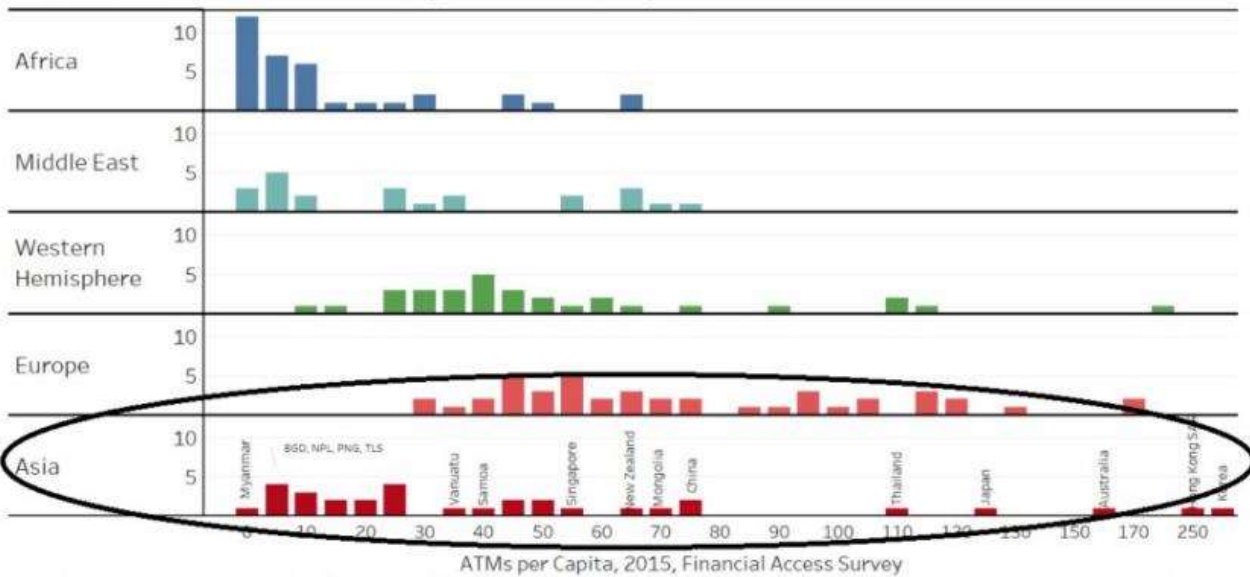
Source : Fintech and Financial Services: Initial Considerations, IMF staff discussion note 17/05



# Wide disparities across Asia-Pacific...



Distribution of ATMs per 100,000 People in 2015  
Y-axis shows number of countries at given level of ATMs / Financial Inclusion

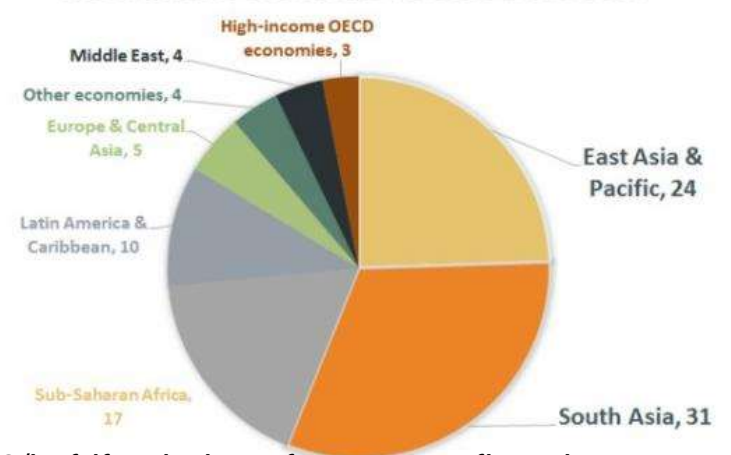


**But many remain unbanked.**

Adults who are excluded from the financial system

**2 Billion**

THE WORLD'S UNBANKED ADULTS BY REGION





# Fintech services - Disruption



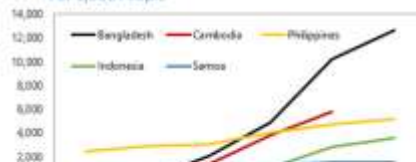
Chinese fintechs have reached a disruptive tipping point

Percentage of banking/financial customers using FinTech services



## Bangladesh

Number of Mobile Money Transactions Per 1,000 People

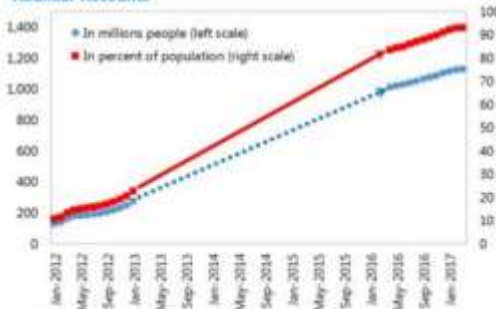


Mobile financial services, agent based banking and upgrading financial architecture have bolstered

have taken a more holistic approach to financial inclusion, with greater use of digital technology.



Aadhaar Accounts



Source: Unique Identification Authority of India (UIDAI).

Number and Balances of PMJDY Accounts



Source: PMJDY.

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# Industry 4.0 - Policy implications



## Policy Implications



**Social experimentation** between public & private sector to **innovate** and solve local problems.



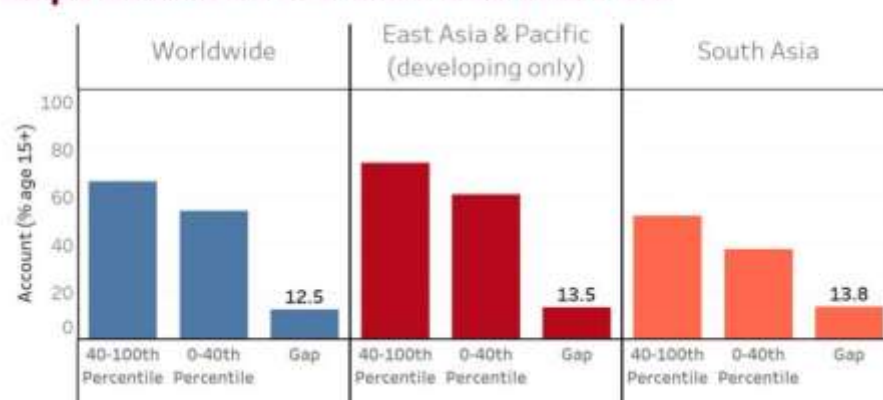
## Policy Implications



Infrastructure investment, particularly **technology infrastructure**

...and gaps within countries

## Gaps Between the Rich and the Poor



Improve **financial literacy** for **technology** to **empower** people with the benefits of technology



**Better and broader data** on fintech

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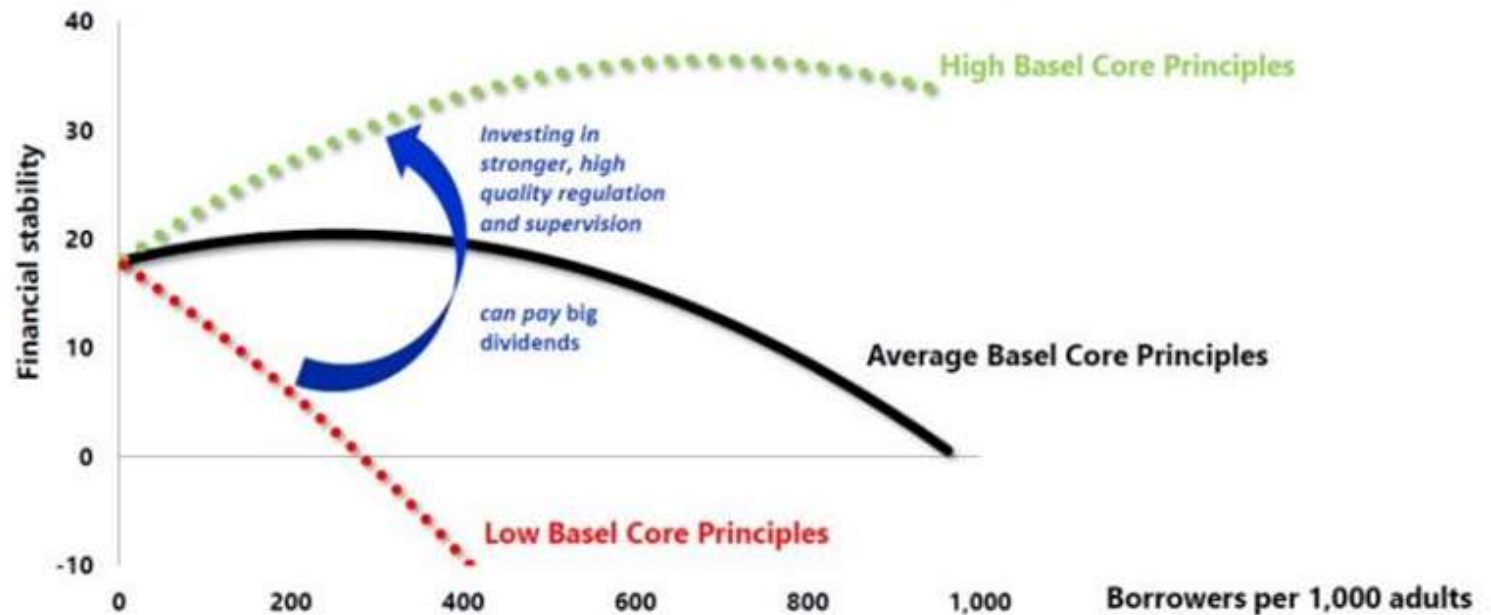
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# Policy Implications

Need right balance for FinTech regulations:  
**Innovation & Stability**



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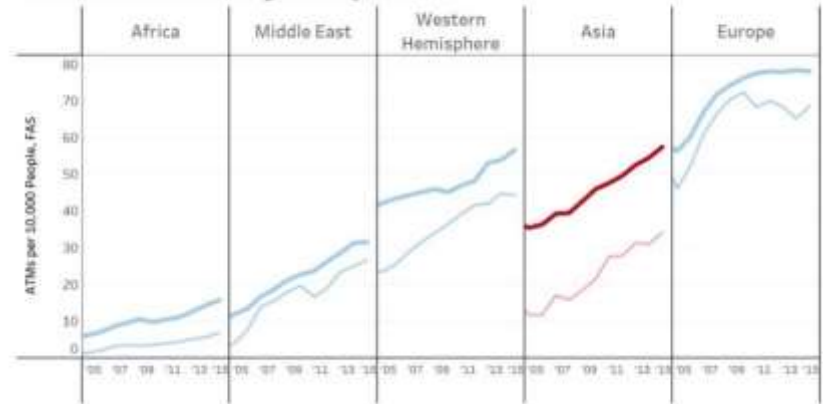
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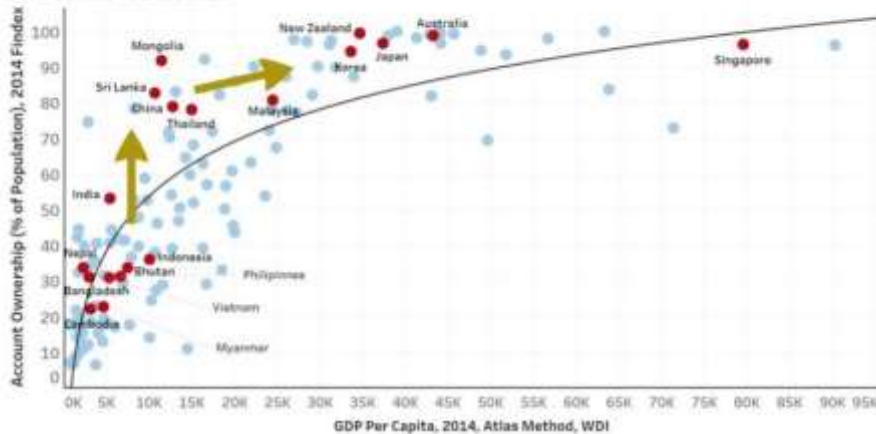
## Rapid Progress Globally

Financial inclusion has been Growing, Particularly in Asia



## Financial Inclusion Arc

Income & Financial Inclusion



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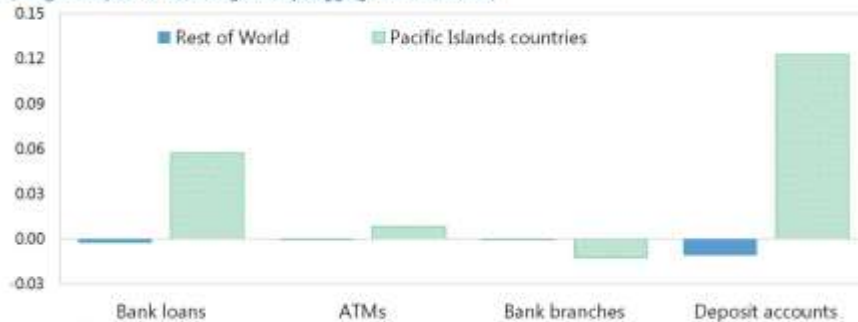


# Evidence

Leapfrogging has a **positive impact** on traditional banking services in Pacific Island Countries (*green bars*).

### Technology Leapfrogging and Financial Inclusion

(marginal impact of technological leapfrogging on FI outcomes)



Sources: FAS, WDI and Staff Estimates

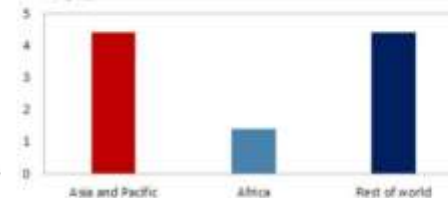
Leapfrogging



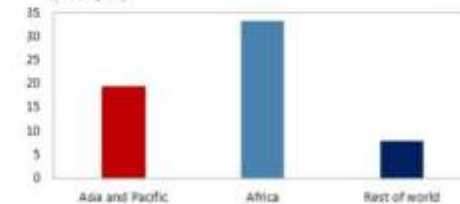
## Initial Evidence - Technology Supports Inclusion

**Increased technology** is linked with an **increase in access** to financial services

**Impact of Cellphone Access on Financial Inclusion**  
(impact of 1% increase in access on deposit accounts per capita)



**Impact of Internet Access on Financial Inclusion**  
(impact of 1% increase in access on deposit accounts per capita)



Source: "Financial Inclusion in Asia-Pacific" (IMF, 2017: Forthcoming)

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## Blockchain - Challenges

- A reduction in evidential quality or loss of access to blockchain records  
= >negative impact on transparency and public accountability  
= deprive entitlement to land.
- Human rights may be violated if exposes personally identifiable information
- Reliance upon volatile publicly traded cryptocurrencies for record keeping solutions => subject country to exchange rate & other financial risks.

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## Blockchain - Challenges

### Financial risks :

- a departure from traditional centralized operating models (in-house DB) and costs to acquire or develop DB are amortized over years, or, alternatively, where a fixed price service contract has been negotiated with a service provider for a regular fee for service.
- Price fluctuations of cryptocurrencies relative to the national fiat currency
- Price may be subject to forces completely outside of national control(e.g., rapid price increases, price volatility, and periods of illiquidity).
- Challenge : network users will be to model the future expected value of any cryptocurrency underlying a solution, which may be difficult to do given current low levels of understanding about the factors affecting price (relative to other currencies)

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## Blockchain - Opportunities

- Standards to model the cost of supporting a given blockchain-solution (relative to the cost of more traditional approaches) at different exchange rates in order to identify relative costs and value.
- Standards to implement solutions that do not rely upon an underlying cryptocurrency for the recording of transactions, assuming they can achieve the same level of system functionality.
- Standards to allow if and how to integrate functionality for payments of deposits and fees, since the ability to handle such aspects of transactions natively would be lost - efficiency through DLT
- Standards to support payments - that allow network participants to create their own “permissioned network use only token” representing and/or convertible at a rate fixed to the jurisdiction’s fiat currency - reduce forex risk due to public trading of crypto currencies.

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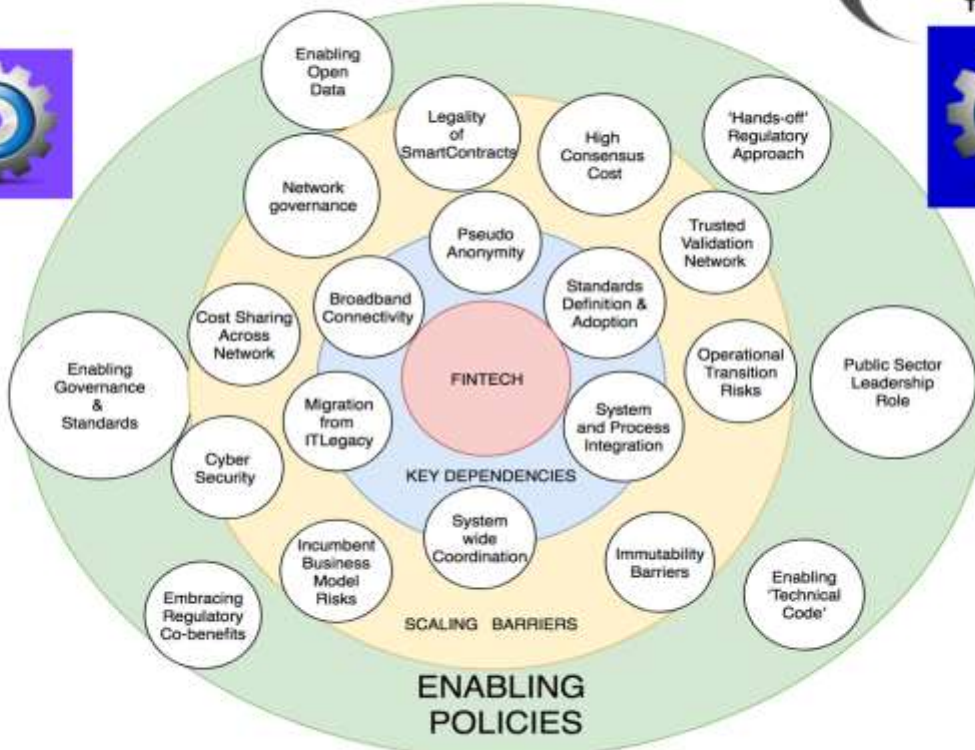
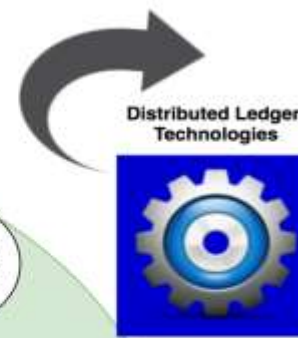


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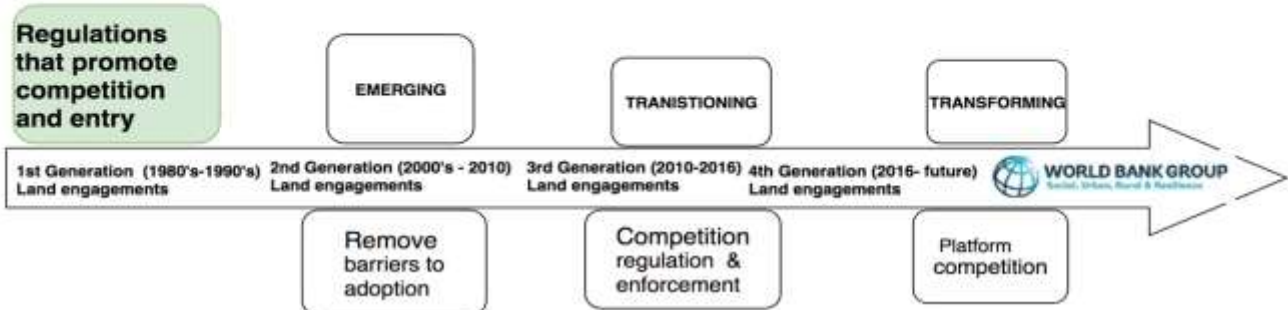
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## Enabling policies of Fintech - Barriers and key experiences

“At present, crypto assets do not appear to pose risks to financial stability. However, regulators should be vigilant to the potential for financial stability challenges that could arise should crypto assets be used more widely” - IMF Global Financial stability report 2018



(Modified version Source : UNEP 2016, World bank 2016)



# 7th session of UN ECOSOC (Jul-Aug 2017)



*“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.”* **FIG a ‘member’ of the GGIM Geospatial Societies is in liaison with both ISO TC 211 and ISO/TC 307 and FIG Commissions 3, 5, 7 and 9 express their interest in supporting this effort.**



<http://ggim.un.org/meetings/GGIM-committee/>

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**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





# ECOSOC forum - financing for development 23–26 April 2018

*Follow-up and review of the financing for development outcomes and the means of implementation of the 2030 Agenda for Sustainable Development E/FFDF/2018/2  
Financing for development: progress and prospects - Note by the Secretary-General*

Technological advances also pose risks in relation to illicit financial flows. The potential for anonymity with the use of new technologies, such as blockchain technology and digital currencies, can heighten the risk of illicit finance. Member States can strengthen regulations on markets that contribute to the illicit movement of resources. International cooperation on the return of stolen assets is mandated by the United Nations Convention Against Corruption. More investments could be made in the human and technical resources necessary to speed up the return of assets."

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## ISO standards & Policy Jul-Aug 2017

From the report of the UN Secretariat - Implementation & adoption of standards for the GGI community, E/C.20/2017/8/Add.1 - “ The Charter for the Land Administration DWG was presented at the side meeting of the Expert Group on LAM at the IV HLF on UN-GGIM in April 2016, Ethiopia. Following its approval at the OGC’s 99th Technical Meeting in June 2016, the DWG has formed a direct liaison with ISO/TC 211 & Expert Group to ensure shared goals are developed and the work programs of both groups are synergistic. As a result of this liaison, a joint meeting was held in Delft, The Netherlands in March 2017.

The event consisted of a 2-day Expert Group meeting ([http://ggim.un.org/Delft\\_Meeting.html](http://ggim.un.org/Delft_Meeting.html)) followed by 2 days of technical focus on the Land Administration Domain Model (LADM) with the following preliminary actions identified:

- (a) FIG to make a NWIP to ISO/TC 211 to initiate a review of the LADM;
- (b) ISO Stage 0 – project, given potential broad scope;
- (c) OGC Innovation Program prototyping capabilities to potentially be utilized;
- (d) Global Land Tool Network (GLTN) support for developing countries; and
- (e) To be in collaboration with FIG, ISO/TC 211, OGC, World Bank, TUDelft, Kadaster, UNGGIM, GLTN, Royal Institute of Chartered Surveyors (RICS), and others ISO/TC 211, in collaboration with the OGC and FIG, has initiated the review of ISO 19152 Land Administration Domain Model (LADM).

The review will also take into account the requirements from the United Nations Division for the Ocean Affairs and the Law of the Sea (UN-DOALOS) and IHO. The use of Blockchain technology with geospatial information continues to strengthen, therefore ISO/TC 211 has established a liaison with ISO/TC 307 Blockchain and Electronic Distributed Ledger Technologies

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## ISO TC 307 - Need for NWIP

UN Secretariat - Implementation & adoption of standards for the GGI community, E/C.20/2017/8/Add.1 - “ The Charter for the Land Administration DWG was presented at the side meeting of the Expert Group on LAM at the IV HLF on UN-GGIM in April 2016, Ethiopia.

- (a) FIG to make a NWIP to ISO/TC 211 to initiate a review of the LADM;
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# Road Map for Open standards in the backdrop of ISO TC 307

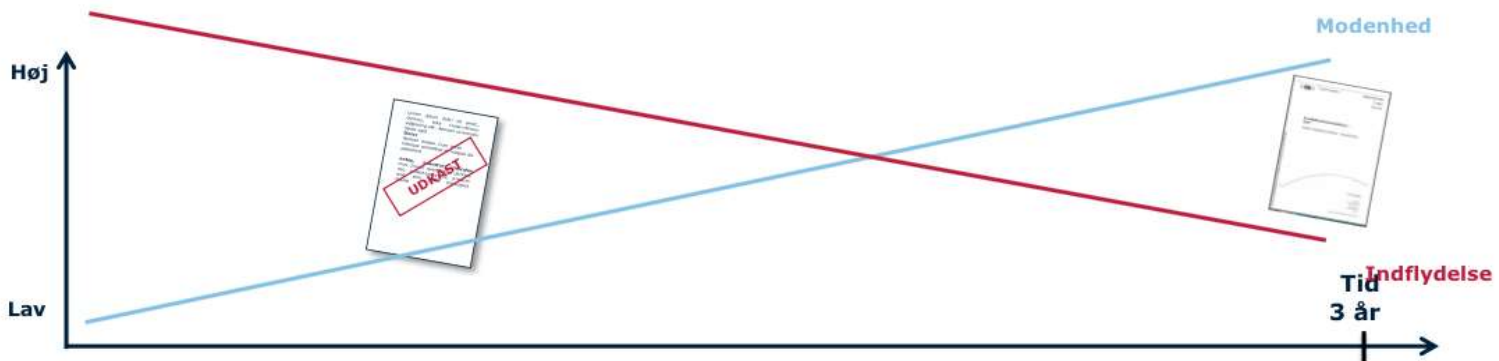
Publicly available;  
 Unencumbered by patents & other intellectual property;  
 Anyone can download and use the standard (non-discriminatory);  
 No license fees; Vendor neutral  
 Data neutral;  
 Agreed to in a consensus decision making process;  
 No single entity controls the standard.

Geospatial world

**Facilitators**  
 Standards  
 Opendata  
 Interconnected systems

- Internet of Things
- Artificial intelligence
- Distributed ledger Technologies
- Cloud, Bigdata
- Wireless and Broadband

Dokument forkortelse:	<b>PWI</b>	<b>NP/NWIP</b>	<b>WD</b>	<b>CD</b>	<b>DIS</b>	<b>FDIS</b>	<b>ISO</b>
Dokument navn:	<b>Preliminary Work Item</b>	<b>New Work Item Proposal</b>	<b>Working Draft</b>	<b>Committee Draft</b>	<b>Draft International Standard</b>	<b>Final Draft International Standard</b>	<b>International Standard</b>



# Geospatial readiness index (CGRI) Modified

"The Indian NSDI story began with a directive issued by the Department of Science and Technology in 2000. Since then, the country has moved towards the formulation of a geoportal in 2008 which complies with OGC standards and hosts OGC compliant metadata. India's space agency, the Indian Satellite Research Organization (ISRO), has enabled a satellite-based regional positioning system called NAVIC and augmentation system called GAGAN. Bhuvan and Naksha platforms, geospatial data and information is made freely available to the citizens of the country"  
- Geobuiz 2018 report

## STANDARDS - Interoperability, Redundancy & Evolution

### Geospatial (GS) Data infrastructure :

- GSDI
- platforms and Portals
- Positioning infrastructure

### Enabling Policy framework:

- GS
- Open data
- Space-GNSS
- Science Tech

### User Adoption level:

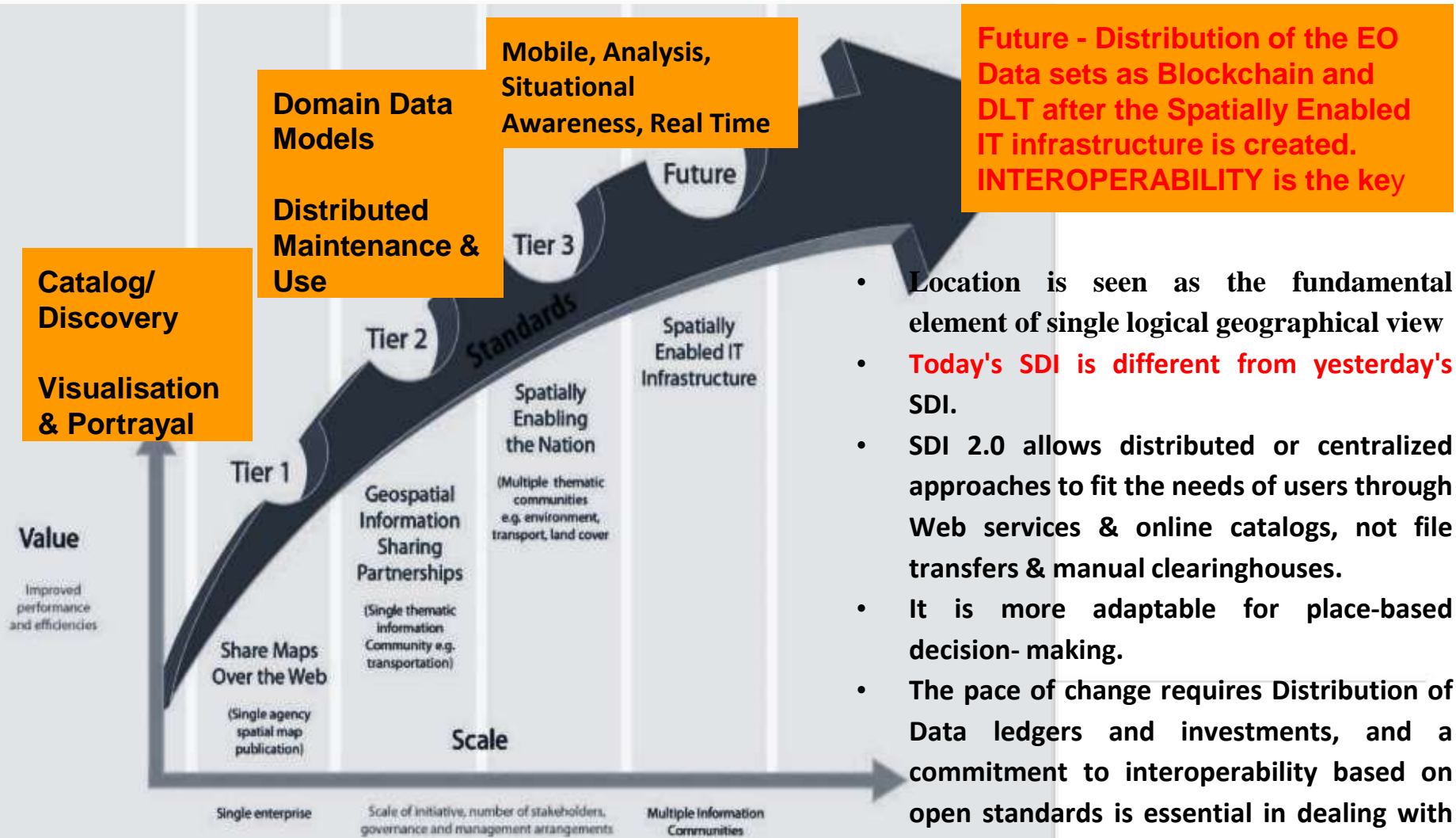
- Mapping
- Asset management
- System integration
- Enterprise

### Industry capacity:

- Capacity
- Incubation
- Associations



# SDI 2.0 and Blockchain



- Location is seen as the fundamental element of single logical geographical view
- **Today's SDI is different from yesterday's SDI.**
- SDI 2.0 allows distributed or centralized approaches to fit the needs of users through Web services & online catalogs, not file transfers & manual clearinghouses.
- It is more adaptable for place-based decision- making.
- The pace of change requires Distribution of Data ledgers and investments, and a commitment to interoperability based on open standards is essential in dealing with this transition.



## Future works

A proposal for the Geospatial industrial council will be to be setup with a vision - to advance the geospatial industry globally.

The objectives are

- 1) to create collective shared value for entire ecosystem and network
- 2) Co-create and strengthen the geospatial value by partnership with governments, regional entities and civil society
- 3) Think laterally, position consciously and grow collectively to advance the role of geospatial industry.

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- Regulation does offer an answer to - Distortions, Market abuse, Excessive Arbitrage, Risk of contagion
- Regulation is essential - Consensus, Consistent application and contain - cross sector growth and cross border growth of crypto assets.
- consensus within the global regulatory community about what crypto assets are—for example, a security or a currency
- Nimble, Innovative, Collaborative.
- National authorities and international standard setters are encouraged to intensify cooperation on the monitoring of crypto assets and on the consistency of the regulatory approach
- “At present, crypto assets do not appear to pose macro critical financial stability risks Preventive measures such as reporting requirements, customer due diligence, and transaction monitoring could be employed to ensure that crypto assets provide similar safeguards to traditional money against money laundering and the financing of terrorism.” - IMF

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EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:  
ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES

6–11 May 2018, Istanbul

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