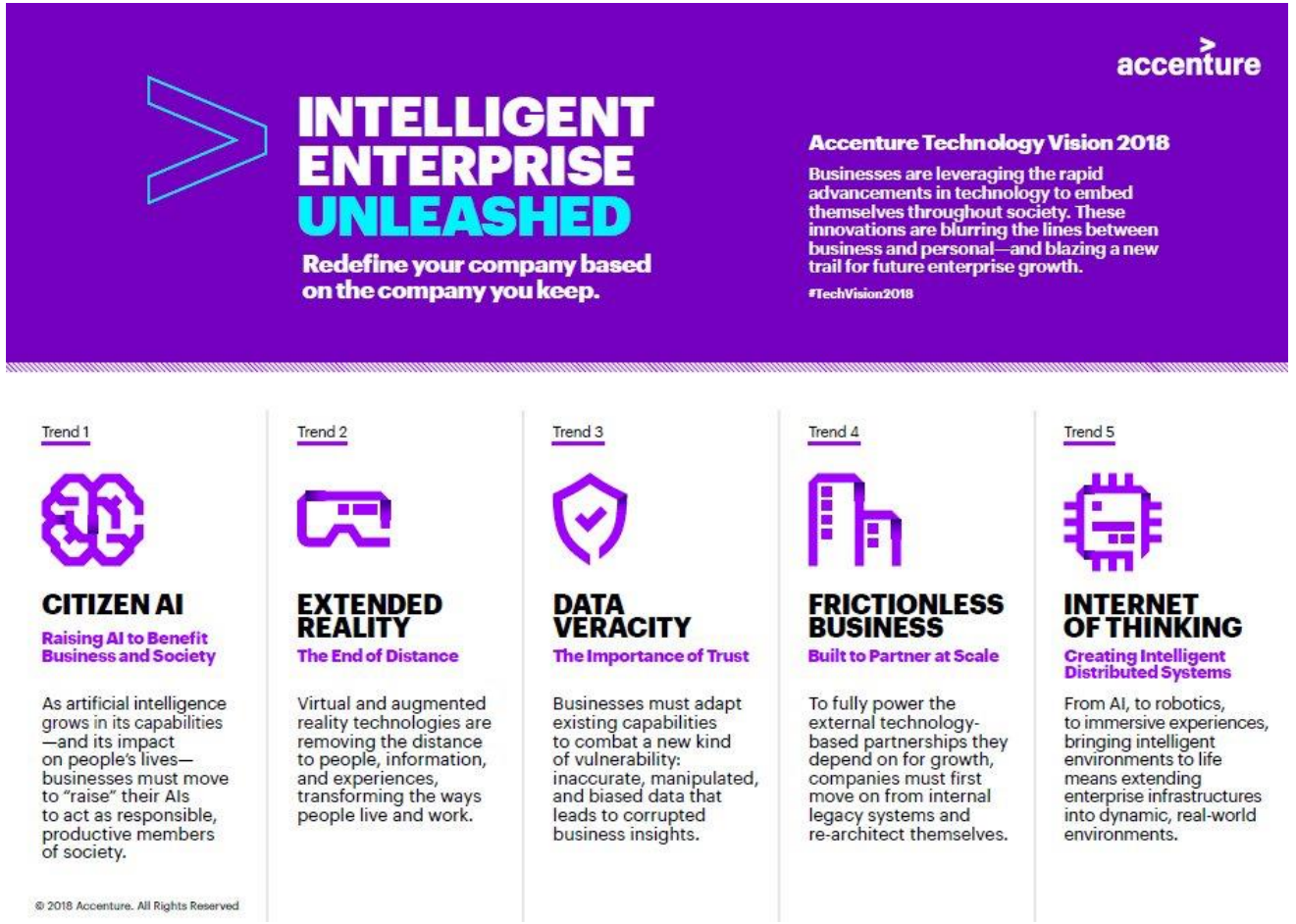
Disruptive Technology: Revolutionizing Access to Finance by SMEs

WORLD BANK GROUP

Manila
July 23, 2018

We live in an increasingly digital and 'disrupted' world

- Growing digitalization of government and business
- Emergence of disruptive technology
  - The rapid growth of IoT, Blockchain, Big Data, AI as a component in almost all disruptive change
- Future competitiveness and socio-economic growth at stake



We heard about 3 major challenges for government

Knowledge gap

What is Disruptive Technology?

Going from hype to reality

How is it relevant to me

Tools to scale

How can I implement such technology?

IOT Study – Interview Protocol (Government/Regulatory Agencies)

Category I: Organizational Information

1. Country/City Name:
2. Name of Organization:
3. Person(s) Name:
4. Persons(s) Title:
5. Person(s) Roles and Responsibilities:

Category II: Legal/Regulatory Framework

1. Is there a formal digital policy from the government?
2. Does the digital policy recognize the use of IoT-based applications for government service delivery?
3. Is the current policy designed to foster or inhibit the growth of IoT in society?
4. Is the policy aimed at specific uses of IoT or is it more general than that?
5. Are there existing laws or policies on freedom/right/access to information or privacy laws that either facilitate or hinder/pose a barrier to the use of IoT-based applications?
6. Does the policy cover IP?
7. Are there any specific laws that regulate the collection and use of data produced by IoT applications?
   a. Who owns the data? (The device provider or the buyer? The government? Or another?)
   b. Are there any limitations on the sharing and use of this data?
8. Does the policy contain any cybersecurity provisions?
9. Does the policy specify any technical standards for IoT; is interoperability a policy goal?
10. Is there a formal stakeholder consultation/citizen engagement process? Were businesses consulted?
11. Were the stakeholders consulted prior to formalizing the use of IoT-based applications?
12. What was the mechanism for consultation and what was the feedback and response from the consultation process?
13. Are there any outstanding/residual concerns from stakeholders?
14. What is the authorizing framework/environment for the use of IoT-based applications within the agency (e.g., mandate letter, policy direction, etc.)?
15. Are there policy guidelines/standards informing the IoT implementation, and if so, what are they?
16. Are any measurement/evaluation standards incorporated in the policy

Category III: Areas of Public Infrastructure

- What are the areas of public infrastructure services and what type of IoT applications are being considered?

1. Built Environments/Buildings, including institutions such as hospitals, schools, social housing, seniors' homes, etc.
   a. Smart systems such as lighting, elevators, face recognition–based security systems, etc.
   b. Predictive maintenance of engineering systems such as elevators/escalators using real-time monitoring
   c. Real-time monitoring of operation and maintenance of emergency management systems such as fire protection, backup generators, etc.
   d. Performance-based licensing and inspections by regulatory agencies
   e. Sensor-based integrated building management systems (e.g., supported LEED buildings)
2. Energy Systems, including power generation, heating, ventilation and air conditioning equipment, boilers and pressure systems
   a. Remote monitoring and operation of energy systems
   b. Sensor-based detection, response, and management of equipment failures such as corrosion, leaks, and environmental releases
   c. Drone-based monitoring of pipelines
   d. Indoor air pollution monitoring and response systems
   e. Remote monitoring and verification of certified contractors
3. Transportation
   a. Real-time GPS-based scheduling and routing
   b. Real-time monitoring and management of fleet,

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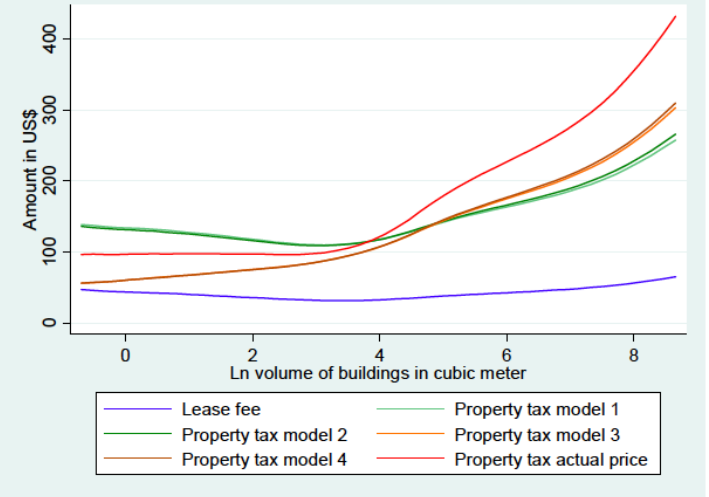
Figure 2: Estimated Building Heights, Central Kigali

Table 7: Predictions for estimated Tax Revenue from a 1% Property Tax with various exemptions

	Est. revenue (USD)	Share of baseline
A. Only properties sold in 2013-16 (in sample prediction)		
Lease fee ("current rate")	552,923	
1% property tax using reported sales price	2,616,113	
1% property tax using estimated price	2,081,242	
B. All properties in urban Kigali (out of sample prediction)		
Memo item: Potential lease fee using current rates	4,908,248	
Baseline: 1% property tax		
1% property tax using estimated price	15,984,606	
Scenario 2 (RWF 30 mn./ 300m^2):		
Land lease fee	6,534,196	0.41
Building tax	1,185,989	0.07
Total	7,720,185	0.48
Scenario 3 (25% or RWF 5 mn./ 300m^2):		
Land lease fee	6,534,196	0.41
Building tax	8,877,086	0.56
Total	15,411,282	0.96
Scenario 4 (median or RWF 9 mn./ 300m^2):		
Land lease fee	6,534,196	0.41
Building tax	7,463,678	0.47
Total	13,997,874	0.88
Scenario 5 (mean or RWF 13 mn./ 300m^2):		
Land lease fee	6,534,196	0.41
Building tax	6,202,656	0.39
Total	12,736,852	0.80

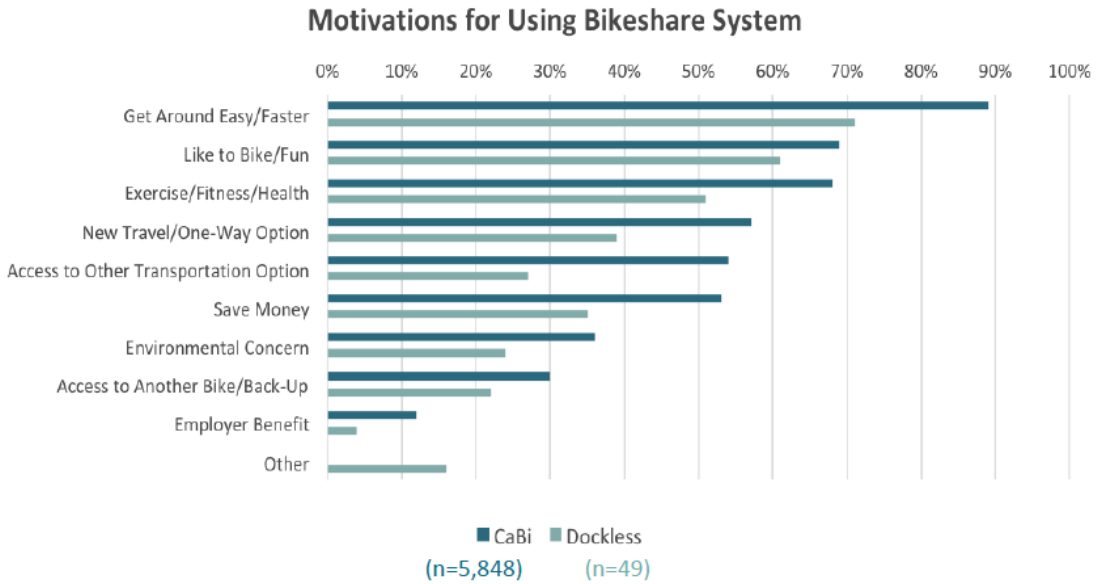
Note: Results are based on the error model (f) and apply to our study area.
Scenario 2 involves a 1% of building value exempting all structures with values less than RWF 30 million (US$ 38,120) plus a land tax (RWF 70 /m^2 for area < 300 m^2 plus RWF 105/m^2 for area > 300m^2) in line with the Government's current proposal. To illustrate revenue implications of different exemption structures, scenarios 3, 4, and 5 set the value of buildings to be exempted from taxation at the first quartile (US$ 4,927), median (US$ 8,277), and mean (US$ 11,055) of the building value distribution, respectively. Current lease fee rates imply that 0.45% pay RWF 5/m^2, 0.16% pay 10/m^2, 14% pay RWF 30/m^2, and 86% pay RWF 70/m^2.

Figure 4: Within-sample Prediction of Potential Property Tax Liability, Model Results Compared

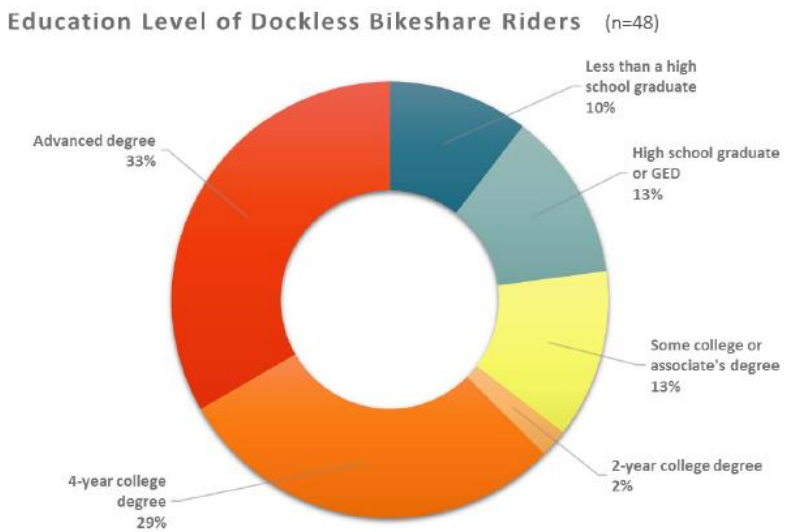


Note: A 1% ad valorem property tax rate is assumed throughout.

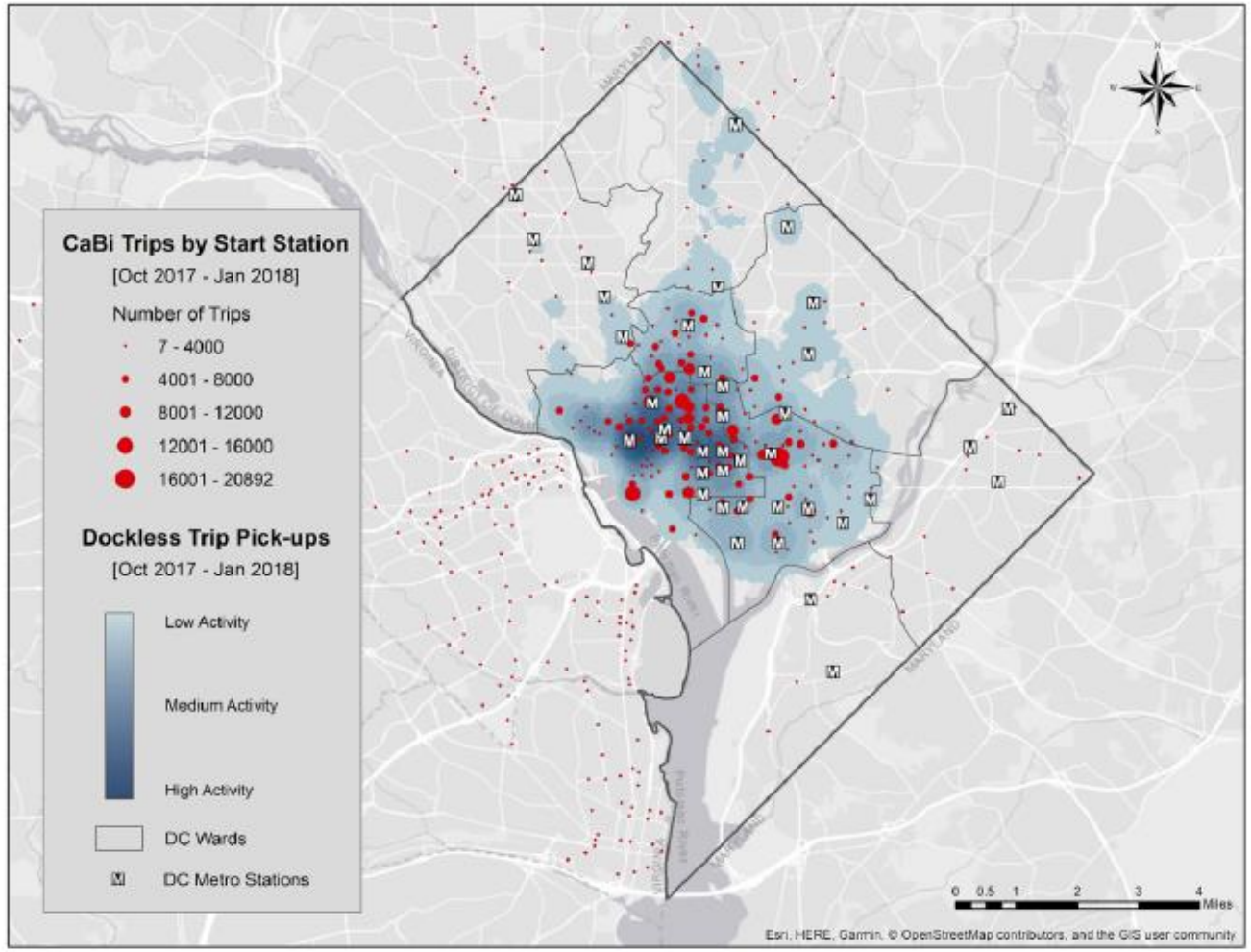
Comparison between UAVs and Satellites : Updated 06/16		
	UAVs	**Satellites**
Costs of platform (USD)	$1000's - $20,000's	$1,000,000 - $100,000,000's
Highest Spatial Resolution	Sub 1cm	31cm (panchromatic) for civilian accessible platforms, analysis requires training
Highest Temporal Resolution	Best case: within 1 hour	Best case: within 24 hours
Geographical coverage	Best case: 500km2 per day	500,000km2 per day
Licensing	Typically more open	Typically strict
Regulations	Restrictive (at present time)	Permissive
Cargo capable	Yes	No
Weather Restrictions	Can gather imagery beneath clouds. Not impacted by high winds	View can be blocked by clouds. Not affected by high winds. Radar and LIDAR satellites functional with cloud cover.



Survey Figure 2: Motivations Compared For Bikeshare Systems (49 Respondents for Dockless Bike Riders. 5,848 Respondents for CaBi Bike Riders)



Dockless Survey Figure 12: Education Level Of Dockless Bike Riders



GIS Figure 11: CaBi and Dockless Pickup Heat Map (October 2017- January 2018)

We found that Disruptive Technology is still nascent in governments

Strong value-proposition but no clear business models

Data is the key

Significant policy challenges
Technology as an enabler

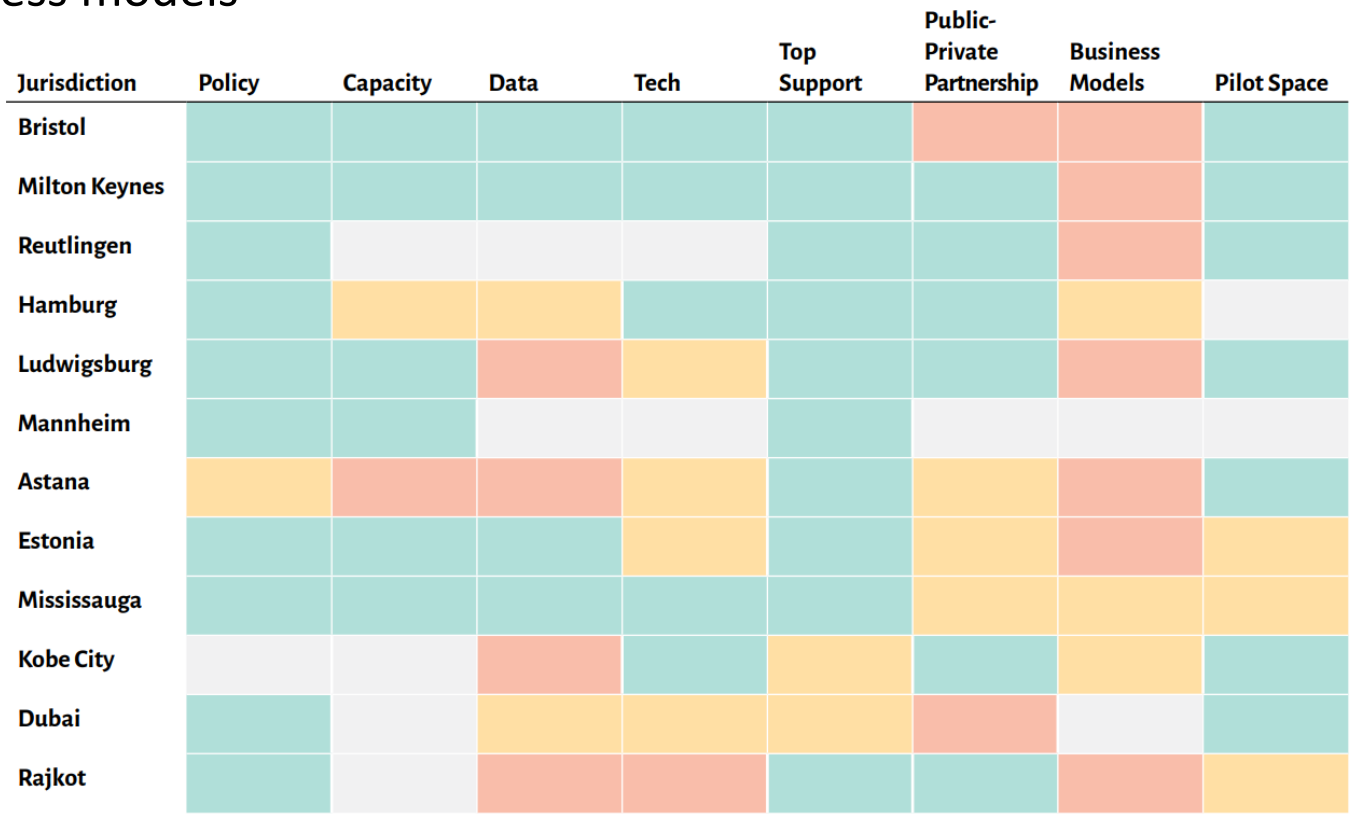
Infrastructure is a major obstacle

Clear role for government

Major capacity gaps

Successful projects share characteristics

It is important to recognize risks



Jurisdiction	Policy	Capacity	Data	Tech	Top Support	Public-Private Partnership	Business Models	Pilot Space
Bristol								
Milton Keynes								
Reutlingen								
Hamburg								
Ludwigsburg								
Mannheim								
Astana								
Estonia								
Mississauga								
Kobe City								
Dubai								
Rajkot								

Note: Green = available and functional; yellow = partially available; red = not available; grey = not known.

Strong value-proposition but unclear business models

Most initiatives still at the pilot stage

- Exploratory sandboxes (Bristol Living Lab)
- Constrained geographies (Reutlingen)

Temporary business models

- Funded largely through grants or limited funds, uncertain long-term financial viability)

Different types of pilots

- Funded largely through grants or limited funds, uncertain long-term financial viability)

Data management is a major barrier

Most governments unprepared for the deluge of emerging technology data

- Open Data initiatives (Milton Keynes, Mississauga)
- Shared platform for data exchange (Estonia's X-Road)
- Data hubs (Milton Keynes Data Hub)
- Data visualization experiments (Bristol Data Dome)

Data as a potential competitive asset

- Development of businesses based on open IoT data

the smart city agend

Figure 6. Mississauga Connectivity

100+ connected Fire vehicles
(cellular mobile data & GPS)

50,000+ connected
LED streetlights
(wireless & cellular)

800+ WIFI Access
Points

2200+ connected
mobile workers
(WIFI & cellular)

800 km of city-owned fibre
connecting 100+ city buildings
("PSN" - Public Sector Network)

MISSISSAUGA
A SMART CITY

500+ connected busses
(cellular mobile data & GPS)

200+ network-connected
electronic signs

12+ connected
rain gauges

700+ network-connected traffic
lights

800+ network-connected
traffic & security cameras

700+ connected Works vehicles
(cellular mobile data & GPS)

The policy environment is under-developed

IoT as an enabler

- Regulations
- Prescriptive requirements

IoT as a technology

- Data
- Security
- Interoperability and standards
- Infrastructure

Infrastructure is a major challenge

IoT has specific infrastructure needs

- Limitations and Strengths of IoT specific networks (e.g., LORAWAN)
- Broadband availability

New infrastructure models

- Public versus private networks (city owned, telecoms)

Most successful disruptive technology projects share common characteristics

Coordinators

Astana Innovations, Fraunhofer Institute, Digital Catapult

Public-private partnerships

Government seed funding/grants

Private investments with long-term incentives

Academic involvement for credibility and research

Local

Engaging local communities

Localizing applications/business models aligned with local needs

Leadership

Mayoral commitments and leadership (e.g., Astana, Bristol, Mississauga etc.)

There are clear skills gaps in government and the private sector

Digital skills programs

- IoT literacy (Open University)
- Digital imagination (Bristol's Knowle West Media Centre)
- Digital skills and educational curriculum (e-Estonia)

The government can be a major enabler

Diverse roles

- Public infrastructure to test IoT applications (Bristol, Mississauga)
- Physical/community spaces (Living Labs)
- Innovative procurement (Reutlingen)
- Policy sandboxes (Morgenstadt)
- Financing

What should government do to create “digitally enabled” ecosystems

Leadership/Policy

- Proactive policy development
- Align strategic objectives

Strategy and Implementation

- Establish sandboxes to develop pilots (test value proposition, technology, policies, infrastructure, security)
- Establish a coordination agency to manage and run pilots
- Develop public-private partnerships and platforms
- Research and develop “localized” business models
- Develop IoT infrastructure

Capacity and Engagement

- Engage local stakeholders through education and outreach
- Develop IoT capacity within and outside the government
- Encourage standardization

Blockchain pilot aimed at SMEs and entrepreneurs

- Can Blockchain simplify the business environment for export?

- Can Blockchain increase access to finance?

The project

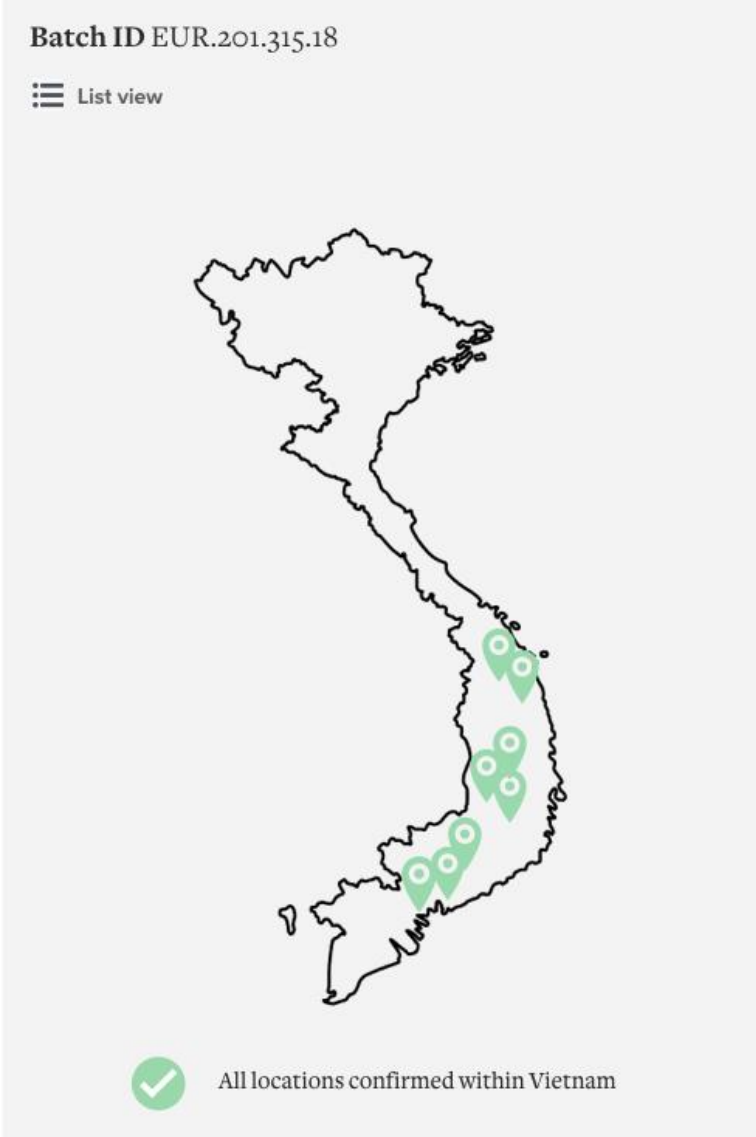
Vietnam

Coffee supply chain

Customs and other government agencies

Private sector counterparts

Cross-disciplinary WBG team + Provenance



Workshop in Ho Chi Minh City

175+ participants

Key themes – blockchain, gender, entrepreneurship, disruption

Interactive, hands-on

PoC will comprise 3 smart contracts

1. to upload verified source information on a batch by batch basis — for instance the triangulation of GSP, local commune land registration and 4C certification;
2. to facilitate the secure and verified exchange of goods and transfer of proof of origin information between any two parties — for instance between a trader and processor and;
3. to facilitate the temporary holding and passing of the goods through customs facilities, recording either acceptance or rejection of the the exporters application to export a given batch.

HS Heading	Description of product	Working or Processing, carried out on non-originating materials, which confers originating status
	or included, except for:	
ex 0511 91	Inedible fish eggs and roes	All the eggs and roes are wholly obtained
Chapter 6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	Manufacture in which all the materials of Chapter 6 used are wholly obtained
Chapter 7	Edible vegetables and certain roots and tubers	Manufacture in which all the materials of Chapter 7 used are wholly obtained
Chapter 8	Edible fruit and nuts; peel of citrus fruits or melons	Manufacture in which: - all the fruit, nuts and peels of citrus fruits or melons of Chapter 8 used are wholly obtained, and - the weight of sugar used does not exceed 20% of the weight of the final product
Chapter 9	Coffee, tea, maté and spices	Manufacture from materials of any heading
Chapter 10	Cereals	Manufacture in which all the materials of Chapter 10 used are wholly obtained
Chapter 11	Products of the milling industry; malt; starches; inulin; wheat gluten	Manufacture in which all the materials of Chapters 10 and 11, headings 0701, 071410 and 2303, and sub-heading 0710 10 used are wholly obtained

HS Heading	Description of product	Working or Processing, carried out on non-originating materials, which confers originating status
Chapter 19	Preparations of cereals, flour, starch or milk; pastrycooks' products	Manufacture from materials of any heading, except that of the product, in which: - the weight of all the materials of Chapters 2, 3 and 16 used does not exceed 20% of the weight of the final product, and - the weight of the materials of headings 1006 and 1101 to 1108 used does not exceed 20% of the weight of the final product, and - the individual weight of the materials of Chapter 4 used does not exceed 20% of the weight of the final product, and - the individual weight of sugar used does not exceed 40% of the weight of the final products and - the total combined weight of sugar and the materials of Chapter 4 used does not exceed 50% of the weight of final product
ex Chapter 20	Preparations of vegetables, fruit, nuts or other parts of plants; except for:	Manufacture from materials of any heading, except that of the product, in which the weight of sugar used does not exceed 20% of the weight of the final product
2002 and 2003	Tomatoes, mushrooms and truffles prepared or preserved otherwise than by vinegar of acetic acid	Manufacture in which all the materials of Chapters 7 used are wholly obtained
ex Chapter 21	Miscellaneous edible preparations; except for:	Manufacture from materials of any heading, except that of the product, in which: - the individual weight of the materials of Chapter 4 used does not exceed 20% of the weight of the final product, - the individual weight of sugar used does not exceed 40% of the weight of the final

Prototype

Customs verification of product origin

New smart contract at customs

CUSTOMS DECLARATION NUMBER 301708309730

View associated documents

Entering the EU Market at ZERO rate, as established under the EU-VIETNAM FTA, Chapter II (National Treatment and Market Access for Goods), Annex II c I (Tariff Schedule of the EU) http://trade.ec.europa.eu/doclib/docs/2016/february/tradoc_154200.pdf

In compliance with Chapter IV (Protocol Concerning the Definition of the Concept of "Originating Products" and Methods of Administrative Cooperation, articles 19, 20, 25, 26) and Annex VII (declaration by the exporter) http://trade.ec.europa.eu/doclib/docs/2016/february/tradoc_154205.%20institutional%20-%20for%20publication.pdf

Additional information can be retrieved from the Vietnam Trade Portal http://www.vietnamtradeportal.gov.vn/

Declaration of Origin

10231078

EXPORTER

KCN BIEN HOA 2, PHUONG LONG BINH, THANH PHO BIEN HOA, TINH DONG NAI, VIET NAM

CONSIGNEE

N/A

CERTIFICATE USED IN PREFERENTIAL TRADE BETWEEN

Vietnam

AND

European Union

COUNTRY, GROUP OF COUNTRIES OR TERRITORY IN WHICH THE PRODUCTS ARE CONSIDERED AS ORIGINATING

Vietnam

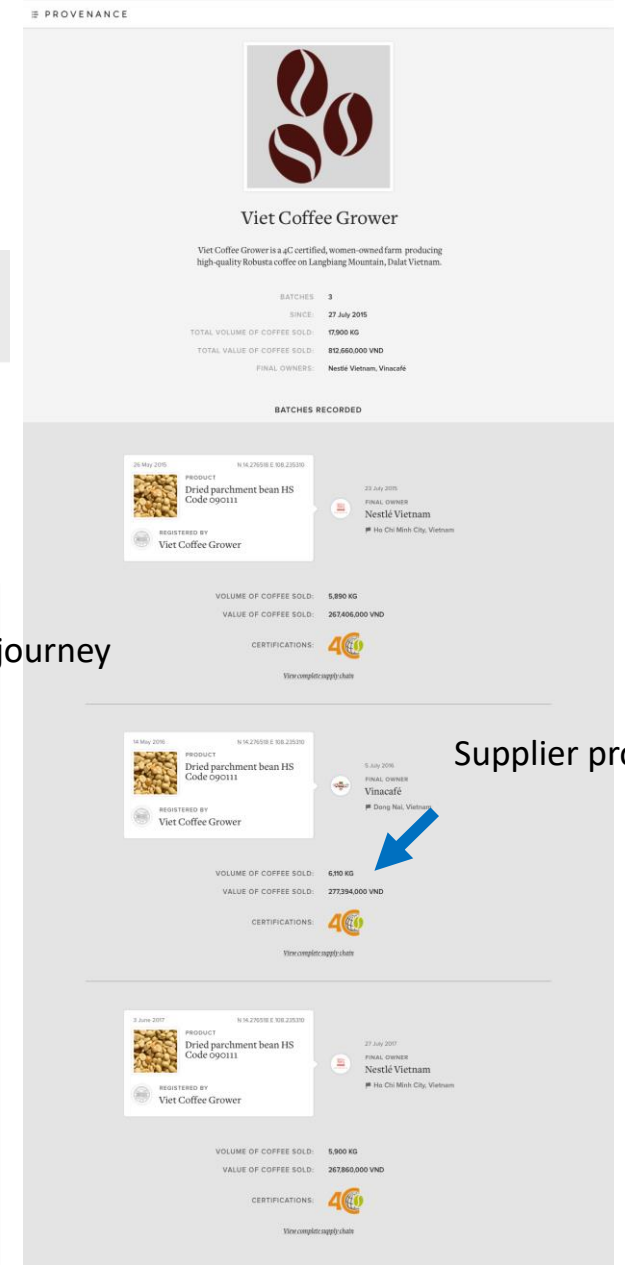
Batch ID EUR.201.315.18

Map view

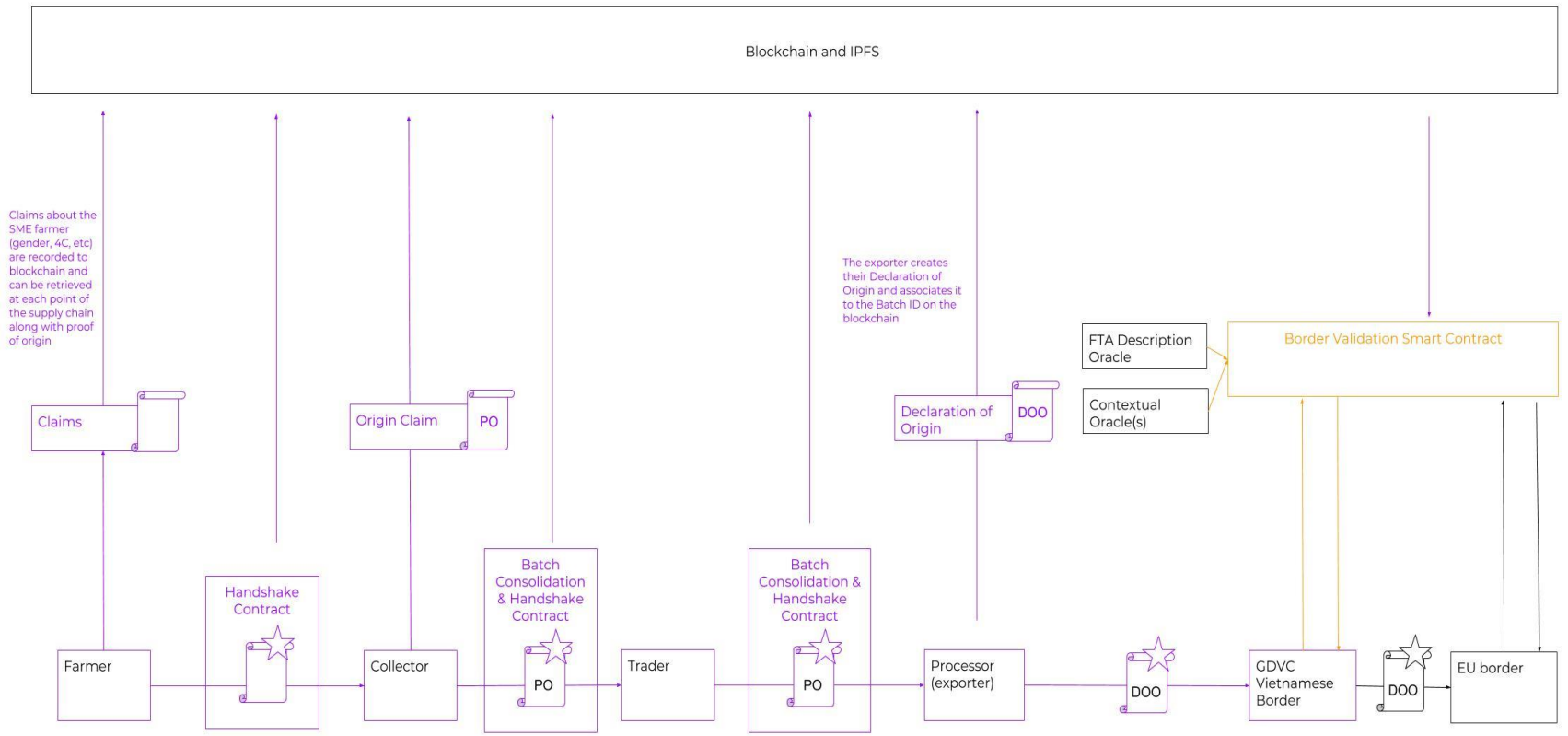
LOCATIONS	DATE
Robusta coffee beans HS Code 090111 13.889518 108.110288	11 February 2018
Robusta coffee beans HS Code 090111 14.210496 108.362100	11 February 2018
Robusta coffee beans HS Code 090111 14.276518 108.235310	11 February 2018
Robusta coffee beans HS Code 090111 13.943164 108.309874	16 February 2018
Robusta coffee beans HS Code 090111 14.801986 108.210954	20 February 2018
Roast and ground coffee HS Code 090121 13.889518 108.110288	22 February 2018
Roast and ground coffee HS Code 090121 14.210496 108.362100	23 February 2018

Product journey

Supplier profiles



Orange: A process being built for the PoC
Purple: A process that will be in the PoC simulation -- Provenance IP



All actors (i.e. farmer, collector, trader, processor/exporter, GDVC) will have a user ID on the provenance system that records and tracks their supply chain activity on the blockchain.

Claims and Proof of Origin are preserved when batches are consolidated, transformed and transferred by actors

Report

Results of the prototype

Lessons learned from other cases

Cost benefit of blockchain in our scenario and beyond

Policy/ regulatory environment

Scope for intervention

Looking ahead