Helping the Public Sector Defend Against Cyber Attacks

SPECIAL EDITION: Tech for Integrity

Optimizing Opportunity from China’s Belt and Road Initiative

PERSPECTIVES

PUBLIC SECTOR
Welcome
to Citi Perspectives for the Public Sector.

Much of this edition is centered on three themes that define our era: technology, development and efficiency. Technology is an everyday part of our personal and business lives in both developed and developing nations. It can be a powerful force for good; increasing access to opportunities for marginalized groups and stimulating growth, for example. However, as demonstrated by numerous headlines over the past year, it also creates enormous potential risks.

We examine how the public sector can defend itself – and its citizens – against cyber threats to financial flows and sensitive information. We also look at the emergence of digital money, including national digital currencies and private cryptocurrencies. In another article, we hear about how Citi Innovation Labs are creating future transaction banking solutions with the help of outside partners and the close involvement of clients. The public sector is playing a critical role as a regulator and adopter of this technology. At Citi, we are focused on partnering with our clients to maximize the benefits that this new technology can bring to governments and their citizens.

This edition includes a two-part special on using technology to root out the cancer of corruption. In the first of these articles, we assess the cost that the abuse of power imposes on the global economy and the role technology can play in developing effective integrity solutions. In the second piece, we highlight a host of remarkable solutions that have emerged from our 18-month Citi Tech for Integrity Challenge global public private partnership.

How technology solutions are being applied to solve problems are highlighted in two enclosed articles: One addresses how electronic payment methods deliver numerous benefits for development organizations and humanitarian relief recipients; the other looks at how ministries of foreign affairs can realize sizable financial and operational benefits from centralization and consolidation of financial operations within their global embassies.

Driving growth, addressing the infrastructure funding gap, and continuing to improve ways to attract more private capital to achieve these goals continues to be at the top of our clients’ agenda. One article addresses the most ambitious infrastructure investment project, the China One Belt, One Road initiative. We also provide some insights on how we feel the mismatch between available capital and emerging market infrastructure can be addressed. We also address how we see the Ratings Advisory role evolving and ways to better help clients improve their rating and their access to global capital markets given the ambitious agendas announced by many governments beyond China.

As always, this annual publication brings together our thought leaders to deliver insights and practical advice, informed by their experience of working with clients. Our goal is to reflect your interests and highlight best practice. We’d be delighted to hear your thoughts on the subjects raised in this edition as well as ideas for future articles.

Julie Monaco
Global Head for Public Sector, Corporate and Investment Banking, Citi
For the public sector, detecting cyber threats and improving security is a key priority: many governments now view cyber security as a core part of their national responsibilities.
Helping the Public Sector Defend Against Cyber Attacks

Combating the wide range of cyber threats facing the public sector is challenging but by identifying risks and improving collaboration, it is possible to create a robust defense, write Gary Schneider, Head of Public Sector Product for North America and Larry Zelvin, Global Head for Cyber Security.

Cyber security has dominated the headlines in 2017. The WannaCry ransom attack in May and the Petya destructive virus in July caused widespread disruption to the public sector in a number of countries. Cyber espionage, such as the theft of politically, economically or militarily sensitive information, has also become more widespread. For the public sector, detecting cyber threats and improving security is a key priority: many governments now view cyber security as a core part of their national responsibilities.

While public sector bodies face the same range of threats as corporations, the breadth and depth of their role in society can make it more challenging to manage cyber risks. Every national government not only has huge domestic and cross-border financial flows, they also generate large volumes of highly sensitive data that is stored in associated databases. National governments are also responsible for protecting critical public infrastructure such as air traffic control, the electricity grid and even nuclear power generation, all of which are potential targets for bad actors.

To compound these challenges, the public sector sometimes faces greater constraints than corporates when addressing cyber threats. For example, public sector bodies tend to use legacy systems that may be tougher to defend than those used by corporates. And while national, regional and local governments are committing increasing resources to cyber security, budgetary pressures can make it difficult to secure the necessary investments to maintain optimum protection, especially in developing countries.
To combat fraud, espionage and other cyber-related risks, the public sector must understand who is attacking them and why. There are five cyber threat actors – nation states, cyber crime, terrorism, hacktivism and insider – each with different targets, methods and objectives.

1. Nation state actors steal intellectual property and collect intelligence to advance national interests. Given their potentially unlimited resources and advanced capabilities, they are tough to defeat.

2. Cyber criminals seek financial gain but may cause damage if they fail. They use spear phishing and similar social engineering, automated crime tools, fraud, botnet-enabled distributed denial of service attacks and cyber extortion or ransomware (where PCs are locked and payment demanded to unlock them, as with WannaCry).

3. Terrorist actors are politically or ideologically motivated and aim to provoke fear using cyber attacks designed to destroy, degrade, disrupt or deny system operation, and cyber-enabled functions to recruit, incite, train, plan and finance operations.

4. Hacktivists generally seek publicity to further their geopolitical or social agenda and usually operate disruptive or embarrassment campaigns primarily via distributed denial of service attacks and website defacements.

5. Insiders are potentially the greatest threat to the public sector given their inside knowledge, which can more easily enable them to steal data, conduct fraud, or cause damage undetected. They may seek financial gain or wish to cause harm because they disagree with government policy, as in the case of Edward Snowden.

Increasingly, the boundaries between many of these groups are becoming blurred. For example, nation state actors may engage in criminal activity in order to destabilize key public sector bodies. Similarly, the motivation behind data breaches, such as that incurred by the Office of Personnel Management in June 2015, may be mixed: while there was a clear espionage element to the attack, government employees’ personal data may also have been sold on the dark web.

Cyber threat actors also employ a variety of strategies including disruptive attacks that result in the loss of capabilities (but which may be a cover for another attack designed to steal data) or business email compromise, where fake emails are used to dupe recipients into making wire payments. The range of techniques used by cyber threat actors can make it more difficult to understand their true target. They are also developing new techniques and capabilities on a near daily basis.
How the financial sector can help
Given such a range of actors and techniques, protecting the public sector’s cyber defenses is challenging: just one breach could be critical and devastating. Fortunately, public sector entities can successfully prevent or defeat attacks at a number of stages by better focusing and coordinating their efforts not only internally but also externally. That approach will give public sector entities (and their private sector partners) the ability to customize and layer defenses for each stage and type of actor.

At Citi, this customization of cyber defenses occurs at the Cyber Security Fusion Centers, intelligence-led organizations which house 13 Citi security teams including cyber intelligence, incident management, and vulnerability assessment. These centers constantly monitor for cyber-attacks globally as well as collect data on patterns of activity in order to better understand the methods and motivations of cyber threat actors. Citi has Security Fusion Centers in the U.S., Singapore and Hungary to prevent and detect cyber-attacks against the bank, its customers and critical partners worldwide.

Citi also works closely with the Financial Services Information Sharing and Analysis Center, as well as other public sector organizations such as law enforcement and national Computer Emergency Readiness Teams (CERTS), to share information in real time about cyber threats. It is essential that the financial sector works collaboratively to support governments and other public sector bodies in their efforts to fortify their infrastructure and improve awareness and knowledge. Only through this combined effort across the private and public sectors can we keep ahead of the ever-changing cyber risks facing the world and then ensure that citizens and clients can continue to rely on public and financial services.

We will have to build a new social consensus around the appropriate rules, laws and regulations for the fast-changing digital age.
Sovereign rating advisory emerged in the late 1980s as the presence of emerging market countries in global bond markets expanded.
Much has changed in sovereign rating advisory over the past three decades. The function has evolved, and must continue to evolve if it is to achieve a borrower’s objectives through viable transactions that help to compensate the advisor’s efforts, and remain viable in commercial terms, writes Stephen Taran, Global Head of Sovereign Debt Advisory, Citi and Joaquin Jugo, Head of Latin America, Public Sector Group, Citi.

Sovereign rating advisory emerged in the late 1980s as the presence of emerging market countries in global bond markets expanded. Salomon Brothers, an investment bank that subsequently became part of Citi, was engaged as an advisor to India for its first rating in 1987 and later worked with Malaysia and Thailand for their bond market debuts.

The traditional model of Sovereign Rating Advisory combined advice on obtaining a rating and assisting governments in their management of rating agency relationships, typically in combination with a new bond issue mandate. Advisory was essentially an adjunct to the DCM business, helping to win mandates for bond issues.

The bank’s Sovereign Rating Advisory role at this time essentially comprised four dimensions:

1. Dissecting the analysis that supported rating agencies’ conclusions to enable the sovereign to better understand the motivations and reference points of agencies.

2. Providing assistance to the government to assess the accuracy and relevance of the analysis supporting the ratings.

3. Developing the factual information that could be used to challenge rating agency analysis and conclusions.

4. Helping to arrange and facilitate meetings between rating analysts and government officials. Advisors attended these meetings and offered advice on how to respond to agencies’ questions.
Pinpointing the key variables influencing a rating

In the past five years, Sovereign Rating Advisory at Citi has evolved into a broader role as governments have begun to take a more active interest in managing rating agency relationships.

Historically, emerging market governments were essentially reactive participants in the rating process: agencies asked questions and requested data; governments responded; agencies then analyzed this information and produced a rating. Today many emerging market governments are active in the bond markets and are consequently more sensitive to investor perceptions and the cost of funding; they therefore have an interest in playing a more proactive role in the rating process.

Citi Sovereign Rating Advisory still provides the four services described above. However, long experience of rating agency analysis has enabled the bank to pinpoint the key variables influencing a rating. Using this knowledge, Sovereign Rating Advisory can now help policymakers identify policy reforms, such as tax or budget reform, that would enhance their access to global bond markets.

It is important to differentiate this role from that of the International Monetary Fund or other multilateral agencies that provide advice and support to developing countries on macro-economic and development issues. Citi’s focus is much narrower, helping sovereigns identify the policy reforms that could have the greatest impact on ratings and prompt tighter spreads to lower the cost of future debt issuance.

How is contemporary Sovereign Rating Advisory different?

Citi’s goal of helping sovereigns, both to improve their rating and their access to global bond markets, comprises a number of different functions and requires additional skills when compared to traditional rating advisory.

Clearly, the ability to issue debt and the spread that must be paid over the relevant risk free instrument is closely related to the rating of an issuer – all other things being equal, higher rated borrowers will trade at a tighter spread.

However, investor perception of a credit – and therefore the spread it trades at – is also affected by other concerns. For example, rating agencies tend to look at long-term trends and largely ignore news headlines and business cycles. These factors may be more important to investors, since headlines can affect spreads over a short-term trading horizon.

It should be noted that some rating agencies have begun to take into account market perceptions of issuers, by assessing the extent to which ratings are aligned with market-implied ratings (i.e. whether an issuer’s spread deviates from that of a typical issue with a given rating). Despite this, there remain some fundamental differences between rating agencies’ and investors’ consideration of a credit.

It has become increasingly important for Sovereign Rating Advisory to consider the priorities and concerns of investors not just because of the growing maturity of emerging market sovereign issuers but also because the investor base is changing. Traditionally, emerging market debt was bought by buy-and-hold investors, which used ratings as a large part of their investment analysis. As emerging market debt has become a more mainstream investment class, total return investors have come to represent a growing proportion of the emerging markets bond market.

Both total return investors and, to a lesser extent buy-and-hold investors, have increasingly taken a more active approach to credit risk analysis: they are now typically more independent of rating agencies. It is therefore worthwhile for issuers to cater to the analytical capacities of the investor base.
Understanding the concerns of the investor base requires a different skill set for a bank. While a deep understanding of the rating process remains crucial, the broader Sovereign Rating Advisory role played by Citi requires it to understand investors’ concerns and market dynamics.

Aligning products and services with government needs
The division between rating advisory and public sector products and services must always be clear and unambiguous: confidentiality and confidence are essential to the rating advisory process. However, properly approached, there are opportunities for Citi to work with a government to identify and execute solutions that will help the government to achieve its rating goals.

Solutions that could be advantageous to sovereigns seeking to improve their market access can be split into four broad categories. These are:

Fiscal
1. Commodity hedging: governments heavily dependent on commodity exports such as oil or cocoa as a source of revenue can see their budgets heavily impacted by changes in the price of those commodities. By mitigating volatility through hedging, fiscal risk can be reduced, leading to improved investor perceptions of the government’s credit.

Catastrophe bonds: countries vulnerable to natural disasters, such as hurricanes or earthquakes, have a riskier profile for investors because of the fiscal implications of natural disasters, which can affect government revenues. By providing insurance against such risks, catastrophe bonds can improve a country’s risk profile.

Governance
2. Efficiency and Transparency: digitization and other new technologies, such as the use of purchase cards, can significantly improve governance and decrease opportunities for corruption and graft. In addition to having a fiscal impact (by cutting waste and improving cash management), these measures also positively affect soft metrics, such as World Bank indicators on the effectiveness of government, accountability, and control of corruption, which provide comfort to investors and rating agencies alike.

Liability Management
3. Debt re-profiling, debt exchanges: The rating agencies place considerable weight on refinancing risk in their rating assessments, especially for sovereigns in the lower rating categories. By smoothing debt maturity profiles, reducing the volume of refinancing needed in a specified period, emerging market governments can reduce refinancing risk. Successful liability management can have a material positive impact on rating agencies views, potentially contributing to improvement in the issuer’s rating.

Improved Productivity
4. Privatization and Direct Foreign Investment: Promotion of direct investment can help attract foreign capital and expertise which can have credit-positive pay-offs. Increased direct investment can improve a country’s balance of payments, boost productivity, increase economic growth and employment, positively affect a country’s currency and ultimately benefit its credit rating.

A new type of Sovereign Debt Advisory
Citi’s antecedents introduced the concept of sovereign rating advisory in the 1980s and guided numerous countries to successful market debuts. While many banks active in rating advisory continue to deploy similar models, Citi has embraced the significant changes both among issuers and investors in recent years by changing how it approaches market access. The bank’s more proactive approach to Sovereign Rating Advisory demonstrates its comprehensive understanding of the drivers of ratings and investor behavior, better positioning the bank to help sovereigns to get the bond market results they want.
China’s Belt and Road initiative (BRI), also known as One Belt, One Road, is among the most ambitious development and investment projects in the history of the world.
Optimizing the Opportunity from China’s Belt and Road Initiative

China’s vast connectivity and cooperation plan will create a wide range of opportunities in participating countries in the coming years. Clients must ensure they work with a bank that offers local knowledge and comprehensive capabilities in order to achieve their goals, writes Catherine Wang, North Asia Public Sector Head, Citi.

China’s Belt and Road initiative (BRI), also known as One Belt, One Road (OBOR), is among the most ambitious development and investment projects in the history of the world. First proposed by Chinese President Xi Jinping in 2013, it received a significant boost in May of 2017 when China hosted 29 heads of state and representatives from over 100 countries and committed an additional $128 billion to the plan and signed 270 new BRI cooperation agreements.

The objective of this ambitious, long-term, multi-regional plan is to reshape the international trade landscape by promoting enhanced connectivity, trade flows and investment opportunities between China and multiple developing countries. Currently, 26% of China’s total trade volumes are with BRI countries; by 2025 this is forecasted to increase to 40%. BRI has 12 sectors of focus (which align with sectors where China has a competitive advantage and global demand is strong). It encompasses 65 countries (representing 62% of the world’s population and 30% of global GDP), with ASEAN countries, which have infrastructure funding needs of $3 trillion according to the Asian Development Bank, a key focus.

BRI has six principal land (Belt) and sea (Road) corridors. Belt corridors will connect China with Europe, via Central Asia and Russia; the Persian Gulf and the Mediterranean Sea via Central and Western Asia; and Southeast Asia, South Asia and the Indian Ocean. The Belt will consist of a network of overland roads, bridges, tunnels, rail routes, oil and natural gas pipelines, and other infrastructure projects. The sea-based Road corridors extends from China’s coastal ports to the South China Sea, Indian Ocean, Africa and Europe and the South Pacific Ocean and will consist of a network of ports and other coastal infrastructure projects.
How will BRI be financed and facilitated?
BRI is expected to require over $2-3 trillion in funding from China and its partner countries. The Chinese government will channel its equity investment through the Silk Road Fund. China’s policy banks (Agricultural Development Bank of China, China Development Bank, and the Export-Import Bank of China), China’s big four state-owned banks, the Asian Infrastructure Bank and the New Development Bank (formerly known as the BRICS Development Bank – four members of which are covered by BRI) will also provide funding. While the Asian Infrastructure Investment Bank and the New Development Bank were not set up specifically for BRI, their country remits overlap significantly with the initiative.

Although sums involved are enormous, they represent only a fraction of China’s available banking sector assets and will be drawn down or funded over an extended period of time. Nevertheless, there will also be a significant role for other financial institutions, including international banks, and other governments.

Sovereigns taking part in the BRI initiative will require advice and assistance in raising debt in the syndicated loan and international bond markets. Many Chinese companies (including state-owned firms) will use the BRI to grow their business into new markets and take advantage of improvements in infrastructure and expanding trade flows: research by McKinsey notes that more than 200 enterprises have signed cooperation agreements for projects along the BRI routes.

In each market where they operate, these companies will need cash management services and accounts that meet often complex regulatory requirements. Moreover, given that the countries benefiting from BRI are emerging markets – and in many cases could be described as frontier markets – escrow facilities will be essential in order to facilitate secure investment. Corporates will typically require trade finance solutions while some will also require finance, which ideally should be in local currency in order to match locally-generated cashflows and minimize risks.
How Citi can help
Citi is well positioned to help different types of public sector clients with their BRI requirements. Offering various financial services directly in 58 countries out of the 65 along the Belt & Road, Citi is a global leader in the project and infrastructure market (in the institutional distribution of risk, the bond market and the export credit agency market). Treasury and Trade Solutions are widely offered, including cash management services, such as payments (including cross-border) and collections, and trade services and finance.

Depending on local regulatory requirements and Citi’s license, the bank is also able to offer Advisory, Securities and Fund Services, Capital Markets Origination and Markets services. These capabilities can help clients to navigate the particular challenges of their investment projects. For example, Citi may be able to help clients to secure access to local currency funding using structured solutions even where domestic markets are undeveloped and illiquid.

Most importantly, Citi’s on-the-ground presence in BRI markets ensures that it has in-depth knowledge of local conditions, regulatory and legal frameworks and business practices. Moreover, to support its clients, Citi operates nine China desks worldwide with six (in Hong Kong, Singapore, Dubai, Kazakhstan, Kenya and South Africa) serving Chinese clients operating in BRI countries. The bank has a full range of capabilities to help clients plan their BRI projects to ensure they manage their risks effectively and achieve their strategic objectives.

Citi’s thought leadership and commitment to BRI was reflected by its BRI event in China in September 2017, which involved Country Chief Officers from a number of BRI countries (as well as China) and where Citi’s economists and other experts, shared market knowledge and discussed product and solution requirements. In advance of the event, many Citi clients had voiced their appreciation of Citi’s decision to hold a BRI event to discuss the opportunities and challenges it presents, and help them to improve their understanding of BRI countries.
Economies around the world are facing the challenge of delivering sustainable, inclusive, good-quality infrastructure which goes hand in hand with economic and social development.
Addressing the Currency Mismatch Could Hold the Key to Unlocking Infrastructure Investment

Global infrastructure around the world is struggling to keep pace with growing demand and projected needs, especially in the emerging markets, leading to worsening gaps. In the following Q&A, Valentina Antill, Citi’s Head of Strategic Risk Solutions for the Americas, and John Finnigan, Citi’s Head of Development Organizations, explain why this challenge persists and how it can be overcome.

Why is infrastructure important and what challenges does it face?
John Finnigan (JF): Economies around the world are facing the challenge of delivering sustainable, inclusive, good-quality infrastructure which goes hand in hand with economic and social development. There are a number of disruptive forces in play such as ongoing shifts in the world’s economy and sluggish global growth. Although public investment in infrastructure has been falling gradually as a percentage of GDP, infrastructure could provide a much needed boost to the economy.

In emerging markets, the infrastructure financing gap ranges between $1 – $1.5 trillion, which far exceeds the capacity of governments, donors and development financial institutions.

As a result, global growth is being held back and the world is missing an opportunity to improve people’s wellbeing: achieving the ambitious Sustainable Development Goals is at risk unless the world changes its current trajectory and reverses the worsening gap.

Meanwhile, there are billions of dollars in debt and equity capital seeking secure and healthy returns. Given the long-term, stable cashflows of many projects in the infrastructure sector, it seems the perfect destination for such capital. But in large part, this investment is not taking place.
What is stopping investors’ capital connecting with infrastructure projects around the world?

JF: Foreign exchange risk provides one key explanation for international investors’ reluctance to invest in infrastructure. It’s well known that the majority of infrastructure projects are most efficiently funded in local currencies. That’s because most of their costs and revenue streams in the form of charges paid by end users are also in local currency.

In developed markets this is not a problem: FX risk is limited and can be cost-effectively mitigated if necessary. Consequently, bank lending to many developed market projects is relatively robust. The big challenge is to match the capital available to the risk attributes that underlie infrastructure projects in emerging markets.

How are the consequences of this FX mismatch reflected in the project finance market?

JF: While there is no shortage of capital and there is growing recognition of infrastructure as an asset class, the currency mismatch persists. Last year, nearly half of the $380 billion in debt financing was generated in emerging and developing economies. However, only 28% of that debt financing was in emerging currencies. Foreign exchange risk remains a significant challenge in emerging markets and developing economies. Developing local capital markets and deepening their financial capacity and strength is one approach to addressing foreign exchange risk. Currency hedging instruments represent another set of risk management strategies to overcome this challenge.

How can this blockage be overcome? What role should different institutions play?

Valentina Antill (VA): Overcoming this predicament requires an emphasis on simplicity so that solutions gain appeal in the market. Further development and deepening of the domestic capital markets – bringing more local currency investment to emerging markets projects – is the ‘low-hanging fruit’: it’s the simplest solution for projects’ FX risk. However, this will not generate the critical mass of international investors that is required or the benefits of capital competition that they bring, given that international investors are notoriously adverse to emerging market FX risk comingle with credit risk. Development financial institutions (DFIs), agencies and international organizations already play a pivotal role in financing and facilitating emerging market infrastructure investment. Now they need to direct their convening power, influence and ability to effect change to address the challenge of FX risk in order to scale for greater private sector investment and ensure that local government entities do not have to absorb more of their local currency devaluation risk.

While passing the local currency devaluation risk to sovereigns and/or end-users is the most commonly deployed mechanism for dealing with FX risk in emerging markets infrastructure today, it has limited capacity and it represents a par excellence example of a ‘wrong-way risk’, where exposure increases as credit quality worsens.1

While there is no shortage of capital and there is growing recognition of infrastructure as an asset class, the currency mismatch persists.

1 This is mainly due to the high correlation between local, especially sovereign, credit risk and local currency risk.
What immediate measures can be put in place to tackle FX risk and bridge the infrastructure gap?

VA: I consider this to be the greatest opportunity and the greatest challenge in today’s global financial landscape. The challenge is that the likely size of the long-term emerging markets derivatives markets is dwarfed by the quantum of local infrastructure funding needs. This is especially the case with so-called ‘frontier markets,’ where infrastructure needs are the most urgent. Nevertheless, there are some strategies that can be implemented right now. They were recently shared during a private roundtable session that Citi hosted on the sidelines of the World Bank Group/IMF Spring Meetings and would go some way towards breaking the logjam in infrastructure investment.

One approach comprises various liquidity-oriented derivatives market strategies that aim to maximize the amount of currency hedge a project can attain via the derivatives market. In all emerging markets, without exceptions, short-term derivatives contracts are many times more liquid than long-term contracts (which are typically needed by a project). So, currency risk can be hedged with short-term (forward) contracts for the required value. The forward would be periodically rolled over (renewed) at expiry. An increase in the cost of a new forward (so-called ‘carry’, reflecting the interest differential between U.S. dollar and the local currency) is a risk — potentially affecting the project’s debt-servicing ability. However, a supranational or DFI Liquidity Facility might be considered as a risk mitigant. While an emerging market carry cost is not a risk to be ignored, it pales in terms of volatility and magnitude compared to FX devaluation risk. Moreover, unlike FX risk, carry reverts to pre-crisis level, almost without exception (see the Brazil and Russia crisis performance in the charts that follow), enhancing the project’s ability to repay the Liquidity Facility.

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1 These markets are entirely devoid of any derivative instruments (most of the LICC).
2 This could be subordinated debt extended by a DFI to the project, enabling it to rollover the hedge and service its debt.
Another example of a liquidity-oriented derivative market strategy is hedging currency risk using a proxy, i.e. a correlated currency or portfolio of correlated currencies, to achieve a larger hedge amount than the one available in the single-currency swap market. A proxy hedging strategy provides a solution to achieving a borrower’s desired hedge when hedging in a single currency is constrained due to limited liquidity (see below diagram).

Efficient Frontier for BRL Proxy Hedging Strategies USD 2 BLN equiv. BRL 10-year project, with max. amount of 10-yr BRL hedge capped at USD 0.5 BLN

Currency risk may also be hedged by accessing proxy-currency investors to raise funding in a local currency correlated with the domestic currency of the project; for example, a Colombian project might be funded in Mexican pesos or Chilean pesos rather than U.S. dollars. As many emerging market currencies move in tandem, if one is faced with a choice of funding a local project in U.S. dollars or in another emerging market currency, the latter one will almost always – at least from a correlation and volatility perspective – prove to be a better choice. The U.S. dollar is one of the most ill-suited assets to fund an emerging market currency asset. In relation to Latin America, countries in the Alianza del Pacifico

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4 The portfolio (‘basket’) approach is admittedly considered somewhat less attractive by the DFI community.

5 The Alliance of Chile, Colombia, Peru and Mexico offers tax benefits on investment in its capital markets. Currently under discussion are investments by Mexican Afores (pension funds) in the Colombian 4G road network.
Finally, currency risk can also be hedged by utilizing project risk-averse local investors to fund projects in local currency, with offshore investors that provide U.S. dollar collateral, such as T-bills, kept offshore. In another variation of this strategy, a local development bank provides local currency funding to offshore investors or a supranational, which on-lends local currency to the project. This strategy has been used for a CEEMEA project (via repo on euro treasury bonds) and is also being employed by Colombia using a development bank’s loans to international banks. What I particularly like about these strategies, aside from their elegance and simplicity, is that they do not require a local derivative market and, as such, provide a foreign investment solution for infrastructure in frontier markets.

Finally, currency risk can also be hedged by utilizing project risk-averse local investors to fund projects in local currency, with offshore investors that provide U.S. dollar collateral, such as T-bills, kept offshore.
What more can sovereigns and development financial institutions do to address the FX mismatch?
VA: All of the strategies described above limit the role of a DFI to that of a residual, conditional risk-taker: they are left with ‘right way’ risk rather than, for example, direct local currency devaluation risk. The risk of an increase in carry or basis risk between two correlated emerging market currencies or that of emerging market currency revaluation is dwarfed by a risk of emerging market currency devaluation.

My recent visits to London, Washington DC, Mexico City and Bogota to discuss new strategies and ideas highlighted the seminal role of sovereign and multilaterals in this endeavor. The idea of having emerging market investors from one country funding infrastructure projects of another emerging country (in Latin America this is known as the ‘South-to-South solution’) drew particular attention.

It is also worth noting that World Bank Group CFO Joaquin Levy highlighted the role of a Liquidity Facility as a catalyst to private investment for emerging market infrastructure in the June issue of Infrastructure Investor.
How optimistic should we be that these solutions can make a real difference?

VA: Citi is engaged in strategic initiatives redesigning financing for development and introducing new ideas and solutions to address FX risk in emerging market infrastructure. However, regulation, political idiosyncrasies related to each emerging market jurisdiction, undeveloped swap markets and a lack of appetite from foreign investors will render a uniform approach elusive for some time to come. Unlocking the needed capital from inherently risk-averse foreign investors to finance infrastructure in emerging markets requires a standardized effort spanning the private sector, development financial institutions as well as agencies and international organizations.

Cooperation among these critical actors has the potential to satisfy the growing demand for investment in emerging market infrastructure and introduce a more prominent role for local currency markets. And that could have a tangible impact on the ability of people around the world to improve their lives and build a better future for us all. ■

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The ability to make payments legally and with certainty is fundamental to facilitating trade. The role of money is integral to this process and has been for thousands of years.
Money – It’s Nothing but Data: The Rise of Digital Currencies

After 3000 years of using physical money, we are now entering the realm of digital money: national digital currencies and private cryptocurrencies are likely to co-exist. Ruth Wandhofer, Global Head of Regulatory & Market Policy and David Walker, Head of Public Sector Banking, EMEA assess whether these emerging digital offerings will gain the public’s trust.

The ability to make payments legally and with certainty is fundamental to facilitating trade. The role of money is integral to this process and has been for thousands of years. As economic requirements and technology have changed so have the tokens used for transactions – from livestock, to coins, to paper money. The latest change is digitization.

Money has three key properties. It acts as a medium of exchange, a store of value, and a unit of account. Money can function as a medium of exchange only in a system that allows for its secure transfer. The system must record these transfers, allowing for an audit trail that enables transparency and helps resolve disputes. And it can only function as a store of value and an effective unit of account if there is price stability.

Emerging trends in technology, regulation and consumer expectations and behavior are redefining the players, platforms and roles in modern commerce and financial flows. For example, many young consumers prefer to use online and social media-based services to communicate, connect, transact and share reviews. Financial services firms are innovating to accommodate these changes.

As technology adoption increases, consumers are being offered new, convenient ways to buy things. The annual transaction value of online, mobile and contactless payments reached more than $3.6 trillion in 2016, up from $3 trillion in 2015. Money, as well as payment processing, is moving from electronic to digital technologies, emphasizing – more clearly than ever – that money is nothing but data.

Digitization is clearly having a significant impact on how people use money. But are digital currencies at a point of development where they can adequately deliver the three key properties of money, and so truly emerge into the mainstream?
In recent years, financial market participants have become excited by digital currencies, with most attention focused on blockchain-based currencies like Bitcoin and Ethereum.

**Bitcoin cryptocurrency properties**

In recent years, financial market participants have become excited by digital currencies, with most attention focused on blockchain-based currencies like Bitcoin and Ethereum.

Bitcoin, the peer-to-peer electronic cash payment system, arrived in 2008, and is the antithesis of the traditional, regulated financial industry. It does not rely on financial institutions as trusted third parties. Instead, it is based on cryptographic proof. Bitcoin is the most important of the roughly 700 private cryptocurrencies in existence and has captured the world’s imagination since its introduction, although acceptance at retailers remains low.

The economic importance of bitcoin and its potential as a means of payment may be limited by its private nature and the absence of any government backing or a legal or regulatory basis. The highest number of bitcoin transactions in a single day in 2016 was 328,538; Visa processes 150 million transactions a day on average. Indeed the bitcoin platform can currently only process 7 transactions per second, compared with Visa’s capacity of over 2000 transactions per second, greatly limiting its scalability, and therefore usefulness, as a mainstream means of exchange.

Neither does bitcoin currently have the characteristics to be a unit of account or an accepted store of value. The key problem is its constantly changing purchasing power. Its price has fluctuated more than the most volatile commodities in recent times. Such a feature is incompatible with being accepted as money. Price stability is a key mandate of central banks, for which elastic monetary policy is a key tool. This process is at odds with bitcoin’s limited exogenous private supply which results in inherent volatility. Dramatic changes in purchasing power are the mortal enemy of any trusted currency.

In parallel there are societal, consumer protection and regulatory considerations regarding the viability of bitcoin in the mainstream. The cryptocurrency ecosystem remains imperfect, with periodic reports of hacking and theft of coins a major concern for consumer protection. The anonymity of cryptocurrencies raises concerns including anti-money laundering (AML), combating the financing of terrorism (CFT) and tax avoidance. Citizens, companies and governments need to have trust and confidence in systems for commerce, tax and social benefits. Authorities will ordinarily need access to identification and transaction information if all parties are to be provided with adequate levels of protection and reporting. Digital money ought to be easier to monitor than physical cash but societies will need to choose their level of oversight. The concept of society’s need for ‘privacy’ may win over the libertarian’s preference for ‘anonymity,’ allowing for a balance to be found among the needs of consumers, society at large and governments.

**Central bank experiments**

Bitcoin may not have yet exhibited the characteristics required to be viable as money, but that doesn’t necessarily mean that viable digital money is out of reach. What if a central bank issued a digital coin that was as widely accepted as a banknote? And if not a central bank, what if a group of banks or payments operators issued a digital coin?

Several central banks are experimenting with technologies and their legal and governance underpinnings. The Bank of England, Singapore’s MAS, Sweden’s Riksbank and Denmark’s Nationalbank – among many others – are exploring digital ledger technology, assessing the potential to issue their own digital currency and analyzing issues such as domestic and cross-border payments, digital identity and trade services.

Let’s consider again the question of medium of exchange. Given that our fiat money is today mostly electronic, its difference compared to bitcoin relates mainly to settlement. With paper money, transfer of value and settlement is simultaneous and instant. With electronic money there are two parts – the transfer of value and the after-the-fact settlement process. This delayed settlement causes friction in
payments generally. Might digital currency be able to blend the two aspects of transfer and settlement, making settlement simultaneous and instantaneous and removing the friction in the current system?

A number of technologies, including blockchain, are being assessed for their ability to support a national digital currency. Blockchain is a digital ledger that allows many parties to have read/write access; it uses complex algorithms to validate each entry. Everyone connected to the network can see what is happening without the need for a centralized clearing or settlement process. Instead of using financial intermediaries, the world would rely on financial protocols.

This development has the potential to remove the friction in payments and increase efficiency, transparency and certainty in transactions. One downside is that this decentralised system requires users to confirm each transaction, introducing additional processes into the reconciliation of money flows, with consequences for the amount of technology and energy required for computing. Continued experimentation and close collaboration is needed between governments, policymakers, industry and innovators to achieve sustainable outcomes in this next evolution of money.

Let’s consider now the characteristics of price stability and unit of account. Today, central banks actively seek to stabilize the value of money and keep purchasing power relatively constant by changing the size of the supply of money. Unorthodox monetary policy actions have been undertaken to achieve this in recent years, ensuring consumers experience predictable price stability and inflation, without regard for the underlying money supply.

Central banks today manage this elastic money supply by influencing the actions of credit institutions. Central bank digital money, if created, might conceivably bypass the financial sector and be issued to end-users directly from the balance sheet of the central bank. The central bank would therefore retain essential control over money supply and be able to deliver an acceptable level of monetary stability. Technologically the means exists today for a central bank to maintain many millions of accounts; after all, Facebook maintains billions of active accounts.

In such a scenario, digital money, like cash, would become a liability of the central bank, and many consumers would have a reduced requirement for intermediary banks. Retail banks might still serve the critical function of lending new money into the economy, even if they lost certain privileges regarding digital money accounts. They might even have to compete with the central bank for deposits.

Are we there yet? The big issues around monetary policy, financial stability, consumer protection and the technology involved continue to be investigated with vigor. There is clear official support for formal digital money, and the numerous experiments currently underway will yield valuable results and experience. A co-existence of national digital money with numerous private cryptocurrencies, perhaps offered by trusted brands and companies can be expected.

These central banks and their partners from the commercial, financial and technology worlds continue to develop the uses for the next generation of connectivity, convenience and security for society. The traditional economic tests for money; means of exchange, store of value and unit of account will act as the milestones on this journey.
Intra-regional trade forms the backbone of trade in Europe, Asia and North America, as the share of goods and services traded within each region covers more than 50% of the total volume.
Intra-African Trade: Will Africa Flow While the World Ebbs?

Deep uncertainty clouds the direction and trajectory of global trade given the recent economic and political developments. Anti-globalization, economic nationalism, shifting alliances and disruptive technologies are posing unprecedented threats to global trade flows not seen since the early mid-20th century. These forces are aggravating the discrepancy between the WTO’s forecast for global trade to expand by 2.4% in 2017 and the IMF predicted global economic growth of 3.5% per annum. This cements a worrisome trend where the ratio of growth in trade to GDP is declining from approximately 1.5x to less than 1.0x since 2011.

While there appear to be rising risks to the established trade patterns and partnerships, there are also evolving opportunities fostered by these same factors, particularly for those historically excluded from the benefits and advances of the existing regime – most notably Sub-Sahara Africa. Could the early 21st century herald the realization of an integrated and flourishing trade community on the African continent? Is there sufficient political leadership and commitment to forge the necessary foundation to drive sustainable growth and foster intra-regional trade flows? Can African markets harness the advances of technology to digitally connect with each other and to empower the potential of its youth? There are some very encouraging developments that are generating positive momentum for intra-Africa trade flows but there remain attendant risks that public policymakers and private sector players need to effectively manage in order to realise the trade potential of a region rich in natural and human resources.
In 2015, the talks of forming two mega trading blocs began in Africa.

State of Affairs of Intra-Africa Trade Flows
Intra-regional trade forms the backbone of trade in Europe, Asia and North America, as the share of goods and services traded within each region covers more than 50% of the total volume. In contrast, intra-African trade represents only 16% of total trade in 2014 albeit having grown from a low threshold of 10% in 2000.¹ The World Bank estimates that intra-Africa trade costs are the highest of any region in the world and approximately 50% higher than those found in East Asia. This cost structure has produced a region that is more integrated with the rest of the world than within its own continent.

While Africa has been constrained by a number of acknowledged factors, including a shortfall in physical infrastructure and a legacy reliance on primary commodity exports, there are two key lessons gleaned from the other regions that are beginning to be applied on the continent: the political will and leadership to foster integration through common institutions and rules, and the emergence of Global Value Chains (GVCs).

Regional Trade Agreements
In 2015, the talks of forming two mega trading blocs began in Africa. These mega blocs are to overcome the inefficiencies of sub-regional trading blocs and are signs of political will and commitment by nation states to promote regional integration.

Tripartite Free Trade Area (TFTA) includes the 26 countries that are members of the Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), and Southern African Community (SADC). The outreach of TFTA is vast; it covers a population of 632 million and a combined GDP of US$1.3 trillion.²

The even larger mega bloc, Continental Free Trade Area (CFTA), will bring together 54 African countries with a combined population of more than one billion people and a combined GDP of more than US$3.4 trillion.³ CFTA is expected to initially eliminate tariff and non-tariff barriers and later become the stepping stone to an African economic community.

These free trade areas will reinforce regional integration and promote intra-Africa trade by creating a much larger market for free flow of goods and services and serving as an impetus for infrastructure investments. It has been estimated that the large market created by TFTA will help to sustain economic growth at 6-7% as the regional integration decreases dependency on international trade. Further, the mega blocs can facilitate investments to infrastructure projects while creating much needed jobs for the continent’s young population.

As the TFTA and CFTA are still in the drafting phase, there are some considerations that may need strong political will in order to reach mutually beneficial agreements. The mega trade blocs can resolve issues with overlapping memberships, if the rules are superior to those of regional communities. The risk of low implementation of agreements can be resolved by agreeing to enhance the capacity of negotiators and policymakers. Hesitancy over implementing a common external tariff stems from dependency over tariff revenues in some of the member countries. However, focus should be on assessing the potential short-term losses against long-term gains.

¹ African Economic Outlook 2017
² The Benefits of Africa’s New Free Trade Area, Calestous Juma and Francis Mangeni (Technology +Policy | Innovation@Work), June 2015
³ Tralac (https://www.tralac.org/resources/by-region/cfta.html)
Through regional integration, Africa can harness its potential and build an economically and politically vibrant continent. The mega trading blocs can help facilitate the progress, but this requires unprecedented political power and negotiations in order to work. By focusing on promoting intra-African trade, manufactured goods will likely account for a larger share in both regional and international trade. This will create employment opportunities for the young population but also, by and large, help the economies to withstand in times of macroeconomic shocks. This in turn will help Africa to integrate into the Global Value Chains (GVCs), a crucial next step in moving towards sustainable development and economic growth.

Global Value Chains (GVCs)
GVCs constitute a larger share of trade than ever before. GVC trade accounts for 60-67 percent of global trade in value-added terms and constitutes a key driver for intra-regional flows growth. For instance, intra-Asian trade has grown from 42 to 52% over the last decade as a result of GVC integration aided by the promotional efforts by intergovernmental organisations like ASEAN.

Trade trends in Africa have been changing as the continent builds out its trade relationships in a more highly interconnected world market. Historically, developed economies were Africa’s main trading partners built on the extractive industries and the export of primary commodities. This pattern is slowly evolving as Africa diversifies its trading partners, e.g. emergence of China, but remains overly reliant on commodities exports. African countries need to focus on the creation of GVCs and increase their manufacturing and processing capacities to produce value-added products.

Compared to food and other products, intra-African trade in manufacturing declined from 18% in 2005 to about 15% between 2010 and 2015.4 However, African manufactured exports constitute a larger share in intra-African trade than with the rest of the world. This translates into more resilient intra-African trade than exchanges with the rest of the world, because primary products that constitute over 50% of trade between the continent and other countries are more susceptible to external price shocks than manufactured goods.

4 African Economic Outlook 2017
As recently highlighted by the World Bank, there is tremendous potential for Africa to establish and develop more regional value chains in a number of sectors and to substitute non-regional imports for African goods. In the production and processing of food, Africa possesses the necessary resources for self-sufficiency and beyond, however only 5% of Africa’s imported cereals are currently sourced from within Africa. The supply of food can be further enhanced through the regional processing of minerals including phosphates for fertilizers. Developments in one sector are also impacting and innovating regional supply chains: the emergence of off-grid power supplies is driving a nascent manufacturing industry for “fit for purpose” off-grid appliances including lamps, televisions and stoves.

Infrastructure
The quality of transportation and communication infrastructure in Africa is an obstacle for regional integration. In fact, infrastructure that is designed to facilitate international trade is much more developed than those of intra-Africa trade. Only 30% of African roads are paved and consequently the cost for trade increases. Shipping a car from Japan to Abidjan costs US$1,500 while shipping that same car from Addis Ababa would cost US$5,000.\(^5\) It has been estimated that the continent needs to invest nearly US$100 billion annually in infrastructure over the next decade and currently less than half of this target is met.

However, major infrastructure projects that span across countries are moving forward and will play a crucial role in developing an interconnected Africa. The North-South Corridor is a large infrastructure project which aims to connect seven countries in southern and eastern Africa. The project includes roadways and railways spanning more than 6,000 miles.\(^6\) Another large infrastructure project in western Africa, the Bamako-Zantiebougou-Boundiali-San Pedro Corridor, provides a route to open up access for landlocked countries, increased trade opportunities between Mali and Ivory Coast, and reduce the travel time by 70%.\(^7\) This is in addition to country-specific projects coming on-stream including rail projects in Ethiopia and Kenya that are opening access to the key ports of Djibouti and Mombasa.

African sovereigns must continue to invest and open up key infrastructure corridors to open up markets and drive down costs. Governments need to be coordinated and seek value for money, but they must also be smart on how and where they can apply technology in leapfrogging some of the trade challenges, particularly in the delivery of services.

\(^5\) UN Economic Commission for Africa, African Union and African Development Bank 2010
\(^6\) ICA (https://www.icafrica.org/en/topics-programmes/north-south-corridor/)
\(^7\) European Commission (https://ec.europa.eu/europeaid/blending/road-improvement-and-transport-facilitation-project-bamako-zantiebougou-boundiali-san-0_en)
Digitization

Important developments have taken place in connecting people in Africa, as an ever-increasing number of people now have access to mobile technology and are connected by the internet. Roughly 46% of the African population is subscribed to mobile services, Egypt, Nigeria and South Africa being the key markets, and a quarter of these subscribers also have broadband access. Internet development in Africa has allowed users to access information and financial services, monitor market prices, set up businesses, and connect with regional countries and the rest of the world. Even though internet penetration is the lowest compared to other regions, the number of connected users is growing faster than the global average.

Mobile technologies and services are essential in ensuring employment and sustainable development, because increased take-up of mobile services creates improvements in productivity and brings efficiency gains. In trade terms, global commercial services imports continue to outpace growth in merchandise trade at a rate of 5% to 1% (2010-2015) according to the WTO. Currently the mobile ecosystem has created 3.8 million jobs, including workers directly employed in the ecosystem and indirect jobs supported by the development of the sector.\(^8\)

\(^8\) GSMA (https://www.gsma.com/mobileeconomy/africa/)
Creating employment opportunities, especially for the young workforce is a major priority and challenge for many African sovereigns. Africa has the youngest population in the world and the youth accounts for 60% of the unemployed population. The region’s embrace of technology has driven transformational change across numerous sectors, including financial services, health and education. Governments need to continue to develop the appropriate policies and operating environments to drive change and create employment opportunities for their youth.

Conclusion
A G-20 report, Seizing the Benefits of Trade for Employment and Growth (2010), highlighted that “trade openness has been shown in practice to bring greater economic growth and greater employment, so long as it is complemented by appropriate macroeconomic and supporting policies.”

Against the backdrop of turbulent social, political and economic shifts in the world order, the African continent should inwardly concentrate its efforts and focus to aggressively promote the region’s “trade openness” and implement the relevant policies.

Political leadership and commitment will be critical to forging and implementing the proper macroeconomic and supporting policies as well as the necessary regional framework to foster faster and greater intra-regional trade flows. Continued strategic and collaborative investment in both physical infrastructure and human resources (i.e. education, health) is also fundamental to the implementation of the trade agenda.

Lastly, Africa needs to not only leverage its comparative advantages (e.g. favourable demographics, arable lands, natural resources) but also embrace and employ the disruptive technologies that are transforming the old order.

Digitization is changing the rules of trade by introducing new products and services, transforming industries and value chains, disrupting business models, and creating new employment opportunities. Technology should continue to allow Africa to realise advances and leapfrog physical challenges to provide greater access to products and services for its people and region. Today the momentum is positive and the direction is clear for the realization of an integrated and flourishing trade community on the African continent.

9 African Economic Outlook 2014
Tech for Integrity

Over 1.6 billion people annually have to pay a petty bribe to receive public services, an astounding number.
A week doesn’t go by without a news article somewhere about a government-involved corruption scandal. The explosion of corruption onto our front pages and into mainstream debate creates the impression of a new epidemic – a recent surge in global corruption with tentacles deep into the public sector space. In fact, in a recent Kroll survey of global executives, 40% of those asked said they believe bribery and corruption risks are increasing. According to Transparency International, some 58% of Africans across the continent said corruption is on the rise.

That said, it is just as possible that recent global public frustration with governments, combined with the extraordinary spread of information communication technology (ICT), have simply shined a very powerful new spotlight into the longstanding dark room of corruption; the absolute magnitude of corruption may not be new, rather the world is simply discovering more of it and tolerating less. As the digital age pulls back the curtain on today’s global “integrity” issues, the systematic application of technology will give us an opportunity for game-changing progress in the fight for integrity.

Needless to say, corruption, or the abuse of entrusted power for private gain, comes at enormous economic and social cost. It destroys the very trust that underpins democratic values and institutions, and puts cracks in the social contract that binds us together. 60% of young people see corruption as the most serious issue facing their local communities and the most important factor driving inequality. From a purely economic standpoint, according to the IMF, corruption is a tax on investors, undermining outcomes in virtually every global industry. While estimates vary, the WEF puts the cost of corruption at 5% of global GDP, or approximately $3.7 trillion dollars.

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1 I would like to thank my Citi colleagues for their contributions to this article, in particular Gabrielle Charnoff, Steven Holzer, Amor Sexton, Greg Baxter, Laura Gaviria Halaby, Alex McMahon and Tarun Ratan.
5 Transparency International, “What is Corruption?”
7 World Economic Forum
8 IMF, “Corruption Matters,” September 2015
From a business perspective, Angel Gurria of the OECD estimates that corruption adds 10% to the global cost of doing business and 25% to public contracts. Yet it is the world’s poor that are hardest hit! Over 1.6 billion people annually have to pay a petty bribe to receive public services, an astounding number. Recognizing this, the world’s new Sustainable Development Goals (SDGs), specifically SDG 16.5, targets substantially reducing corruption and bribery in all its forms.

The search for a new paradigm of integrity is now “top of mind” for the world’s political and economic leaders. A recent WEF survey points to 67 countries that consider corruption to be one of their top three problems. ICT may not be a magic bullet, but it is arguably the most powerful tool in the integrity tool kit. While governments have recognized this for years, the pace of technological advances is now supercharging these tools.

The inappropriate movement of money, payments and collections of any kind in the public sector is fundamentally enabled by legacy paper, manual and cash processes that only defy digital gravity by avoiding it all together. There has been significant progress in governments adopting electronic payments and collections, including the use of procurement and benefit cards to make payments. We have seen governments successfully implement mobile wallet payment and digital identity solutions; however, given the possibilities of existing and frontier technologies, we have only seen the tip of the iceberg.

While some may disagree, despite its historical significance and habitual societal entrenchment, cash is bad. Several years ago developmental organizations, including the UN and USAID, began an initiative supported by Citi that is directed at the poorest of the world’s population called the “Better than Cash Alliance.” Around the time of the launch of the Better than Cash Alliance, Citi and USAID published its Mobile Wallet Accelerator Principles, most of which are still highly relevant today. The Principles were driven by the belief that mobile phones, which are in the hands of 2 billion of the world’s poorest, could be transformational in connecting the poor to the economy and financial system. The fundamental objective of these mobile payment ecosystems is to replace cash, and by doing so, open up the door to a myriad of financially inclusive digital developmental solutions.

Commercial transactions in cash create a lack of transparency that contributes to suffocatingly low revenue to GDP ratios in the developing world. Citi estimates that a mere 10% improvement digitizing monetary flows has the potential to shift over $1 trillion dollars into the formal economy.

Needless to say, corruption, or the abuse of entrusted power for private gain, comes at enormous economic and social cost.

Private Investment

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<th>Private investment in Global FinTech companies ($bn)</th>
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Source: Citi and CB Insights; Includes first round and subsequent private investments.

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10 B20 Task Force on Improving Transparency and Anti-Corruption Speech, Angel Gurria, 2012
11 U4, “Reducing Bribery for Public Services Delivered to Citizens,” 2015
12 United Nations, Sustainable Development Goals
13 CSIS, “Costs of Corruption,” February 2014. 144 countries were surveyed.
15 CSIS, 2014
17 UN, Better Than Cash Alliance, https://www.betterthancash.org/about
18 USAID, Citi, “10 Ways to Accelerate Mobile Money,” 2012
19 Brookings, “Can Corruption Adversely Affect Public Finances in Industrialized Countries?,” April 19, 2010
Further, Citi estimates that $350-$400 million can be saved by converting cash payments to digital. Yet, digital is disruptive, and many of the frontier solutions are still being developed. Just as the digital revolution has turned many industries on their head, from media to music and taxis to hotels, it is at the early stage of disrupting financial and government services.

The financial technology (FinTech) feeding this disruption is aimed at cash; 70% of the $19 billion spent on FinTech investments in 2015 was focused on the last mile, where the electronic payment chain breaks down. From Kenya's digital wallets to India’s digital identity, to the disruption witnessed in P2P lending in China, the framework that anchors major components of our regulatory and financial system are being challenged. At the same time, this disruption requires new thinking around the safety and security demands of citizens. Governments should embrace technology with this in mind; CX must be the new UX.

Today, there are over 200 digital currencies in existence, the most well-known and first of many being Bitcoin, a decentralized “cryptocurrency.” Bitcoin developed its reputation as an anti-establishment, anti-centralized-trust, autonomous organization, which created opportunities for illicit financial flows beyond the reach of regulators and law enforcement. The extraordinary irony is that bitcoin’s technology platform, blockchain, may end up being one of the most significant integrity tools ever created. Blockchain is a platform that records and verifies transactions on a distributed database, or ledger, and is transparent, traceable and immutable.

Steve Johnson, in his seminal book on innovation, talks about “exaptation,” where a mature technology is borrowed from one area to solve an unrelated problem in another area. Bitcoin’s original purpose was to allow non-trusting parties to transact in a secure manner without a trusted intermediary. The “exaptation” of Bitcoin’s blockchain technology is likely to be a world of many, many blockchain platforms, with extraordinary wide ranges of permutations on the distributed ledger theme, including ones where there is, in fact, a third party of trust controlling and administering the chain. Some blockchain platforms will increasingly be permissioned, centralized while still distributed, where a government or Central Bank can have special permission to control a “master ledger,” with layers of permissioning depending on circles of trust.

Blockchain technology – for all its current uncertainties and risks – has the potential to challenge the backbone of global payment channels. The concept of a distributed ledger is not only potentially disruptive to centralized clearing as we know it, but also to all the legacy norms imbedded in and around paper currency, from economic policies and monetary policies to security policies and core social values. These challenges have moved into the rooms of regulators and Central Banks, as these Decentralized Autonomous Organizations, like Bitcoin, take aim at the heart of Central Banks’ trusted third-party role, causing many to be skeptical, cautious or outright concerned.
Despite these uncertainties, the power of having an immutable distributed ledger has meant that some governments have already begun using blockchain platforms. One use case is as an asset registry, for validation of physical world assets. For example, governments can immutably record real estate ledgers, data related to official development assistance, government assets, data related to monitoring of customs duties, or taxes of any kind. Estonia, Honduras, Ukraine, India, among others, have already implemented such blockchain platform solutions.34

In order to fully understand the power and potential of blockchain technology, one must understand smart contracts.35 Smart contracts will be transformational, as they will allow the electronic exchange of digital value or real assets to be programmed into a blockchain platform. Think of a smart contract as a contract made digital that executes itself autonomously based on certain programmed conditions. When the contract is made immutable by being put onto a blockchain as code, it becomes transparent and searchable. Imagine, therefore, in a world of smart contracts, a government being able to electronically audit digital contracts across an entire procurement supply chain, including the financing components. Integrity becomes exponentially easier to accomplish in a world of smart contracts.

Some Central Banks have come to see the fintech revolution — blockchain, smart contracts and the variety of related technologies — as a digital freight train that can’t be stopped. A number of Central Banks are, therefore, constructively engaging with these new realities to understand them, use them, adapt them and regulate them. Regulators, like the Monetary Authority of Singapore, are even bear-hugging these technologies, proactively investigating, sandboxing, and kicking the tires to help shape their future use.36 Such regulators will be the ones that dominate the new field of “RegTech,” where the regulators themselves use cutting-edge technologies to continue to successfully perform their function in the digital age.37

There is extraordinary brainpower in Central Banks today focused on looking at digital currencies and their potential. Many are testing and modeling their own potential parallel national digital currency, while others have struggled and pulled back. These potential Central Bank owned digital currencies will strive to utilize the underpinning of a blockchain platform, while re-introducing the centralized safety, trust, reliability and “regulatable” components of their role.38 Some are attempting to project the resulting impact of these currencies on the economy. The Bank of England, for example, has modeled a national digital currency (a digital pound) projecting a potential 3% annual increase in GDP.39 Even with the extensive thought, modeling and experimentation, the issues are still highly complex. Yet, that will not necessarily slow the train.

As blockchain and its derivatives come to life, the potential of monster-size big data analytics used to supercharge the integrity fight is also significant. Artificial intelligence, machine learning and predictive analytics will allow powerful virtual “search and destroy” missions to be waged against corruption over the internet.40 While Citi, Mastercard and others have been running complicated anti-corruption algorithms on government flows for years, advanced technologies run by groups like Darktrace and Arachne will likely take this to a whole new level.41

When we add the advances in biometrics (facial, voice and fingerprints) that will allow digital and multi-factor identity to combine with device, location and behavioral identity techniques, we will see a leapfrog in progress in

34 Tapscott, 2016
37 Duhaimes’s AML Law in Canada, “Fintech and Terrorist Financing – a major RegTech issue,” January 27, 2016
38 Tapscott, 2016
40 Tapscott, 2016
We will have to build a new social consensus around the appropriate rules, laws and regulations for the fast-changing digital age.

The digital world of the future will increasingly be networked, open and collaborative, creating exciting opportunities for integrity initiatives, but only if governments embrace those same concepts. Open Application Programming Interface (Open-API), tools that enable software systems to communicate, will increasingly become the norm, with the opportunity to take an Appstore approach to technology solutions that solve government problems. This connected world, when bolted to the Internet of Things (IoT) through a trillion sensors, will take transparency to new levels, as it will add physical assets to the already monumental amount of data captured and subject to advanced analytics.

These connected technologies will change the development landscape, as they have the potential to extract manual processes, paper documentation and cash from development flows. When the last mile is made digital and transparent, and information and money can flow freely both ways, the spotlight on the entire digital chain will be bright and the myriad of corruption flash points will become muted.

All of these technologies can be applied to issues surrounding Anti-Money Laundering and Counter Financial Terrorism (AML-CFT) and should encourage regulators and law enforcement to expand their work with fintech and bank players. Promotion of technologies that automate and reduce the cost of the Know Your Customer (KYC) and AML-CFT processes will reap enormous rewards. We should use the full array of technology in our arsenal for this fight. IDmission is one example of a company using integrated cloud-based capabilities, biometric identity solutions, data analytics and know-how on cross-border regulation to drive KYC and AML solutions globally.

While many of the emerging technologies will have to be adapted, tested, scaled and perfected, the bigger challenge may well be in changing societies' paradigms. We will have to build a new social consensus around the appropriate rules, laws and regulations for the fast-changing digital age. Issues like thresholds of privacy, digital safety, security and protection, and citizen experience (CX) need to be urgently addressed.

Johnson writes about how technologies create building blocks that open new doors to solutions previously unthinkable. Take as an example the advent and convergence of broadband, the internet and digital compression technology that gave us YouTube. Johnson calls this concept the “adjacent possible.” Emerging fintech and the convergence of multiple technological building blocks are opening the door to brilliant new ways to apply technology to the needs of citizens and the role of government; if we relentlessly explore and apply the technologies in our “adjacent possible,” we can win the integrity battle.

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43 Citi Perspectives, “Responding to Cyber Threats through Public and Private Partnerships,” 2014
44 MIT, 2016
45 Schwab, 2016
46 Financial Action Task Force
47 IDmission was a Citi Mobile Challenge winner
48 Johnson, 2010
Tech for Integrity, Part II

The first part of this paper, published last year, identified corruption as one of the greatest challenges of our time and outlined ways in which technology can help to defeat it. This second part of the paper, also by Jay Collins, Vice Chairman, Corporate and Investment Banking, Citi, highlights a series of innovations that are already delivering results in the fight against corruption.

I would like to thank Laura Gaviria Halaby, Gabrielle Charnoff, Jesse Podell and Alex Trotta for their assistance with this paper.
When our grandchildren read the history of the technological surge we are now living through as part of the Fourth Industrial Revolution, we will not be judged on the speed of commercialization or lifestyle improvements, but instead on how well society applied technological advances to solve the greatest challenges of our time, such as corruption.2, 3

Where do we start? First, by relentlessly applying new and existing technologies, we have to clearly identify corruption pain points. Second, we need technology innovators, big and small, to focus their firepower and develop solutions that address them. Third, the public and private sector need to work together to implement these solutions. This paper will discuss steps one and two, as well as provide a road map and a call to action on step three.

Before jumping into specific pain points and solutions, it is important to explain the background to this paper: an 18-month global public private partnership called the Citi Tech for Integrity (T4I) Challenge.4 This collaborative effort began in early 2016 during a Citi brainstorming session on how to use crowdsourcing as an open innovation methodology to tackle a major global challenge. Having studied the United Nation’s Sustainable Development Goals, we were struck by the magnitude of the corruption challenge (SDG 16.5) and how interested our global clients were in finding solutions. We knew that multiple technological building blocks had opened the door to potentially game-changing anti-corruption solutions and that many of Citi’s most innovative clients would embrace a focused open innovation effort to ‘do good’ and ‘do well’ at the same time.5

As a result, T4I was born. Citi was joined by Mastercard, Microsoft, IBM, Facebook, Clifford Chance, Let’s Talk Payments and PWC to launch T4I. These strategic allies were also supported by over 70 governments, NGOs and multilateral organizations such as the UNDP, IADB and the World Bank. We kick-started T4I at Davos in early 2017, and began by crowdsourcing integrity pain points from subject matter experts bucketed into eight pain point pillars.6 From several hundred qualified registrants, we selected 213 to be put through the T4I accelerator program, and ultimately selected 96 companies to showcase their solutions in six countries around the world between May and June 2017. In October, the IMF will host an award ceremony to recognize companies with game-changing integrity solutions. The solution examples provided in this paper are drawn from participants in the T4I Challenge.7

1. Cutting red tape

Paper document and manual processes create opportunities for corruption: T4I identifies a myriad of companies that responded to this challenge by using digital document management and workflow efficiency solutions that cut red tape and processes that facilitate corruption. As corruption festers in paper-based manual processing environments, T4I found a myriad of companies that responded to the Challenge with digital document management and workflow efficiency solutions. These workflow management solutions electronify data, automate processes, and then typically bolt on more technologically advanced solutions like digital signatures and identities, and digital document management and security. For example, Citygrows is electronifying paper documents and automating manual processes, simplifying execution, and digitizing and securing data in the cloud.8

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2 The Fourth Industrial Revolution, Klaus Schwab, 2016
3 This paper has been informed and enriched by dialogue and input from the hundreds of professionals that participated in the T4I process, including senior and technical government and multinational officials as well as innovators large and small that applied their talent to this challenge.
4 techforintegritychallenge.com
5 The 3 Trillion Annual Funding Gap: Financing the World’s New Sustainable Development Goals, Perspectives, 2015
6 techforintegritychallenge.com/images/content/Citi_T4I_Integrity_Pain_Points.pdf?v=
7 techforintegritychallenge.com/images/content/Citi-Tech-For-integrity-Challenge-Demo-Day-Finalists.pdf?v=
8 Citygrows, citygro.ws Other companies in this market include: Seamlessdocs, Acela, Socrata and Dept of Better Technology.
A plethora of solutions used a ‘permissioned’ blockchain backbone, where the blockchain acts as an immutable, digital data registry on which other functionality relies. Public official asset and liability declaration systems, for example, are difficult to search or audit when they are in paper form. However, when this information is put on a blockchain platform, it can be cross-checked against multiple databases for anomalies and incongruent information by using artificial intelligence (AI).

For example, Wallet.Services, which provides workflow solutions to over 100 agencies of the Government of Scotland, tailors batch data management (BDM) workflow solutions on a permissioned blockchain platform built using Microsoft Azure.9

Digital documentation brings many challenges and opportunities, including the need for e-signature controls and authentication; sorting and prioritizing volumes of data; securely maintaining sensitive information; e-signature protocols, authorization systems and electronic data management protocols are therefore critical. Companies like Dathena, which uses Nvidia’s AI, and Singapore’s Taiger can identify, classify and categorize documents and then analyze the documents for potential cases of fraud and corruption.10, 11

2. Analytics, reporting and transparency
The raw processing power now exists to run extremely complex algorithms at a speed and cost efficiency that was unthinkable in the recent past. Data is being electrified and stored at a breakneck pace; digital data is expected to grow at a 42% compound annual growth rate until 2020.12 As computational costs continue to decline, the phenomenal growth in digital data is providing a training pool for machine learning protocols focused on integrity issues.13

Data storage policies have changed from selectively stored structured data in curated warehouses to cloud-based unstructured data lakes. Open data, open contracting and open government efficiency disclosures allow for much Greater data to be made available for public scrutiny. Furthermore, cloud infrastructure for sharing and accessing data is increasingly automated, flexible, secure and cost efficient.

The massive scale and breadth of ongoing global digitization of data doesn’t just bring promise; unfortunately, connectivity and digitization have ushered in the peril of cyber threats. The world has yet to develop a credible response to the magnitude of increasing vulnerabilities posed by nation-state and non-nation state cyber actors. These actors threaten our network and cloud where the keys to the modern functionality of society are held. Tech for integrity tools require trust in order to be implemented, and greater cybersecurity is required to anchor that trust.

Many of the T4I finalists developed specific solutions that address data management challenges as well as more advanced tools that organize and analyze different types of data. One example is Privitar’s solution, which sorts through large pools of data, and identifies, manages and protects sensitive data.14

Because not all data is script, it has become increasingly important to analyze multi-form, unstructured audio and video data for fraud and integrity anomalies. Companies like Deepgram and Nice Actimize’s “ABC” solution use AI to analyze such data with enormous efficiency and accuracy, and are able to detect integrity anomalies.15, 16

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9 Wallet.Services, www.wallet.services
10 Dathena, www.dathena.io
11 Taiger, www.taiger.com
12 Citi Ventures Research
13 Mkomo.com
14 Privitar, www.privitar.com
15 Deepgram, www.deepgram.com
16 Nice Actimize www.niceactimize.com
As data increasingly moves through digital devices, solutions that can detect device fraud are also critical. Precognitive, for example, is a U.S. SaaS fraud prevention company that can look at device behavioral vulnerabilities and apply predictive analytics against aggregated device data.17

Finally, while 80% of all online data has location data imbedded in it, 90% of that data is left unused. Spanish company CARTO is commercializing solutions based on advanced algorithms that analyze and provide real-time visualization and predictive insights using location data.18

3. Identity
One of the fastest growing global crimes is identity theft; the absence of a straightforward way to prove identity feeds bribery, contributes to fraud and creates barriers to financial inclusion. A shocking 1.1 billion people in the world still lack a legal identity.19

During the T4I challenge, we saw numerous advancements in biometric, behavioral, device and token-driven solutions that together can drive a surge in global identity initiatives and other fintech innovation. The way to unlock the fintech toolkit is often with a robust identity key; similarly, little can be accomplished without first solving identity issues.

Multi-factor, layered identity solutions used for identity onboarding and verification, or for transaction authorization, increasingly draw on ever-advancing biometrics. PAYYAP, for example, has added IBM voice authentication technology to its e-commerce payment solutions20 and Chile’s TOC biometrics is commercializing multi-factor biometric identity approaches for its document solutions.21 Facial recognition tools are increasingly used, yet like voice recognition tools, need to protect against replicas and replay attacks. iProov, a company working with the UK government, is addressing this need with its color flash technology, which is combined with a layer of machine learning to provide high-grade facial recognition.22

Capturing and utilizing multi-source data to add additional identity security is an increasingly used methodology. ID.me, a company which is a U.S. Government service provider, has a solution that allows veterans and other citizens to access multiple government services and benefits through one portal with a single sign-on.23 In addition to being convenient for citizens, the solution combines multi-factor and multi-layer identity tools to maximize identity verification, including external credit bureaus, telco data, fraud algorithms, social media verification, and machine vision (imaging inspection).

4. Government transactions and payment processes
Not unsurprisingly, government payment processes with human interaction create a plethora of integrity pain points. If we seek to reduce the number of global bribes paid, for example, we have to target physical interactions between recipient citizens and distributing public officials. Too many governments distribute benefits without appropriate controls or verification mechanisms; often recipients falsely claim entitlements, receive a benefit more than once, or do not use the benefit as intended. A perfect example of this is conditional cash transfers (CCTs), which make a benefit dependent on a corresponding activity or behavior, such as educational stipends for school attendance, or health payments linked to receiving a vaccine. CCTs are a conceptually fantastic way to improve benefit incentives and impact, yet have introduced burdensome paper and manual administrative bureaucracy into the payment process, increasing the potential for corruption.

17 Precognitive, precognitive.io
18 CARTO, carto.com
19 World Bank Group, ID4D, 2017
20 PAYYAP, PAYYAP.network
21 TOC biometrics, crediwatch.com
23 Id.me, www.id.me
Digital integrity solutions applied to CCTs change this paradigm completely, electronifying and automating the authorization and payment process. Companies like PALPAY, a joint venture between Bank of Palestine and PCNC Solutions, and Myndgenie in India identify both the benefit recipient and the authorized condition certification professional, electronify the certification process, and then automatically release a benefit payment. This radically reduces the potential for corruption and provides hard data impact analysis for benefit programs. Mindgate, also in India, built an event and rule-based engine that automates conditional benefit programs, driving down leakage of their programs from 30% to near zero and taking the certification and payment process from 180 days to only three days. Mindgate also uses Aadhaar, India’s biometric identity program, which is driving the country’s extraordinary progress towards financial inclusion.

Governments also conduct frequent and large transactions with corporations, which, when run manually, make proper oversight and auditing difficult. The electronification of government transactional processes, like tax administration, customs procedures, or the reallocation of public funds or assets, all represent transactions that could be radically improved by digital systems.

One example of a frequent governmental transaction with multiple pain points is an asset sale by a government; governments frequently monetize small and medium-size assets, from real estate and cars, to computers, furniture and confiscated property. Often this sales process is bureaucratic, and any potentially competitive bidding process may be subject to collusion and limitations on participation and transparency, as well as price manipulation, resulting in lower proceeds for the government.

Ukraine is a good example of this problem; oligarchic behavior and 25,000 tender committees have repeatedly produced limited participation auctions costing the government of Ukraine $2 billion a year. An innovative solution was developed and deployed by Prozorro. Sale, an open source, non-profit, funded by Transparency International, a T4I Contributor. The solution layers a centralized database on top of multiple e-auction platforms, allowing the Ukrainian government to provide real-time, transparent buyer data via API and creating unfettered auditable competition among a variety of commercial auction platforms.

5. Public procurement and beneficial ownership

Annually, there is an estimated $9.5 trillion dollars spent on global public sector contracts; it is estimated that corruption adds up to 10% of the total cost of doing business globally, and up to 25% of the cost of procurement contracts in developing countries. Public procurement processes often lack end-to-end transparency. From bid announcement to project requirements, from the status of bid evaluations to the awards process, through to the monitoring of project implementation against project commitments, technology-driven solutions are now available to provide end-to-end transparency.

In order to achieve greater accountability for public purchasing decisions, digital records must be searchable and auditable. Coordination and communication among public procurement entities is often weak; there is a clear need to automate bidder eligibility verification across government so that disclosure of debarments and suspensions is consistent.

For example, big data and automated analytical tools can detect vendor reputational issues, bid rigging, phantom vendors, price fixing, repeat awards to the same vendor and vendor beneficial ownership issues. Crediwatch, for example, uses advanced algorithms to provide a snapshot of any potential government vendor by using 25,000 public data points, providing real-time risk insights.
Digital workflow process management tools also have enormous benefit when applied to the procurement process. End-to-end procurement solutions delivered via API, like those developed by Commugen, are increasingly compelling as can simply be bolted into toolkits by governments.\(^{31}\) Another solution, Teneris by Argentina’s Signatura, tackles tender offers, requests for proposals and sealed bid auction processes by providing a blockchain document management tool with digital signatures and document verification protocols.\(^{32}\)

Technology is required for better monitoring of bid specifications in ongoing projects; often bidders seek to substitute lower quality goods and services during the contract implementation phase in order to recoup the expense of bribes paid to win the mandate. Workflow oversight, where integrity checks are conducted during the execution of complex procured services, is perhaps most needed in the infrastructure space. India’s SuperWise, for example, ensures remote infrastructure construction control and transparency by providing workflow oversight using supply data input, worker and supervisor mobile apps, digital workflow, geo-location capabilities and picture content to tackle integrity issues in the infrastructure sector.\(^{33}\)

AI is a game changing tool when applied to procurement. Taiger, for example, uses multiple AI disciplines to automatically extract and interpret information from structured and semi-structured documents (contracts, powers of attorney, emails, tax documents, financial statements, etc.).\(^{34}\) In addition to reducing processing time from weeks to minutes and delivering extraordinary cost and operational risk benefits, Taiger is a powerful anticorruption tool. While Taiger is initially targeting bank clients, its integrity applications offer enormous potential benefits for government procurement and tax departments.

Remote and operationally challenging geographies, when combined with unbanked and unidentified individuals, create a burning need to develop quick and efficient identity onboarding tools that can be appropriately used across government, aid and developmental organizations. Corruption pain points are magnified exponentially when there are identity problems, as many organizations by default use cash distributions.

The lack of ‘last mile’ digital connectivity has been a major issue in crisis fund distribution not just because of the high fraud and corruption possibilities, but also because official aid organizations and NGOs face funding challenges when their impact analysis is undercut by a ‘blind’ cash component of the distribution supply chain. Impact analysis that includes last mile digital information often contains rich meaningful data that is linked to the flow of funds.

Digital crisis fund distribution options that are better than cash from an integrity perspective are cards and mobile wallets. As mobile wallet ecosystems are rolled out and gain critical mass, mobile payment options will become a more effective tool for crisis relief management. However, mobile wallet payment and collection benefits, combined with data exchange and location-based technologies, are only achievable with sustainable telecommunication and energy infrastructure.

While vanilla pre-paid cards have been tried and tested in those environments, technology and cost efficiencies driven in large part by investments by companies like Mastercard have launched a smart card revolution. The T4I Challenge highlighted a number of companies implementing card solutions with new onboarding techniques, advanced biometrics, reloadable functionality, robust transparent and analytical back ends, and an ability to function with or without internet connectivity.

Some of the most interesting financial inclusion innovators are using SMS, unstructured supplementary service data, radio-frequency identification (RFID), and near-field communication technologies to bring the benefit of electronification of information and

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31 Commugen, www.commugen.com
32 Signatura, signatura.co
33 SuperWise, superwise.site.
34 Taiger, www.taiger.com
payments to the last mile, without relying on internet infrastructure connectivity; these lowtech, or ‘flex-tech’ solutions are ideal for remote financial inclusion initiatives or for emergency government responses to natural disasters or refugee crises.

For example, Paycode, in Ghana, has combined a smart card, a biometric identity solution and a ‘bank in a box’ model that does not rely on internet connectivity to function. The Paycode solution has significantly reduced fraud, particularly associated with ‘ghost workers’, who are on the payroll system, but who do not work for the organization. Nultan has a contactless tap RFID payment solution, specifically designed for the transportation sector in Nigeria, allowing fast non-cash payments without the need for internet. This enables citizens using the bus, for example, to board and pay quickly, avoiding graft.

Meeting the impact analysis needs of the official development assistance community is greatly facilitated by the combination of multiple digital tools. AID:Tech, an Irish company that has proven itself to world class NGOs and large developmental institutions, demonstrated just such a multi-tiered aid solution during T4I; its service integrates advanced identity solutions and data analytics designed to meet very specific aid impact needs. AID:Tech is also an example of a company built on a blockchain platform, which makes distribution records immutable, transparent, auditable and searchable.

Finally, aid often includes non-cash distributions. In addition to identity technologies and advances in mobile wallet and card capabilities, PALPAY, for example, uses RFID technology to distribute and track noncash supplies to crisis recipients.

7. Ethics, engagement and education
There is little doubt that education and citizen engagement can contribute enormously to ethical behavior. As ethical societal norms are established at a young age, the problems of corruption need to be taught early through a variety of tools, including gamified learning. In order to deconstruct the cultural foundation on which corruption is built, there is a need to teach citizens about what constitutes corruption and what can, and should, be done to fight it.

Australia’s ArcLife provides ethical and anticorruption training, includes online courses, connectivity policy ‘snapshot’ tools, and best practices. Technology-based awareness campaigns that help modify the perception that corruption is unavoidable and whistleblower tools that help engage citizens directly in the integrity battle are softer tech, but nonetheless, essential tools. For example, Factico crowdsources data about public infrastructure and services in Mexico and includes a whistleblower app that allows citizens to take 30-second video clips and a Yelp-like interface for location visualization.

Citizens are increasingly demanding greater transparency, and while the technological means are there, society lacks new technology-enabled standards for transparency and disclosure. Transparency Internationals’ work to get governments to set goals and transparently track progress through its “anticorruptionpledgetracker.com” is to be applauded. Engagement initiatives should be encouraged at grassroots levels, where information can be simplified and social

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35 Paycode, www.paycode.com
36 Nultan, www.nultan.com
37 AID:Tech, www.aid.technology
38 PalPay, palpay.ps/language/en/home/
39 ArcLife, www.arclife.com

While vanilla pre-paid cards have been tried and tested in those environments, technology and cost efficiencies driven in large part by investments by companies like Mastercard, have launched a smart card revolution.
media platforms are effective. There is a corresponding need to increase the number and quality of channels for citizen feedback, allowing for complaints, comments, and, importantly, the ability to report corrupt activity anonymously and in different ways.

One example of this is iPaidaBribe, a Bangalore-based bribery reporting company, which has built a whistleblower app that targets petty bribery problem by crowd-reporting bribes.\(^{41}\) AasPass is an Indian integrity grievance communication app that directly links citizens with anti-corruption authorities, and includes audit trails, as a one-stop shop to report and chase corruption grievances.\(^{42}\)

8. Financial crime:
While illicit financial flows (IFFs) represent one of the most globally threatening areas of corruption, they have also proven to be a quagmire for governments, regulators and financial institutions. Global financial crime has been estimated to result in approximately $2.1 trillion USD in criminal proceeds, or 3.6% of global GDP. This, by many accounts, is not shrinking despite billions of dollars of spend by the global financial community.\(^{43}\)

The technologies and solutions reviewed through the T4I process have the ability to shine a spotlight into the dark room of financial crime. However, perhaps more than any other pain point pillar, the financial-regulatory law enforcement ecosystem will have to come together in an unprecedented way to facilitate, permit and coordinate a more robust accelerated adoption of potential solutions.\(^{44}\)

Nevertheless, there is much that can be implemented now. In particular, there are many AI-driven solutions for know your customer (KYC), anti-money laundering (AML) and counter financial terrorism (CFT). Companies like Tradle, which provides one-stop shopping for KYC functionality bridging internal and external networks using Blockchain technology, have tremendous potential in addressing IFFs.\(^{45}\)

In the past, AI has been difficult to apply to unstructured data, such as emails, voice, SMS, computer logs, chats and social media. However, AI and machine learning can now be applied to achieve extraordinary benefits for detection and enforcement. For example, financial institutions face a major challenge in managing ‘false positives’ in relation to AML: tens of thousands of alerts are manually reviewed and only a small fraction actually turn into a suspicious activity report. AI and ML increase the speed and efficiency of this process and lower costs. Furthermore, there have been significant advances in combining behavioral science and AI in relation to KYC, AML and CFT. For example, Quantexa can deliver a behavioral assessment of a potential or current customer/citizen by giving a 360 degree view of all behavioral network connections, providing a credit-risk score that is used during the KYC and AML processes.\(^{46}\)

The power of behavioral analytics combined with AI applied to unstructured data is demonstrated by Singapore-based Sqreem.\(^{47}\) It has built one of the world’s largest data-fusion capabilities ever deployed against corruption and is the quintessential example of the power of combining big data with AI capabilities. Sqreem uses AI to find anomalies (behavioral, specific intent, internal process and structural) by first defining normalcy within a gargantuan data set, stored on a platform occupying over 10,000 servers. While its solutions are applicable to virtually every pain point in the T4I Challenge, its solutions have extraordinary relevance and implications in tackling IFFs.

\(^{41}\) iPaidaBribe, www.janaagraha.org
\(^{42}\) AasPass, www.aaspass.org
\(^{44}\) Deploying Regtech Against Financial Crime, Institute of International Finance, 2017
\(^{45}\) Tradle, www.tradle.io
\(^{46}\) Quantexa, www.quantexa.com
\(^{47}\) Sqreem, sqreem.com.
Government onboarding: the path to implementing integrity solutions

There are several principles that are necessary for governments to implement game-changing integrity solutions:

- **Lead from the top**: Without the highest level of official sector leadership, these solutions will not be implemented. The demonstration of the commitment to integrity begins with a leadership commitment to implement integrity solutions and partner with the private sector.

- **When in doubt, pilot**: Regulators are having success ‘sand-boxing’ new fintech solutions. Many of the innovative solutions coming out of T4I are being piloted (or need to be piloted) before being rolled out in scale.

- **Open APIs**: Most of the innovative companies in this space can be onboarded through APIs, which are faster, scalable, cost efficient and flexible. Companies, like Brillant Pay are building their entire service delivery strategy around providing open API gateways. While most governments are not yet ready to adopt this approach, it will inevitably become mainstream. Governments that adopt open API models have the potential to implement innovative opportunities at a previously unthinkable pace.

- **‘Reliable as a service’**: Many of the innovative companies in the T4I Challenge are relatively small by government standards, yet they have embraced new technologies, in partnership with the likes of IBM, Mastercard, Microsoft, PWC and others. Many SMEs have accelerated the testing and adoption of cutting-edge solutions by using blockchain, AI, smart card, biometric and cloud solutions ‘as a service’. T4I judges frequently found that Microsoft Azure or Cloud services, or IBM’s Blockchain or Watson, were imbedded, or that Mastercard had run the pilot, or PWC had added an auditorial layer of reliability to a solution. All of this can provide comfort to governments as they seek to innovate.

- **Train the team**: Governments cannot design technologically advanced, solution-oriented RFPs, and review tech ideas from consultants, ICT providers and fintech innovators without the necessary competency. The allies and contributors in the T4I Challenge are committed to building capacity.

- **Utilize the expertise of the private sector**: Governments must leverage the knowledge of the private sector effectively and build a deep partnership with it.

**Conclusion**

The fundamental hypothesis of Tech for Integrity Part I was that technology has the potential, if applied aggressively, to radically reduce corruption. The Citi T4I Challenge only served to confirm that hypothesis. The technologies and solutions needed for the integrity war are not futuristic; they are available now. There are a plethora of companies that have the interest and capacity to successfully compete for transparent mandates to execute their integrity solutions; the enthusiasm with which they participated in the T4I Challenge was a clear demonstration. James Wolfensohn, then president of the World Bank, called the world to action in a historic 1996 speech by urging us to “fight the cancer of corruption wherever we find it.” More than 20 years later, we have the technological tools to find and fight this cancer. It is up to us to use them. The private sector strategic allies, NGOs and official contributors of the T4I Challenge, including Citi, stand ready to play a leadership role in the next stage of this effort.

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48 Brillant Pay, www.brillantpay.com

In the past, AI has been difficult to apply to unstructured data, such as emails, voice, SMS, computer logs, chats and social media.
Governments around the world face financial challenges: in many instances they are being asked to do more with fewer financial resources. As a result, they are seeking efficiency savings.
Why Centralization and Consolidation are the Future for Ministries of Foreign Affairs

By establishing a vision and choosing their targets carefully, ministries of foreign affairs can rapidly realize sizeable financial and operational benefits, writes Jim Millette, Head of Global Foreign Missions Banking at Citi.

Governments around the world face financial challenges: in many instances they are being asked to do more with fewer financial resources. As a result, they are seeking efficiency savings. Overseas spending by ministries of foreign affairs (MFAs) and embassies, which can account for a significant part of total government cross-border spending, is often identified as offering savings opportunities. Many embassies’ processes are manual and lack centralized oversight: there are significant opportunities to improve efficiency, lower costs and reduce potential risks.

However, undertaking the necessary business process change to successfully achieve savings can be daunting. MFAs have hundreds of embassies worldwide, many of which have considerable local financial autonomy. Despite the obvious shortcomings of a decentralized structure and the clear potential benefits that would arise from consolidation and centralization, it is often hard for many governments to know where to start. The scale and scope of the challenge faced by MFAs seems too large and too onerous.

Fortunately, consolidation and centralization does not have to occur in a single implementation. Instead, an incremental approach can be taken that generates immediate efficiency and financial benefits – these can even be used to fund further stages of a program. It’s important to see centralization as a process rather than an event. Every stage on the journey offers learning opportunities and benefits that are worthwhile in themselves, while making future stages and savings easier to achieve.

A process, not an event
The U.S. Department of State’s financial services consolidation serves as a practical example of the benefits an incremental approach to centralization can deliver. From 1991 onwards, the Department of State began a process of consolidation of its treasury, payments, foreign exchange and other financial processes. Nothing was set in stone: structures established in some stages were subsequently further consolidated – but each stage created additional efficiencies.
The Department of State’s key drivers and considerations during its centralization strategy were:

- Cutting both visible and invisible banking costs – the latter were especially high in the case of non-relationship banks in emerging markets – to enable the department budget to be put to better use.

- Enabling activity to be focused on trusted relationship banks improving risk management and increasing negotiating power.

- Reducing the number of financial and administrative resources in the field and moving them to centralized locations. This lowers costs associated with moving administrative staff during a crisis or emergency.

- Advancing digitalization and improving systems efficiency.

- Convincing department and treasury seniors that centralization is a process that generates benefits across several administrations rather than being a one-off activity.

The Department of State initially consolidated the accounting and disbursing operations of 21 regional Financial Management Centers worldwide into three regional Financial Service Centers (FSCs): FSC Mexico City, FSC Paris and FSC Bangkok. In subsequent years, as financial systems became more sophisticated, significant savings were achieved by further consolidating accounting, disbursing and payroll to a new financial center headquarters in Charleston, SC while maintaining regional support in Bangkok. Later advances included consolidation of post-related financial activities, such as expensive post-assignment travel/change of station vouchers and medical payments.

The business process change associated with these initiatives was significant. Critical to its success was the concurrent implementation of a quality management system (QMS). A QMS gave the Department of State the ability to measure the quality and timeliness of its operations; it could therefore identify opportunities and justify business process change, which enabled cost savings to be realized. Most recently, the State Department has implemented ISO-9001:2008 certification, putting over 1000 people in multiple locations under a centrally managed QMS and ISO certification, with integrated performance measures and processes.

Four steps to success

1. **Visibility before execution**: Governments should start with visibility and vision when planning their consolidation strategy. Many governments, including those of technologically advanced countries, remain partially or totally paper-based and consequently have limited oversight of their treasury, payments, collections, bank accounts and other financial services.

   In practical terms, this means that millions of dollars are sent to embassies around the world for local disbursement with extremely limited visibility into program execution. In the current financial environment, these practices are unsustainable. MFAs should start by identifying their existing accounts, policies, structures and processes. Once complete, they can look for centralization opportunities, which are considerable given that the vast majority of MFAs’ finance is executed locally out of embassies.

2. **Start small and build on successes**: Typically, the top 10 to 15 embassies will account for a majority of all costs associated with overseas operations and therefore are a good starting point to target for centralization first. The specific financial functions that should be prioritized will vary according to the transaction profile of embassies.

3. **Calibrate the cost savings**: Payments are usually the first to be centralized: processing and execution costs can be reduced by as much as eight times compared to local payment initiation. Similarly, centralization of the FX component of payments can lower costs: spreads may be five times lower than those offered by local banks. The State Department was able to reduce voucher processing costs from as high as $55 per voucher at some posts to about $15 by centralizing at shared service centers (SSCs) in Bangkok, Manila and Sofia.
4. Communicate clearly and constantly:
Centralization must be handled carefully. There may be resistance at a local level given that functions are being transferred. It is important to communicate the rationale for centralization clearly. A high level advocate for the strategy who is prepared to drive the process is essential. Equally important is the message that while certain processes may move to an SSC, program execution decisions will remain local.

The broader benefits of centralization
Centralization offers many opportunities to lower costs. The establishment of an SSC for payment processing creates economies of scale, while centrally executed payments and FX are cheaper than local alternatives (and are also consistently priced). In particular, centralization enables domestic payments to be segregated from cross-border payments, which tend to be less efficient and significantly more costly when managed by local banks.

Treasury centralization also offers opportunities to consolidate banking relationships, which may reduce fees. Moreover, payment centralization enables local balances to be kept to a minimum, optimizing returns on overall balances.

However, cost savings are just one benefit of centralization. In today’s environment, the integrity of payments, security and fraud prevention are key objectives for governments. A centralized model requires standardized policies and controls and dedicated specialists, which help to improve the quality of processes. For example, centralized payments use an independent ‘checker’ outside the embassy, which minimizes operational and fraud risk. Similarly, the replacement of cash and check payments with electronic methods minimizes fraud risk and provides a full audit trail, while global real-time statements facilitate better control and transparency.

The pressure on government to control costs, and improve accountability, will only increase in the coming years. Ultimately, MFAs should move to a centralized model given the enormous financial and control benefits it offers. Those that have yet to take the first step should take comfort that the challenge is not as great as it seems.

Working with a trusted partner
As MFAs respond to budgetary pressures by seeking to lower costs and operate more efficiently, they can use Citi’s suite of tools to help achieve their centralization and efficiency goals including:

- CitiDirect BE® is a web-based global banking platform that brings together all of an MFA’s banking functions in one security-protected location, providing centralized access to account information in real time from any computer or mobile device. Solutions accessible via CitiDirect BE include Multi-bank Transaction Initiation, which enables payments to be made from third-party bank accounts via the CitiDirect BE platform, and the ability to initiate payments via SWIFT messages.

- CitiDirect BE® Liquidity Manager (formerly TreasuryVision®) is a comprehensive treasury analytics and workflow platform for cash and investments monitoring, which brings efficiencies to global liquidity and risk management. It delivers enhanced visibility by providing a multi-currency, multi-geography view of data aggregated across far-flung operations and multiple financial institutions.

- WorldLink® Payment Services offers comprehensive cross-border payment capabilities using a variety of payment methods including funds transfers, ACH and checks in local currency or USD. It makes cross-border payments simple and secure by enabling users to issue payments in more than 135 currencies from their offices via a single window – without having to maintain local currency accounts.

Citi combines its leading online cash management technologies and tools with extensive experience of acting as a valued partner to MFAs around the world and deep knowledge of cross-border transactions. As a result, Citi is well placed to help MFAs achieve their centralization objectives in the most effective way possible while delivering a seamless and rapid implementation.
The way humanitarian relief is provided is changing amid an underlying shift to sustainable development.
Digitization for Development

The adoption of digitization by consumers, businesses and governments is a key driver for socioeconomic progress. In developing markets, the rate of mobile phone penetration is accelerating economic development and financial inclusion and therefore changing the deployment of humanitarian relief. Electronic payment methods, including the use of mobile wallets to make and receive payments, deliver numerous short- and long-term benefits for development organizations and humanitarian relief recipients. Development organizations and governments in developing countries have a responsibility to promote their use and seize the benefits they offer.

The way humanitarian relief is provided is changing amid an underlying shift to sustainable development. In 2016, the UN Secretary-General Ban Ki-moon called for cash-based assistance to become the default method to support people in emergencies wherever possible. Cash-based assistance refers to not just the transfer of physical currency, but the delivery of financial value regardless of the medium. Traditionally, relief has been in-kind, with food, medicines, seeds and other types of relief sent directly to the locations where they are required. In-kind aid continues to have a crucial role in instances where there are severe market disruptions, emergencies, natural disasters, or in scenarios where a local market does not exist.

In other contexts, the rationale for the shift to cash-based programming is twofold. For beneficiaries, receiving cash-based assistance gives them purchasing power and the ability to meet their own needs – it is an empowerment tool that encourages greater dignity and self-reliance. At the same time, the money received as cash-based assistance circulates in the community and benefits the local economy beyond the recipient. The World Food Programme’s Director of Innovation and Change Management, Robert Opp, notes that local economies receiving cash-based assistance have enjoyed a multiplier effect in terms of benefits – for example, every dollar given to a Syrian refugee translates into at least two dollars in the local economy. For development organizations, cash-based assistance is also advantageous in certain contexts, because it can be easier, faster and cheaper to administer than in-kind aid – though there is still a requirement for security if there are large amounts of physical currency.

Traditional cash-based programming mechanisms and digital alternatives
Existing mechanisms enabling cash-based assistance include the distribution of physical cash, prepaid cards (also referred to as stored-value cards) and vouchers. While these methods of assistance offer many advantages, there are some disadvantages.
The distribution of hard-currency offers recipients many benefits given its widespread acceptability. However, it creates opportunities for corruption and theft: the vast majority of bribery cases involve a cash transaction. Physical cash distribution also has significant security and human resources costs, requiring organization employees to “separate funds into individual envelopes, a time-consuming process that requires close supervision. They then have to transport and distribute the cash to beneficiaries which again takes time and requires investment in security,” according to a report by the Bill & Melinda Gates Foundation and Dalberg Global Development Advisors. Organizations are often evaluated by their donors on the basis of how much humanitarian relief reaches end-recipients. The use of physical cash inevitably increases leakage—development organizations are therefore eager to minimize its use.

Prepaid cards can be reloaded as required making them a flexible mechanism. While this lowers their costs over time, they do carry an initial cost. Other drawbacks are that beneficiaries have to be in an area that supports card-based payments, and that beneficiaries may be unfamiliar with cards and require special training to use them.

Vouchers can be in either paper form (verified by the organization) or increasingly in electronic form. Both types can be taken to local participating retailers and exchanged for goods. One advantage of vouchers is that they potentially offer greater control over where money is spent and on what items. One downside is that vouchers are typically not digitized. Therefore, like physical cash, they require a manual process and distribution logistics.

The use of digital payment methods is increasing significantly in the development sector. While there are already many applications for digital solutions, the pace of innovation for digital cash transfer applications is accelerating.

For example, advances in biometrics are driving innovations in cash-based programming, helping to deliver a higher level of accountability. The United Nations World Food Programme in Jordan launched an innovative iris scan payment system, allowing Syrian refugees living in camps to purchase food items from local shops using a scan of their eye. Once the shopper has their iris scanned, the system automatically communicates with the UN Refugee Agency’s registration database to confirm the identity of the refugee and their remaining balance.

Mobile wallets are also becoming an increasingly important mechanism to provide humanitarian relief to beneficiaries. Mobile wallets effectively act as a store of value, similar to a bank account, on a mobile phone; they do not require linkage to an account at a traditional bank. Payments can be sent via text message and funds stored on the phone can be used or withdrawn at participating retailers.

Why payments to mobile wallets make sense
In developing countries, despite progress, many people continue to be unbanked. Moreover, traditional banking infrastructure is often limited in nature. While people therefore have limited access to traditional retail banking services in emerging markets, mobile phone penetration
in many countries is high: payments into mobile wallets therefore offer considerable advantages over traditional payment methods. Mobile wallets have been extremely successful in parts of East Africa, where there is a significant demand for small value payments: payment volumes via Kenya's M-Pesa payment system are now larger than bank-based volumes.

For development organizations delivering humanitarian relief, mobile wallets offer a number of advantages. Costs, including security, human resources and preparation, are considerably lower than in-kind aid as distribution is electronic. According to a paper by the Bill & Melinda Gates Foundation and Dalberg Global Development Advisors, after initial high costs, including purchasing mobiles for recipients, mobile money is 15% cheaper than paper vouchers.\(^1\) Digitization of payments for relief workers in Sierra Leone during the Ebola crisis, delivered cost savings of more than $10 million while also cutting payment times for relief worker salaries from over one month to around one week.\(^4\)

Mobile wallets significantly reduce the risk of corruption, fraud and theft and improve safety and security for both beneficiaries and aid workers as cash is not being transported. A study by global humanitarian organization, Mercy Corps, comparing the use of mobile money and physical cash distribution, found that incidents of theft of cash transfers fell by more than 50% thanks to the use of mobile money.\(^2\) Mercy Corps also found that 82% of beneficiaries surveyed thought that mobile money offers more security than cash.

As well as speeding up payment of relief workers, mobile wallets accelerate the distribution of humanitarian relief. Cycle time for mobile money is approximately 2-2.5 times faster than the delivery of physical cash or paper vouchers, according to the Gates Foundation study: physical cash typically takes 12 days, vouchers take nine, but mobile money takes only five days. The report also notes that mobile wallets reduce reconciliation time for payroll lists and have a lower rate of human error when it comes to data entry.

In addition to the above-mentioned efficiencies and value-add, probably the most important advantage of utilizing mobile wallets is traceability and control. Network operators are able to track where money has been spent, providing a digital audit trail that enables the organization and ultimately the donor to see exactly how many people received relief and how much value each recipient received, according to a report by communications equipment company Ericsson.\(^5\) As with vouchers, the use of funds provided as humanitarian relief that are held on mobile wallets can be restricted to certain stores or items such as food, water and medicines. The increased transparency of mobile wallets could increase confidence among donors and unlock future funding; it could even potentially elevate governments' dialogue with taxpayers who seek to better understand how development budgets are spent.

Mobile wallets also offer a longer-term advantage over some other forms of cash-based programming: they encourage financial inclusion by increasing access to loans and other financial products, boosting prosperity. Research by Tavneet Suri of the Massachusetts Institute of Technology and William Jack of Georgetown University estimates that access to the Kenyan mobile money system M-Pesa increased per capita consumption levels and lifted 194,000 households, or 2% of Kenyan households, out of poverty.\(^6\) While a mobile wallet is not a traditional bank account, it is a financial service and acts as a gateway to enable individuals to have more control of their financial lives. Mobile wallets allow people to save money and therefore feel less vulnerable; in such circumstances they may be more willing to take risks and establish small businesses, for example. The ability to save money using M-Pesa is thought to have encouraged women below the poverty line to leave subsistence farming and take up more lucrative occupations, according to Suri and Jack.

**Government has an important role to play in paving the way for mobile wallets, and ensuring that large banks can integrate into this payment channel in developing countries.**

**Mobile wallets are being supported by central governments**

Government has an important role to play in paving the way for mobile wallets, and ensuring that large banks can integrate into this payment channel in developing countries. One driver for the involvement of government is that mobile wallets provide needed financial services to unbanked and impoverished communities as is the case with Kenya (see overview on following page). Another motivation is that increased use of digitized payments has the potential to increase tax revenue. A case study by Rashmi
Pillai of the Consultative Group to Assist the Poor showed that digital payments in Tanzania not only spur economic modernization, but could boost the country’s tax revenue by nearly $500 million a year.\(^7\)

Government support for mobile wallets is essential in a number of areas. Firstly, a comprehensive and robust national identification system is necessary: without one it is impossible to prove who is sending and receiving payments. Secondly, a mobile wallet can improve financial access and convenience, while reducing fraud and increasing security.

Benefits of One Acre Fund’s transition from previous physical cash to the digital farmer repayment process include the following:

- **Convenience and transparency:** In a 2015 survey of 250 farmers, 100% preferred mobile repayment to cash.
- **Fraud reduction:** Instances of repayment fraud fell 85% after digitization of repayments.
- **Security:** Farmers, especially women, felt safer than when holding cash.
- **Faster processing time:** Total repayment processing time fell from 16 days to 2-4 days.
- **Lower administration costs and improved allocation of resources:** Total repayment collection costs for the One Acre Fund fell 80%, largely due to easier reconciliation. Staff employed in repayment processing fell from 56 to four.
- **Value added service to beneficiaries:** Time spent by field officers on collection activities was cut by almost half, enabling them to spend more time with farmers on improving their agricultural practices and yields.

### What Kenya gets right

Kenya’s M-Pesa is widely held up as an example of one of the most successful mobile wallet systems in the world – and a demonstration of the huge potential benefits that they can bring to a population. What has made it so successful?

From a technological perspective, mobile phones are ubiquitous in Kenya with penetration of 86.2%\(^9\). Moreover, while Kenya is a competitive mobile telecom market, Safaricom, which operates M-Pesa, has a 65% market share, meaning that a large proportion of the population is capable of making or receiving a payment via a single mobile network.\(^10\)

Kenya also has the social and behavioral conditions required to make mobile wallets a success, as does much of Sub-Saharan Africa. Along with a large unbanked population, there is a pressing social requirement for payments. Kenya has a large migrant population in urban areas that supports families in rural areas. With a limited banking network and few cost-effective, high quality alternatives, mobile wallets met an unfulfilled need for Kenyans to make domestic remittance payments.

Finally – and importantly – Kenya’s government recognized its citizens’ need for such a product and decided to allow a permissive regulatory environment during the launch of mobile money, allowing mobile network operators to run pilots and scale up the solution before more restrictive laws and regulations were put in place. This decision lowered launch costs and risk for mobile operators and gave them the confidence to innovate.

The success of M-Pesa has prompted scores of innovations that leverage the money transfer system, enabling users to save, pay their utility bills and even sell solar power or buy tradable government bonds.\(^11\)

One notable success story is One Acre Fund, a social enterprise with longstanding Citi Inclusive Finance partnership, which provides smallholder farmers with agricultural inputs and training to grow their way out of hunger and poverty. Products and services are provided on credit and now repaid using the Citi M-Pesa solution, and the program, which is expected to reach 520,000 farm families this year, typically increases farmer’s income by more than 50%.\(^12\)
receiving funds. In many countries, individuals with the greatest needs do not have a form of identification or a fixed address. In countries where systems exist but are considered insufficiently trustworthy, mobile operators and banks are more likely to be cautious when investing in, and integrating with, mobile wallets. Only government has the authority and resources to implement a national ID scheme.

Secondly, government needs to take a measured approach to regulation, varying the requirements according to the stage of development that mobile wallets have reached in a country. While clear guidance on mobile wallets must be available from the start, mobile operators are more likely to invest in mobile wallet infrastructure if there is a guarantee of regulatory flexibility during the initial stages. Once mobile wallets gain momentum, regulations for mobile network operators (MNOs) that provide mobile wallets should be aligned with the banking system with regard to anti-money laundering (AML) and prudential measures; this will ensure that all parties have confidence in mobile wallets over the long-term. Governments must criminalize and impose penalties on money launderers and provide strict enforcement measures. In addition, MNOs should be required to meet Financial Action Task Force recommendations, which include know your customer (KYC) and customer due diligence requirements, transaction monitoring, suspicious activity reporting, screening procedures and mandatory recordkeeping.8

Confidence in MNOs’ ability to not only know their customers but also monitor and screen payment originators and beneficiaries against watch-lists will increase the likelihood of bank integration with mobile wallets. This is especially important for cross-border payments and interoperability between MNOs: operators on both sides of a transaction (the payer and the payee) should conduct similar KYC, screening and monitoring to minimize AML risks. In addition, placing restrictions and controls on the size of individual mobile wallet transactions and setting monthly transaction limits will ease AML concerns.

From a prudential perspective, it is crucial that MNOs protect the monetary value consumers place in mobile wallets. Ensuring that consumers have a right to their money without risk of loss is of the utmost importance. Government should therefore require MNOs to hold a certain level of funds in trust based on payment volumes or deposits on their system, for example. Ultimately, the goal should be to encourage inter-operability between mobile wallets and the traditional banking system.9

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Citi’s Public Sector clients are keen to anticipate what the future may hold and how emerging technologies could impact and transform cities and nations.
Citi Innovation Labs: Creating the Transaction Services of the Future

The pace of change is accelerating in transaction banking as a result of myriad technological innovations and new ways of thinking. In the following Q&A, Dustin Ling, Citi Public Sector Banking, talks to Gulru Atak, Head of Citi Innovation Lab, about how Citi Innovation Labs are harnessing outside partners and working with clients to realize these inspirational developments.

What are Citi Innovation Labs?
Citi has a global network of Labs that drive innovation throughout each of Citi’s businesses. They are strategically located around the world, including the U.S., Mexico, Ireland, Israel and Singapore. The Innovation Labs pioneer the exploration of disruptive trends and technologies to build the capabilities for future Citi solutions.

Together, the Lab Network promotes rapid research, experimentation and prototyping of next-generation solutions that will deliver value to our clients around the world. We conduct proof-of-concepts and pilot tests and learn across a range of emerging technologies, including blockchain and cryptocurrencies, biometric authentication, the internet of things, and artificial intelligence.

I lead the Innovation Labs in Dublin and Singapore, where we drive new capabilities for our clients in Citi’s Treasury and Trade Services (TTS) business.

How do Citi Labs approach innovation?
The Citi TTS Lab role is two-fold: firstly to execute – to ideate, develop and deliver innovative propositions, and secondly to enable – to act as a catalyst and supporter for innovation across the broader TTS organization.

The Lab takes a client-centric approach to developing new solution propositions, starting with an insight into a client need or problem and seeking to develop compelling solution responses. We engage closely with our clients throughout the journey from validation to co-creation. The Lab employs a design thinking mindset to ensure users have a positive experience across all touch-points as well as delivering an effective working solution.

In addition to solution innovation, the Lab also experiments with new and emerging technologies with a view to building strategic and re-usable assets for the TTS business.

The Lab also acts as a catalyst and enabler for broader innovation across the TTS organization.
Our close engagement with business partners and a wider ecosystem facilitates innovation across the organization. We bring together industry players, whether clients or regulatory bodies, to identify the real pain points when an industry touches financial services, such as working capital management, and we then brainstorm solutions together.

We have recently hosted Open Innovation Challenges for clients with partners, allies and the wider ecosystem. For example, Citi Tech for Integrity was an open innovation challenge launched earlier this year to source solutions that promote integrity, accountability and transparency in the public sector.

How does Citi involve clients in the innovation process?
The Lab is committed to close, interactive engagement with our clients from the early stages of the innovation process. We connect with clients in a variety of ways: we welcome clients visiting our Innovation Labs, and connect with our clients at project level to validate, co-create and collaborate on specific solution ideas.

Innovation Lab (experimentation/visits)
Our Innovation Labs act as hubs for intensive client engagement in innovation. Typically the initial contact could be a tour of the Lab, to share and engage with clients on innovation projects and solutions at various stages of evolution.

Project owners connect with clients through phone calls, meetings and workshops to validate key assumptions made, to build out design and to refine the evolving solution response.

From time to time, clients will approach Citi/TTS to partner on an innovative idea: Citi Lab works directly with the client team as well as with our business partners in TTS as the project progresses.

Engagement forums: digital money roundtable
In addition to one-to-one engagement, hosted client events can be effective for dynamic idea generation and discussion with clients. One example is the Digital Money Roundtable, which is a forum we host with Public Sector clients on an annual basis. Citi Public Sector, TTS and the Innovation Lab have formally engaged senior public sector clients over the past two years during the IMF Spring Meetings on digital transformations impacting central banks. The private forum has convened central bank governors for digital transformation briefings and best practice sharing on a variety of topics, such as blockchain, digital money solutions and cryptocurrencies.

Open Innovation Challenges
Citi has a strong track record of hosting Open Innovation forums to engage partners and source pain points directly from our clients. Both the Consumer-led Mobile Challenge and Tech for Integrity Challenge for Public Sector have proven to be incredibly useful to our clients. At demo days, the winners are selected and awarded seed money to pilot and accelerate their innovations. As we crownsource ideas by connecting clients with industry start-ups, we can create engagement and impact across the ecosystem to solve the needs of our clients.

What key trends and themes have you observed when engaging with public sector clients?
Across all our client base there is evident interest and curiosity at the disruption and the innovation that is happening apace in the world today themes such as the internet of things, digital money and machine-to-machine interactions. Our public sector clients are keen to anticipate what the future may hold and to understand how these changes could impact and transform cities and nations.

For these clients, relative focus clearly depends on the priorities for their own citizens and nations, but some key themes emerge:

Simplicity at scale the ability to make payments intuitively and at scale; enhancing consumer engagement with public sector services.

Connectedness and integration financial inclusion and digital identity; how micropayments can power smart cities.

Governance and security information flow, including data protection; transparent procurement; how to monitor and prevent fraud and other criminal activities.

Digital Money assessing and understanding the broader impact and implications of a national digital money for macroeconomic and other national and international systems.
What new technology capabilities is the Citi Lab working on that could be game changers for transaction banking?

There is so much going on in terms of new and emerging technology that has the potential to transform transaction banking and many other industries. One of the really interesting by-products is the change in perspective on what is possible, as an inspiration to tackle what was previously unsolved, as well as to approach using new and disruptive business models. This type of impact could be just as much a game changer as the application of the technologies themselves.

**Blockchain**

While there is currently plenty of buzz around blockchain, Citi established a blockchain center of excellence in the Dublin Lab in 2015 together with Citi Ventures, our venture capital arm. Our focus has been exploration and experimentation, to understand the dynamics of distributed ledger technologies and assess their applicability across a range of use cases. As a result of this experimentation, Citi TTS and Nasdaq were able to partner on a compelling solution proposition to support a trading model for private securities. The pilot was launched in May 2017, using tech start-up chain’s distributed ledger technology to record and transmit payment instructions which were processed through the Citi financial network.

**APIs**

While Application Programming Interfaces (APIs) are a well-established technology that is widely used in the consumer space, e.g. in phone apps, its potential applicability for commercial transaction banking is really only starting to be realized. APIs will facilitate the industry-level transition from batch processing to real time. In 2017, Citi TTS launched its own platform, CitiConnect API, for payment initiation, payment status and account balance inquiries. Clients can expect that APIs will transform all types of interactions with their bank, from exchanging information to initiating transactions and how they access a range of services. At the moment the limiting factor for clients to be able to leverage at scale is the diversity of API standards being used.

**Data science and AI**

From Citi TTS’ viewpoint, developments in the field of data science and Artificial Intelligence (AI) will also be transformational for transaction banking. As just one applied example, we are currently working on a predictive risk analysis tool, which will help clients to detect outlier payment transactions from established patterns and routines, and to set additional controls. It is a self-learning tool, based on the client’s payment data history. The system can identify outliers with a certain level of confidence and reroute them to a final approver. This will help our clients proactively monitor and action irregularities in their payments processing.

As in the other areas of focus, the Lab actively collaborates with external parties and partners. For example, AI was a hot topic at Mobile World Congress, so we have teamed up our data scientists with AI companies to uncover real-use cases for transaction banking and develop solutions for our clients.

**How disruptive will these new technologies be to transaction banking and Citi’s clients?**

In the near term, transaction banking is not facing the same level of disruption as retail banking, mainly because of the time it takes to build trust in the eyes of institutional clients, and the fact that the stakes are much higher when a treasurer or chief financial officer (CFO) is making government or company decisions.

In terms of clients, we have not seen disruption on a large scale just yet, but we will. However, it will take a cultural shift in both government entities and corporate organizations. For example, as millennials become treasurers and CFOs, expectations and behaviors in business banking will align with that generation’s day-to-day experiences.

We should take inspiration from the developments happening today. We should envision the future of treasury and cash management, and begin work today to realize that vision – that is what we are doing in the Lab.
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