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*Monday, March 19, 2018*

Top 10 risk and compliance management related news stories  
and world events that (for better or for worse) shaped the week's agenda,  
and what is next

Dear members and friends,

Do you believe that [Artificial intelligence \(AI\)](#) is [enhancing the power of the human brain](#) in the same way that electricity enhanced the power of the body 150 years ago?



Prof Joachim Wuermeling, Member of the Executive Board of the Deutsche Bundesbank, gave a very interesting presentation at the 2nd Annual FinTech Conference. He said:

[“Artificial intelligence and big data](#) are currently the strongest and most vivid innovation factors in the financial sector. Using AI in finance may trigger dramatic improvements in many businesses. AI elevates the role of data as a key commodity.

Used wisely, big data make outcomes more reliable and may improve financial mediation. Process chains can be organised in new ways. ["The scope and nature of banks' risks and activities are rapidly changing,"](#) as a recent Basel Committee analysis puts it.

This evolution towards increased use of non-human intelligence is not something that has just occurred in the last few years. The first invention of

neural networks, a central pillar of most AI systems, dates back to the year 1943.

Until a few years ago, the main users of big data and AI in the area of finance were certain [hedge funds and high-frequency trading](#) firms. In recent times, the application of AI in finance has begun to spread widely, via "normal" banks, FinTechs and other financial service providers, to the general public.”

But, Prof Joachim Wuermeling continued: “But [opportunities are always accompanied by risks](#). As regards the financial system, if too much trust is put in "intelligent" systems, [the stability of financial markets may be at stake](#). The workings of AI can be a mystery; it can trigger loss of control, make fatal errors, and have a procyclical effect due to its mechanistic functions.

Pattern recognition has its limits. This can be dangerous particularly in crisis scenarios. [An autopilot would never have been able to land a jet on the Hudson River](#). Nor can algorithms stabilise in periods of financial stress.

Looking at the recent turbulence in equities and the market for VIX-related financial products, it can be concluded that the events of 5 February share [many similarities with a "flash crash"](#). Unfortunately, as with the original flash crash of May 2010, we have only limited knowledge about the direct drivers that triggered the event.

It can be assumed that algorithmic market participants were quite active during the relevant period. But as to which strategies were applied and to what effect, we have no knowledge so far. The [rise in volatility in the S&P 500](#) then nearly instantly affected the VIX industry, making it not the cause but more the first victim of this market event, with losses up to 95 % on assets. [We do not expect this phenomenon to disappear](#) in the future. On the contrary, more of these flash events are to come.

[AI is still in its infancy](#). Continuous processes for the entire AI lifecycle still have to be defined and scaled for business needs. That means that AI must be embedded in the process of acquiring and organising data, modelling, analysis and delivering analytics.

[The skills gap](#), particularly with regard to data science and machine learning expertise, is the foremost challenge. At this stage, [non-human intelligence is far from replacing](#) the human brain in any respect.”

This is a [very interesting presentation](#). I understand that, like Heraclitus has said, there is nothing permanent except change. Perhaps it is too early to feel confident that AI will not create new major vulnerabilities.

[Albert Einstein](#) believed that the true sign of intelligence is *not knowledge but imagination*. Is this possible with artificial intelligence?

[Aristotle](#) has said that there is no great genius without some touch of madness. [Edgar Allan Poe](#) added that science has not yet taught us if madness is or is not the sublimity of the intelligence. As you see, I try to be positive, and I try to ignore that, according to Plutarch, the mind is not a vessel to be filled but a fire to be kindled.

Read more at Number 8 below. Welcome to the Top 10 list.

*Best Regards,*

*George Lekatis*

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*Number 1 (Page 10)***Basel III Monitoring Report, March 2018**

BANK FOR INTERNATIONAL SETTLEMENTS

This report presents the results of the Basel Committee's latest Basel III monitoring exercise based on data as of 30 June 2017.

The Committee established a rigorous reporting process to regularly review the implications of the Basel III standards for banks, and it has published the results of previous exercises since 2012.

The Committee's [finalisation of the Basel III reforms is not yet reflected](#) in the results; the collection of relevant data for those reforms started for the end-2017 reporting date.

Data have been provided for a total of 193 banks, comprising 106 large internationally active banks.

*Number 2 (Page 13)***Where do we go from here? The future of US-EU financial relations following the finalisation of Basel III**

Speech by Dr Andreas Dombret, Member of the Executive Board of the Deutsche Bundesbank, at the Institute of International Bankers, Annual Washington Conference, Washington DC.



“Take global banking regulation - and [Basel III](#), in particular. On the one hand, we have just finalised Basel III, the global minimum standard for international banks. On the other hand, parliaments and governments in the United States and the European Union are debating regulatory changes

that [seem to diverge](#) from this global compromise. Banks remain uncertain about precisely what the regulatory future holds.”

*Number 3 (Page 21)*

## [A Euro Cyber Resilience Board for pan-European Financial Infrastructures](#)

Benoît Cœuré, Member of the Executive Board of the European Central Bank, at the first meeting of the Euro Cyber Resilience Board for pan-European Financial Infrastructures, Frankfurt am Main.



“Recent technological advances have enabled cybercriminals to conduct ever more sophisticated, precise and powerful attacks.

And nobody is immune to cyber risks, including businesses, financial infrastructures and public administrations. So [we should avoid a "blame and shame" culture](#) and work together.

The ECB and the Eurosystem are striving to lead by example. At the ECB, overseers, operators, supervisors and IT security services are working together more closely on cyber issues.”

*Number 4 (Page 24)*

## [The Federal Reserve's regulatory agenda for foreign banking organizations - what lies ahead for enhanced prudential standards and the Volcker rule](#)

Speech by Mr Randal K Quarles, Vice Chairman for Supervision of the Board of Governors of the Federal Reserve System, at the Institute of International Bankers Annual Washington Conference, Washington DC, 5 March 2018.



“Non-U.S. firms serve as an important source of credit to U.S. households and businesses and contribute materially to the strength and liquidity of U.S. financial markets, so it is critical-not just as a matter of fairness but as a matter of our domestic interest-that we as regulators ensure that they operate in a fair and open financial services sector. I view that as an important part of my job.

So today I want to share my perspective on the appropriate regulatory environment for foreign banks operating in the United States, as well as some thoughts on specific elements of that regime. Before doing that though, [we should take stock of the pre-crisis history of foreign firms operating in the United States.](#)”

*Number 5 (Page 34)*

### [Making globalization work](#)

William C Dudley, President and Chief Executive Officer of the Federal Reserve Bank of New York, at the Central Bank of Brazil, São Paulo.



“Although the debate about the benefits and challenges of globalization is not new, it has recently come into sharper focus. This debate is important to all of us, and I think it is particularly relevant to Brazil given its importance in the global economy.

Globalization [means different things to different people](#). In my remarks today, I will focus on the role of globalization as a force for international economic integration and economic development.”

*Number 6 (Page 38)*

## [Largest reported DDoS attacks mitigated](#)



The largest ever reported Distributed Denial of Service (DDoS) occurred in early March 2018, according to Netscout Arbor.

A peak of [1.7 Terabits per second \(Tbps\)](#) was recorded, [although the attack was mitigated](#).

This followed a recent attack against GitHub on 28 February, with a peak of 1.35 Tbps. The largest known attack previously took place in 2016 against the US DNS provider DYN, which peaked at 1.2 Tbps.

The method used for these attacks is known as a [‘memcached server DDoS’](#). Memcached servers store data in memory that applications may need access to on external databases.

*Number 7 (Page 40)*

## [Private cryptocurrencies and lessons from a red paperclip](#)

Nestor A Espenilla, Jr, Governor of Bangko Sentral ng Pilipinas, at the Shareholders' Association of the Philippines (SharePHIL) General Membership Meeting and Cryptocurrency "The Truth & The Myth Forum", Makati City.



“But there it is. Cryptocurrencies are a medium of exchange. The Bangko Sentral ng Pilipinas (BSP) recognizes this. We have defined crypto or virtual currency as any "form of digitally stored value created by an agreement within the community of virtual currency users." As far back as 2014, the BSP advised the public of the features, benefits and attendant risks in dealing with cryptocurrency.”

*Number 8 (Page 48)*

## Artificial intelligence (AI) in finance - six warnings from a central banker

Prof Joachim Wuermeling, Member of the Executive Board of the Deutsche Bundesbank, at the 2nd Annual FinTech Conference, Brussels.



“AI in finance could impact on the functioning of our financial system in a profound way. Some suggest that AI is [enhancing the power of the human brain](#) in the same way that electricity enhanced the power of the body 150 years ago. Hence, it could become a big thing in finance.

[Artificial intelligence and big data](#) are currently the strongest and most vivid innovation factors in the financial sector. Using AI in finance may trigger dramatic improvements in many businesses. AI elevates the role of data as a key commodity. Used wisely, big data make outcomes more reliable and may improve financial mediation. Process chains can be organised in new ways. "The scope and nature of banks' risks and activities are rapidly changing," as a recent Basel Committee analysis puts it.

This evolution towards increased use of non-human intelligence is not something that has just occurred in the last few years. The first invention of neural networks, a central pillar of most AI systems, [dates back to the year 1943.](#)”



*Number 9 (Page 55)*

## Call for experts for TRANSSEC - Transport Resilience and Security Expert Group

ENISA launches this call for participation to invite experts in security of different sections of the transport sector to participate in its expert group



ENISA has established this expert group to cover security and resilience of transport systems as they undergo a digital transformation built around a plethora of interconnected devices and systems that facilitate automation and intelligent decision-making.

The [threats and risks associated with the digital transformation](#) of the transport sector are manifold and have a potential impact on citizens' safety, health and privacy, in addition to the availability of the critical transport services themselves.

*Number 10 (Page 57)*

## Making Gray-Zone Activity more Black and White

New program aims to lift the fog obscuring an adversary's intentions in slow, simmering non-traditional conflicts



An emergent type of conflict in recent years has been coined “gray zone,” because it [sits in a nebulous area](#) between peace and conventional warfare. Gray-zone action is not openly declared or defined, it's slower, and is prosecuted more subtly—using [social, psychological, religious, information, cyber and other](#) means to achieve physical or cognitive objectives with or without violence.

*Number 1*

## Basel III Monitoring Report, March 2018



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The Committee established a rigorous reporting process to regularly review the implications of the Basel III standards for banks, and it has published the results of previous exercises since 2012.

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Data have been provided for a total of 193 banks, comprising 106 large internationally active banks.

Overview of results Table 1

	31 December 2016			30 June 2017		
	Group 1	Of which: G-SIBs	Group 2	Group 1	Of which: G-SIBs	Group 2
CET1 ratio (%)	12.3	12.3	13.4	12.5	12.4	14.7
Target capital shortfalls (€ bn); of which:	0.3	0.0	4.4	0.0	0.0	0.2
CET1	0.0	0.0	0.0	0.0	0.0	0.0
Additional Tier 1	0.0	0.0	3.1	0.0	0.0	0.1
Tier 2	0.3	0.0	1.2	0.0	0.0	0.1
TLAC shortfall 2022 minimum (€ bn)	116.4	116.4		109.0	109.0	
Total accounting assets (€ bn)	67,969.6	44,497.7	5,003.6	66,685.8	43,526.7	4,788.8
Leverage ratio (%)	5.8	5.8	5.5	5.8	5.7	5.6
LCR (%)	131.4	128.6	159.3	134.0	130.8	174.9
NSFR (%)	115.8	117.3	114.1	116.9	119.3	117.6

All data provided on a fully phased-in basis. See Section 1.1 for details on the scope of the exercise and Table A.2 for the target level capital requirements.

Source: Basel Committee on Banking Supervision.

These "[Group 1 banks](#)" are defined as internationally active banks that have Tier 1 capital of more than €3 billion, and include all 30 banks that have been designated as global systemically important banks (G-SIBs).

The Basel Committee's sample also includes 87 "Group 2 banks" (ie banks that have Tier 1 capital of less than €3 billion or are not internationally active).

The Basel III minimum capital requirements are expected to be fully phased-in by 1 January 2019 (while certain capital instruments could still be recognised for regulatory capital purposes until end-2021).

On a fully phased-in basis, data as of 30 June 2017 show that [all banks in the sample meet both](#) the Basel III risk-based capital minimum Common Equity Tier 1 (CET1) requirement of 4.5% and the target level CET1 requirement of 7.0% (plus any surcharges for G-SIBs, as applicable).

Between 31 December 2016 and 30 June 2017, Group 1 banks continued to reduce their capital shortfalls relative to the higher total capital target levels; in particular, the Tier 2 capital shortfall has decreased from €0.3 billion to €24 million.

As a point of reference, the sum of after-tax profits prior to distributions across the same sample of Group 1 banks for the six-month period ending 30 June 2017 was €212.8 billion.

In addition, [applying the 2022 minimum requirements for Total Loss-Absorbing Capacity \(TLAC\)](#), 10 of the G-SIBs in the sample have a combined incremental TLAC shortfall of €109 billion as at the end of June 2017, compared with €116 billion at the end of December 2016.

The monitoring reports also collect bank data on Basel III's liquidity requirements. Basel III's [Liquidity Coverage Ratio \(LCR\)](#) was set at 60% in 2015, increased to 80% in 2017 and will continue to rise in equal annual steps to reach 100% in 2019. The weighted average LCR for the Group 1 bank sample was 134% on 30 June 2017, up from 131% six months earlier.

For Group 2 banks, the weighted average LCR was 175%, up from 159% six months earlier. Of the banks in the LCR sample, 99% of the Group 1 banks (including all G-SIBs) and all Group 2 banks in the sample reported an LCR that met or exceeded 100%. All banks reported an LCR at or above the 90% minimum requirement that will be in place for 2018.

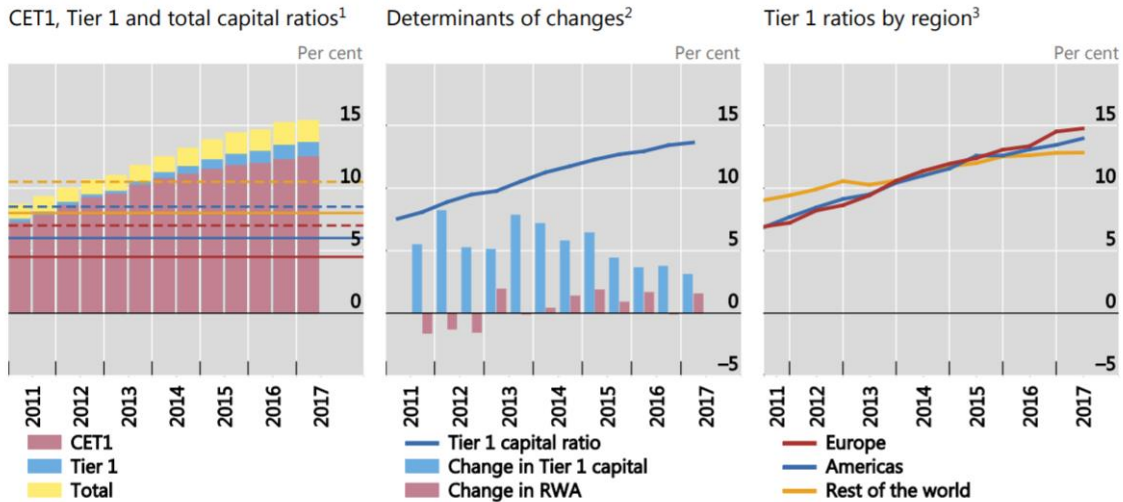
Basel III also includes a longer-term structural liquidity standard - the [Net Stable Funding Ratio \(NSFR\)](#). The weighted average NSFR for the Group 1 bank sample was 117%, while for Group 2 banks the average NSFR was 118%. As of June 2017, 93% of the Group 1 banks (including all G-SIBs) and 94% of the Group 2 banks in the NSFR sample reported a ratio that met or

exceeded 100%, while all Group 1 banks and 99% of the Group 2 banks reported an NSFR at or above 90%.

### Fully phased-in Basel III capital ratios continue to increase

Consistent sample of Group 1 banks

Graph 1



<sup>1</sup> The solid lines depict the relevant minimums, the dotted lines the minimums plus the capital conservation buffer. See Table A.2 for the relevant levels. <sup>2</sup> Exchange rates as of 30 June 2017. <sup>3</sup> See Table B.1 for the composition of the regions.

Source: Basel Committee on Banking Supervision. See Table C.5, Table C.6 and Table C.7 for underlying data and sample size.

To read more:

<https://www.bis.org/bcbs/publ/d433.pdf>



*Number 2*

## Where do we go from here? The future of US-EU financial relations following the finalisation of Basel III

Speech by Dr Andreas Dombret, Member of the Executive Board of the Deutsche Bundesbank, at the Institute of International Bankers, Annual Washington Conference, Washington DC.



### 1 Introduction

Ladies and gentlemen

Thank you for the kind introduction. It is a pleasure to be in Washington and at the IIB's annual conference. Let me use this opportunity to give you my perspective on the future of US-EU financial relations at this well-suited moment, given that the most important post-crisis global reforms have now been finalised.

When I was going to prepare this speech, I asked myself: "[What do all of us in this room have in common?](#)" Do bankers and supervisors across the atlantic share the same convictions? Do we have the same ideas on financial policy? Honestly, I am not perfectly sure on this. So I assume there is at least one major area of common ground, and that is the uncertainty we feel with respect to how things will proceed.

Take global banking regulation - and [Basel III](#), in particular. On the one hand, we have just finalised Basel III, the global minimum standard for international banks. On the other hand, parliaments and governments in the United States and the European Union are debating regulatory changes that [seem to diverge](#) from this global compromise. Banks remain uncertain about precisely what the regulatory future holds.

Moreover, this uncertainty does not stop at finance. The US administration's economic policy announcements, as well as Brexit and

other elections, are causing many to call into question the extent to which nations will actually coordinate their future economic policies.

**This tension between the global and national level creates political uncertainty.** For example, many enterprises feel insecure about the economic policies under which they will have to do business in the future. Likewise, bankers are asking how much of Basel III will be implemented in their jurisdictions and wondering about the individual paths that some countries will take.

This tension between global harmonisation and cooperation, on the one hand, and countries' demands for individual approaches, on the other, will be one of the main fault lines - if not the crucial one - in future US-EU financial relations. Let me elaborate on this challenge.

## **2 What we should - and should not - expect from international harmonization**

Recent years have made us confident - perhaps a little overconfident - with respect to global harmonisation. It would be fair to assume that the global financial crisis and its aftermath played a considerable role in that respect. In the wake of the crisis, we have witnessed a resolute international response led by the world's twenty heavyweight economies.

The international community has put on a truly remarkable display of determination. While the G20 was founded quite some time before the crisis, its members' resolve to take common action was unprecedented in the US city of Pittsburgh in 2009 and at subsequent summits.

Key milestones were achieved in international banking regulation. And this will to reform continued until recently, when the new international minimum standards for banking regulation, also known as Basel III, were finalised.

The international response to the crisis was necessary to make the architecture of the global banking system both credible and acceptable to society at large.

But let's not get carried away by global thinking, and **we should not fall into the trap of global harmonisation as a cure-all** - by which I mean the idea that, if some global rules are good, more global rules would always be better. Instead, we have to live with the fact that, in today's world, international agreements are still made with national and regional interests

in mind. And even though there are strong arguments in favour of harmonisation, we have to respect that, in some areas, there are also strong arguments against common approaches and reasons as to why countries should set their own distinct sets of rules.

A key topic nowadays is that of nations striving for greater sovereignty. In Europe, the most striking example of this was when the United Kingdom decided in a national referendum in 2016 to withdraw from the European Union.

[On both sides of the Atlantic](#), too, we have also experienced it in the form of drawn-out negotiations for trade agreements. Just think about the criticism levelled against CETA, the comprehensive Canada-EU trade deal, and TTIP, the corresponding US-EU project, which slowed these projects down or even brought them to a halt.

Proponents of greater national sovereignty have a point: sovereignty provides scope to deal with issues in a national way. A regulatory landscape that is aligned to national particularities requires, to some extent, that there are national instruments and policies on hand. Fully harmonised rules take away that leeway.

We can even observe this with respect to banking regulation. Currently, global standards that are aimed at large and internationally active banks also have an impact on small community banks. These institutions do not inherently require the same rules as international banks. [On the contrary](#), these rules may interfere with the important role that they play in the economy. I will come back to this subject later on.

For now, my point is a general one. When thinking about the future of international relations, ignoring national political constraints does us no favours. Instead, we will need to tolerate some degree of international diversity.

The first consequence is to take note of the ongoing necessity to balance national and international goals. The second consequence is to identify those instruments that serve these goals most effectively. Today - and across policy fields - [we are still figuring out how this can be achieved](#).

But what does this mean in practice? Going beyond political speeches, redefining the balance of global cooperation and national sovereignty will be a demanding process involving many technical and political decisions,

where it may make sense to opt for greater harmonisation in some cases and for greater divergence in others.

That's why we do not have a simple, universal blueprint. Let me outline some of the developments in three crucial areas of future cooperation: the breadth and depth of financial globalisation and cross-border banking, global regulatory standards, and supervisory cooperation.

### 3 Implementing Basel III: the limits of global regulatory standards

Let me start out with the task of balancing global regulatory banking standards and regional peculiarities.

In December of last year, the Basel Committee on Banking Supervision finalised the Basel III agreement after eight years of global cooperation to devise the complex set of rules.

As I am a strong supporter of implementing this standard in the European Union [on a binding basis](#), I very much expect that the US authorities will take a similar view.

Only if both the United States and the European Union keep their word and implement Basel III faithfully - and in its entirety, which means including the Fundamental Review of the Trading Book - we will avoid regulatory conflict or arbitrage and be able to provide a reliable framework for international banks.

However, please note two qualifications: these are [minimum standards for internationally active banks](#).

Since Basel standards are minimum standards, a country may decide to set stricter requirements. For example, Switzerland has a higher leverage ratio. [And the United Kingdom has ring-fencing rules](#) in place that separate a bank's vital basic functions from its riskier ones. This policy is not of the Basel Committee's making, and the United Kingdom is free to apply it in its jurisdiction.

The second qualification of the Basel III standard is that it is for internationally active banks. As a result, jurisdictions are free to apply a different set of rules to smaller, only nationally active banks that pose no threat to international financial stability. The majority of countries already have less restrictive rules in place for smaller banks in order to reduce the



operational burden imposed on them. I am a strong proponent of extending this proportionality further, because the highly complex regulatory reforms introduced in the wake of the financial crisis were intended for global banks and overburden smaller, regional banks.

In sum, then, we ought to focus on truly global aspects, like regulating globally active banks, while leaving it to individual countries to carry out those tasks that they are better placed to take care of, such as regulating locally active banks.

#### 4 The challenge of supervisory cooperation

The second area in which we will see a re-balancing of global cooperation is supervisory cooperation.

Here, like with regulation, we should reassess where a global approach is sensible, and in which cases national approaches are better suited. As a result, we are likely to see more divergence in some areas, but hopefully some more cooperation in other areas.

[An example for more divergence is likely to be higher demands for licensing foreign bank branches and subsidiaries.](#) Take, for example, the discussion about introducing an EU intermediate holding company, or IHC for short, equivalent regime.

The European Union has been debating a draft law proposing the establishment of what are referred to as intermediate parent undertakings, or IPU's for short: similar to the US IHCs, foreign banks would have to bring their EU operations under a single holding company.

This will most likely become law; and for good reason, because we need to have a better, consolidated understanding of what is going on in international banks doing business in Europe. What's more, we need to be able to act reliably in times of turmoil. Otherwise, we would not be able to fulfil our mandate of ensuring financial stability.

But to be clear, [this instrument is by no means intended to make market entry more difficult for foreign banks](#) - and the Bundesbank will continue to advocate fair access for foreign banks.

As a result, we will move further away from the idea of serving the world from one spot with the need for only one licence. This is frustrating in a way, but it's a realistic approach.

This must, however, not come at the expense of less cooperation. The opposite is true. It's not a coincidence that my last meeting before this conference was with Randal Quarles.

**Trilateral cooperation** - between US, UK and EU authorities - will become crucial if we are to get a full picture of what is going on at global banks.

And, while this applies when times are good, it applies all the more so in times of crisis - winding up a global bank would still be a nightmare, the progress that the Financial Stability Board has made on this notwithstanding.

And **Brexit will contribute** to a growing need for cooperation between supervisory authorities. Semi-formal supervisory colleges of internationally active banks will gain in importance when the United Kingdom leaves the European Union. This will be all the more true if and when regulatory standards diverge.

I have no blueprint for you. In a first step, I think it is vital to acknowledge that, even with some degree of divergence, we should not forget how important it is to remember the repercussions for global and national financial stability if we do not cooperate. This sometimes means that we should accept solutions that are not in our immediate interest.

This concerns, not least, the issue of **protectionism**. Naturally, structural change poses a daunting challenge to the industrialised world, too.

However, protective tariffs are not the right answer, as they harbour the threat of countermeasures that could spiral into a trade war - one that would ultimately only produce losers and one that I give an urgent warning of.

While going it alone may seem like a particularly sophisticated approach for some countries, it will ultimately turn out to be rather short-sighted. I am confident that the new German government will strengthen the rule-based, fair approach to trade policy in the European Union and globally.

## **5 The future of financial globalisation and cross-border banking**

When looking at international banking regulation and supervisory cooperation across borders, we can see that rebalancing is still on the horizon.

These instances of rebalancing should **not take existing regimes to new "black or white" extremes** but rather bring them to a mature state. This is what we can also see when it comes to the evolution of cross-border banking.

We have seen tremendous shifts, but I do not believe that they are bringing about the end of global finance. Let's briefly look at some facts - **two trends** stand out.

**First**, while flows have been receding since 2007, their build-up since 2000 had been far too extreme. From the 1990s to the 2000s, they more than doubled relative to GDP; if you look at the absolute numbers, cross-border capital flows rose more than five-fold between the early 2000s and 2007.

By 2016, flows had returned to their levels at the turn of the millennium. If we remember the freezing of funds during the financial crisis, and the instability that this brought about, the decline constitutes a reasonable trend of de-risking to risk-appropriate levels.

**The second major trend** is that the composition of global finance has changed significantly since 2007. While all types of capital flows have declined, more than half of the drop came from cross-border lending.

IMF and McKinsey analyses reveal that the decline stems mostly from a move away from overseas business and a shift away from cross-border wholesale funding by major European and some US banks.

At the same time, stable capital flows, such as foreign direct investment and portfolio lending, have grown since the crisis.

Overall, we should not make too much of the drop in cross-border flows since 2007, especially in the light of the severe bubble before the crisis. Moreover, cross-border banking has become more stable in terms of not only volume but also composition since the financial crisis.

That means that firms seem to have become less reliant on the idea of a fully global market. They acknowledge that crossing national borders entails risks, and they see that overreliance on short-term wholesale financing is quite problematic.

These are not signs of a global financial recession, but rather of a maturing process.

## 6 Conclusion

Ladies and gentlemen,

I was born in the United States, grew up in Germany and have worked throughout Europe. I have US, German, and European citizenship.

To end the close cooperation between our two nations would necessitate a split personality on my part. But I accept that my two homes have distinct preferences and rules. That we have overcome some of these differences is a remarkable achievement, **but we should not try to make everything equal when it's not.**

It is our duty to rebalance global economic policy cooperation with the demand for national sovereignty. We should value the maturing of cross-border finance at a hopefully more sustainable level and composition; we should honour the commitment made in the context of finalising Basel III while nevertheless accepting its limitations for non-international banks; and we should overcome our reservations about close supervisory coordination, as this will become more important in the future.

**The future of US-EU financial relations will be more complicated.** But this complication could prove beneficial - rather than leading us into an ice age, it could help our relationship mature.

Thank you for your attention.



*Number 3*

## A Euro Cyber Resilience Board for pan-European Financial Infrastructures

Benoît Cœuré, Member of the Executive Board of the European Central Bank, at the first meeting of the Euro Cyber Resilience Board for pan-European Financial Infrastructures, Frankfurt am Main.



It is a pleasure to welcome you back to Frankfurt. Our last meeting was in June last year.

Today, we will discuss the future course of the high-level cyber resilience forum for pan-European financial market infrastructures, critical service providers and competent authorities.

### Establishment of the Euro Cyber Resilience Board for pan-European Financial Infrastructures

Recent technological advances have enabled cybercriminals to conduct ever more sophisticated, precise and powerful attacks.

And nobody is immune to cyber risks, including businesses, financial infrastructures and public administrations. So **we should avoid a "blame and shame" culture** and work together.

The ECB and the Eurosystem are striving to lead by example. At the ECB, overseers, operators, supervisors and IT security services are working together more closely on cyber issues.

Within the Eurosystem, there has been close collaboration on implementing the Eurosystem oversight cyber resilience strategy for financial market infrastructures that we presented at our last meeting, in line with CPMI-IOSCO's guidance on this topic.

The Market Infrastructure Board, which is in charge of Eurosystem financial market infrastructures, has also scaled up its activities to ensure the continued cyber resilience of its systems and platforms.

Eurosystem initiatives are [part of a growing international effort to combat cyber threats](#). The CPMI-IOSCO guidance is being implemented.

In October 2017, the Financial Stability Board (FSB) delivered a stocktake report of relevant regulations and supervisory practices to G20 finance ministers and governors, and G7 ministers and governors published the ["Fundamental Elements for Effective Assessment of Cybersecurity in the Financial Sector"](#).

The FSB will produce a common lexicon of important terms, while the G7 Cyber Expert Group continues to work on third-party risks, cross-sector coordination and threat-led penetration testing, and will make proposals for G7 cross-border cyber crisis simulation exercises.

In this context, the Eurosystem aims at coordinating its own activities in the field of cyber risks with that of market participants and other public authorities to succeed in protecting the financial system from cyber threats. I therefore invite you today to become part of the Euro Cyber Resilience Board (ECRB) for pan-European Financial Infrastructures - a regular forum where we can work together in a trusted environment.

The ECRB's objective is to [enhance the cyber resilience](#) of financial market infrastructures and their critical service providers, as well as that of the wider EU financial sector, in line with international standards.

This will be achieved by fostering trust and collaboration and facilitating joint initiatives - whether among market players or between market players and authorities. The ECRB will thus contribute to the overall stability of the EU financial system.

The ECRB will have no formal powers to impose binding measures and will not make supervisory judgements. Its legitimacy will stem from the voluntary commitment of its members to abide by its common positions, statements and strategic views.

The ECRB will be chaired by the ECB, which will be closely involved together with national central banks and observers from the relevant European public authorities. This will ensure that the ECRB acts in the

interest of Europe as a whole. Its common positions, statements and strategic views will be adopted by consensus.

To kick off the work of the ECRB, we would like to reflect with you on [possible work items](#) which we could address collectively. As part of this, we will also report on two of our most recent activities.

**First**, a cyber resilience survey, developed under the Eurosystem oversight cyber resilience strategy, was conducted across more than 75 payment systems, central securities depositories and central counterparties throughout Europe.

As you will see, the survey highlighted a number of very pertinent issues for discussion, such as cyber governance, training and awareness, and cyber incident response.

**Second**, the Eurosystem is currently finalising the main elements of the European Threat Intelligence-Based Ethical Red-Teaming (TIBER-EU) Framework.

This is an interesting concept which we hope will raise the level of cyber resilience in Europe and enable cross-border, cross-authority testing, which has not been done before.

We look forward to hearing your feedback on these two initiatives. We will also update you on the forthcoming market-wide exercise, which will explore the challenges of a specific cyber scenario and see how we can work closer together in times of crisis.

I am confident that we will have a fruitful discussion. I will now hand over to my colleague Sabine Lautenschläger, who will make some introductory remarks from the supervisory perspective.

After that, I would like to invite the European Commission representative to briefly introduce the very recently published "FinTech Action plan", which presents some interesting points to be considered with regard to the cyber resilience of the financial sector. Thank you.



*Number 4***The Federal Reserve's regulatory agenda for foreign banking organizations - what lies ahead for enhanced prudential standards and the Volcker rule**

Speech by Mr Randal K Quarles, Vice Chairman for Supervision of the Board of Governors of the Federal Reserve System, at the Institute of International Bankers Annual Washington Conference, Washington DC, 5 March 2018.



Thank you very much to the Institute of International Bankers for inviting me to speak here today.

Among my first areas of focus when I was a very young lawyer starting out in my career well over 30 years ago was providing advice to foreign banks and financial firms operating in the United States, and I learned then just how integral, essential, and welcome a part your firms play in our domestic financial sector.

**Non-U.S. firms serve as an important source of credit** to U.S. households and businesses and contribute materially to the strength and liquidity of U.S. financial markets, so it is critical-not just as a matter of fairness but as a matter of our domestic interest-that we as regulators ensure that they operate in a fair and open financial services sector. I view that as an important part of my job.

So today I want to share my perspective on the appropriate regulatory environment for foreign banks operating in the United States, as well as some thoughts on specific elements of that regime. Before doing that though, **we should take stock of the pre-crisis history of foreign firms operating in the United States.**



**First**, the financial crisis revealed that in times of stress, international banking firms with large and complex local operations can contribute to instability in those local markets and can require extraordinary support from local authorities.

**Second**, a number of foreign financial institutions expanded the size and complexity of their U.S. operations at a rousing pace and scale prior to the crisis, and we did not adjust our local regulatory and supervisory approaches to address the increased risk associated with this expansion.

As a result, the difficulties faced by the U.S. operations of non-U.S. banks during the crisis mirrored that of their similarly sized domestic counterparts, underscoring a need for increased resiliency of both domestic firms and the U.S. operations of foreign banks.

To bolster that resiliency, the environment for foreign banks operating in the United States underwent a number of changes. **While there are important differences**, those changes for foreign firms broadly parallel many of the changes instituted for domestic firms. My Federal Reserve colleagues and I have termed these the core post-crisis regulatory reforms: capital, liquidity, stress testing, and resolution planning.

Of course, the obvious and most prominent difference for foreign firms-as attendees of this conference certainly know-was the introduction of the intermediate holding company (IHC) structure, to which the post-crisis regulatory reforms apply.

In my estimation, these reforms have gone a long way toward meeting our goal of a more resilient financial system.

That said, we are now at a point-with ten years of experience in setting up and living with the body of post-crisis regulation-where it is both relevant and timely to examine the post-crisis reforms and identify what is working well and what can be improved.

If none of the regulatory measures implemented up to now were capable of improvement, this would be the first project of this scale and complexity conducted that had been done exactly right the first pass through.

If there was still work to be done after **Hammurabi**, there is probably still some work to be done now after **Dodd and Frank**. In particular, as I have said elsewhere, we should be looking to see where we can achieve our regulatory objectives in ways that maintain our measures' effectiveness, but

improve their efficiency, transparency, and simplicity. As part of that effort, we will consider additional tailoring and flexibility of our regulations in light of their impact on foreign banking organizations (FBOs) based on lessons learned over the past several years.

To illustrate how I am thinking about these issues, I want to focus in my remarks today on two specific regulatory examples. These are, of course, not an exhaustive list of work to be done in the regulation of FBOs, but they tend to be near the top of the feedback list from both the industry and supervisors.

**First**, I will discuss the application of enhanced prudential standards to FBOs, including our flexibility in implementing certain aspects of these standards. I will also offer some initial thoughts on opportunities for further tailoring that regime for FBOs.

**Second** is the Volcker rule. I will provide some of my initial thinking on how we might be able to improve the Volcker rule, both generally and in its application to FBOs in particular.

## Enhanced Prudential Standards

In implementing enhanced prudential standards for foreign banks with a large U.S. presence, we sought to ensure that firms hold sufficient local capital and liquidity-and have a risk management infrastructure-that is commensurate with the risks in their U.S. operations.

And in general, that approach is meeting many of the broad goals the Federal Reserve set out to achieve.

Today, foreign banks with large U.S. operations are **less fragmented**, maintain local capital and liquidity buffers that align to the size and riskiness of their U.S. footprint, and operate on equal footing with their domestic counterparts.

Our current approach aligns with other jurisdictions that host a large and complex foreign bank presence.

**For example**, the European subsidiaries of U.S. banking firms have long been subject to Basel-based standards imposed by the European Union and the United Kingdom as host regulators.

In addition, [European regulators](#) are contemplating a holding company structure for the local operations of foreign banks to reduce fragmentation and ensure effective local supervision, similar in many ways to Federal Reserve rules.

In adopting the enhanced prudential standards, however, the Board has acknowledged both the uniqueness of FBOs-as the U.S. operations are a small part of a larger firm-and the diversity of foreign bank operations in the United States.

The Board contemplated from the outset that circumstances may require application of the rule's requirements to be adjusted in light of an individual firm's structure or risk profile.

The Board has exercised this authority in the past, and I want to stress that we will continue to provide flexibility where appropriate to accommodate these differences.

[For instance](#), in implementing enhanced risk management standards, we have focused on outcomes-a strong control environment for foreign bank operations in the United States-while providing some flexibility in how those outcomes are achieved.

We have allowed the global risk committee to serve as the risk committee for the U.S. operations rather than require the creation of a standalone committee.

Further, for foreign banks with [large U.S. branches](#) but [no IHC](#), the Board has acknowledged the challenges associated with the location of the risk committee.

The Board has accordingly allowed risk committees at U.S. holding companies as well as managerial committees located in the United States, provided that the global board provided appropriate oversight.

We are committed to continuing this outcomes-focused approach and to refining it where needed.

Further, we recognize that effective stress testing regimes can take many different forms, specifically when interpreting the home-country stress testing requirements of the [Dodd-Frank](#) Wall Street Reform and Consumer Protection Act.

The Board has acknowledged, for example, that a foreign bank's [internal capital adequacy assessment process \(ICAAP\)](#) may meet the minimum standards, provided that the firm's ICAAP is on a consolidated basis and reviewed by the home country regulator.

In addition, while we believe that the IHC requirement serves a valuable role in ensuring consistency of regulation across U.S. operations of an FBO, the Board has reserved authority to approve multiple IHCs if circumstances warrant based on the FBO's activities, scope of operations, structure, home country regulatory framework, or similar considerations.

For example, the Board's enhanced prudential standards rule contemplates allowing multiple IHCs in cases where home country legal requirements inhibit the combination of certain bank and nonbank operations.

In practice, and in several instances, the Board has permitted a foreign bank to maintain certain U.S. subsidiaries outside of its IHC, so long as the foreign bank did not have practical control over that subsidiary.<sup>4</sup> In addition, the Board recently approved an application by a foreign bank for a second IHC.

Part of our rationale for [approving the dual IHC structure](#) was the enhancement of recovery and resolution options of the global firm. In granting the exception, the Board applied enhanced prudential standards to the two IHCs in the same manner that would apply to a single IHC, to maintain a level playing field and align incentives for the safe and sound operation of both IHCs.

This approach allows us more flexibility in addressing firm-specific structure needs, while maintaining the goals of the enhanced prudential standards more generally. We will continue to consider future applications based on the merits of the case.

Finally, to the extent that foreign banks have decided to [reduce the scope](#) of their U.S. operations to reduce the application of some of the enhanced prudential standards, the Board has accommodated requests for extended transition periods, so as to avoid unnecessary investments in infrastructure that ultimately would not be required by regulation.

We are committed to tailoring our regulatory and supervisory regimes to align with the risk posed by financial institutions to the U.S. financial system. We are also continuing to evaluate whether our rules are sensitive to changes in the risk profile of banking organizations. We want our rules

both to increase in stringency as firms' risks grow and, just as important, to decrease in stringency when firms have actively reduced their risk profiles.

## The Volcker Rule

Let me turn now to the Volcker rule. Not to put too fine a point on it, but I believe the regulation implementing the Volcker rule is an example of a complex regulation that is not working well.

The fundamental premise of the Volcker rule is simple: banks with access to the federal safety net-Federal Deposit Insurance Corporation insurance and the Federal Reserve discount window-should [not engage in risky, speculative trading for their own account](#).

Whatever one's view of this basic premise, it is the law of the land. Taking that premise as a given, we have to ask how to improve the framework of the implementing regulation to make it more workable and less burdensome in practice from both a compliance and supervisory perspective.

I think we all can agree that the implementing regulation is exceedingly complex. As one example of specifics, among many, the statute and implementing regulation's approach to defining "market making-related activities" rests on a number of complex requirements that are difficult or impossible to verify objectively in real time.

As a result, banks spend far too much time and energy contemplating whether particular transactions or positions are consistent with the Volcker rule.

Some of you may quite sensibly be asking, ["If the deficiencies of the regulation are so apparent, how did we get here?"](#) Despite the best of intentions in crafting the regulations, no one seems to be happy with the complex rule we wound up with.

This has a very positive consequence: I have heard nothing but support from all of my regulatory colleagues for the proposition that the regulation is overly complex and would benefit from streamlining and simplifying to improve its workability in practice.

We are actively working with our fellow regulators in seeking ways to further tailor and to reduce burden, particularly for firms that do not have large trading operations and do not engage in the sorts of activities that

may give rise to proprietary trading. We also appreciate the broad extraterritorial impact of the rule in its current form for foreign banks' operations outside of the United States.

To that end, we have, with the [full cooperation of all five Volcker regulatory agencies](#), picked back up the process that was begun last fall to engage in a rulemaking process subject to the Administrative Procedures Act and develop a proposal for public comment that would make material changes to the Volcker rule regulations.

In that process we will take account of our own experience with the regulations since implementation, and we also want to take account of the views of market participants and other interested parties with views on the Volcker rule, including what is working and what is not. We expect this process will proceed with dispatch.

We must also work within the confines of the statute. For example, a number of my current and former Federal Reserve Board colleagues have expressed support for Congress providing an exemption from the Volcker rule for community banks, which is something I also support.

Short of a statutory exemption, we can only do our best to mitigate burden on community banks that generally do not engage in the types of activities the Volcker rule was intended to cover.

Statutory changes likely would make our work of streamlining more straightforward and complete, but we have a fair bit that we can accomplish even absent such changes.

What are some of the improvements that we are thinking about that would be possible within the regulation itself? As an initial matter, it should be clearer and more transparent what is subject to the Volcker rule's implementing regulation and what is not.

[The definition of key terms like "proprietary trading" and "covered fund"](#) should be as simple and clear as possible. It should not be a guessing game or require hours of legal analysis of complex banking and securities regulations to determine if a particular entity is a covered fund.

It should not happen-although it has happened-that our supervised firms come to us and ask questions about whether a particular derivative trade is subject to the rule, and we cannot give them our own answer or a consistent answer across the five responsible agencies. Supervisors need to be able to

provide clear and transparent guidance on what is covered by the Volcker rule and what is not. This would benefit not only the firms, but the supervisors at the agencies as well.

Again, [a good example is the exemption](#) for market making-related activities, which is one of the key exemptions from the prohibition on proprietary trading.

The rule contains a gaggle of complex regulatory requirements, but the statute contains merely one—that the market making-related activities are designed not to exceed the reasonably expected near-term demands of clients, customers, or counterparties, otherwise known as RENT'D.

We are considering different ways to use a clearer test for RENT'D. We want banks to be able to engage in market making and provide liquidity to financial markets with less fasting and prayer about their compliance with the Volcker rule.

As I noted earlier, we also understand that the Volcker rule has had an extraterritorial impact on FBOs. With respect to foreign banks, there are at least a few places where we would like to revisit the application of the final rule based on concerns raised by market participants and others over the past four years of implementation.

In particular, [there are certain foreign funds-funds that are organized outside](#) the United States by foreign banks in foreign jurisdictions and offered solely to foreign investors—that are subject to the Volcker rule due to Bank Holding Company Act control principles.

Last summer, the banking agencies, in consultation with the Securities and Exchange Commission and the Commodity Futures Trading Commission, issued guidance that effectively stayed enforcement of the Volcker rule to these foreign funds in light of the technical and complex issues they raise.<sup>8</sup> I expect we would continue this period of stay while we continue to consider these important issues.

The statute also contains exemptions for FBOs to allow foreign banks to continue trading and engaging in covered fund activities solely outside the United States.

The regulation again has a complex series of requirements that a foreign bank must meet to make use of these exemptions.

We have heard from a number of foreign banks that complying with these requirements is unworkable in practice, and we are considering ways to address this impracticality.

One possibility that has been suggested by market participants is a simple approach that focuses on the risk of the booking location.

Of course, we would have to consider whether this is possible in light of the language of the statute and principles of competitive equity, but the suggestion is illustrative of the possibility of a more workable approach.

As a final but no less important matter, we are considering broad revisions to the Volcker rule compliance regime. [We would like Volcker rule compliance to be similar to compliance in other areas of our supervisory regime.](#)

As I noted earlier, we appreciate the broad extraterritorial impact of the rule in its current form on foreign banks' operations outside of the United States.

Accordingly, we will be looking for ways to reduce the compliance burden of the Volcker rule for foreign banks with limited U.S. operations and small U.S. trading books.

## Conclusion

As I have described previously, the Federal Reserve is actively reviewing post-crisis financial reforms in an effort to better understand which reforms are working well and which ones can be improved to [reduce regulatory burden](#) and improve the efficiency, transparency, and simplicity of the regulatory framework without compromising a safe and sound financial system.

In that effort, we recognize the importance of foreign banks to the U.S. economy and have a strong interest in ensuring our regulations are appropriately tailored to their U.S. footprint and risks to U.S. financial stability.

Our goal is to maintain a regulatory framework that helps to ensure a strong and stable banking system in an efficient manner that [does not result in excessively burdensome costs](#) to the banking industry or the economy as a whole.



The areas I have discussed today are important components of the exercise of improving our regulations as they apply to FBOs, and are part of a larger overall agenda to critically evaluate and improve our regulations to promote financial stability while fostering the conditions for solid economic activity.

Some of these exercises will require more effort and time than others, but each one of them is a high priority for us at the Federal Reserve. I look forward to hearing your views as we make progress toward these improvements.



*Number 5*

## Making globalization work

William C Dudley, President and Chief Executive Officer of the Federal Reserve Bank of New York, at the Central Bank of Brazil, São Paulo.



Thank you, Ilan, and thanks to the Central Bank of Brazil for organizing this event. It is a pleasure to have the opportunity today to talk about the issue of globalization. As always, what I have to say today reflects my own views and not necessarily those of the Federal Open Market Committee or the Federal Reserve System.

Although the debate about the benefits and challenges of globalization is not new, it has recently come into sharper focus. This debate is important to all of us, and I think it is particularly relevant to Brazil given its importance in the global economy.

Globalization **means different things to different people**. In my remarks today, I will focus on the role of globalization as a force for international economic integration and economic development. I will highlight three themes:

**First**, the important role that trade plays in promoting higher standards of living globally.

**Second**, how changes in trade can create challenges for industries and their workers when they lose competitiveness. Insufficient attention has been given to this issue. We must do better in addressing the very large costs that can be imposed on particular communities and households.

**Third**, the answer to those challenges is not greater protectionism. Instead, we need to provide greater support to displaced workers so they can obtain the skills needed to find new well-paying jobs. We also need to ensure that

there are strong global institutions and international cooperation to help manage the effects of globalization. This includes responding to the challenges stemming from financial globalization-the flow of capital across national borders.

These issues are important to me as a central banker, as they affect the long-term health and productivity of the U.S. economy, the economic opportunities available to our people, and the efficiency and stability of the global financial system.

The [debate around globalization, particularly in advanced economies, reflects many factors](#). Undoubtedly, the global financial crisis and subsequent slow recovery have been significant.

But, just as important have been longer-term trends, such as growing income inequality, the loss of middle-income jobs, and the rise of large emerging market economies such as China and India.

Although the debate about globalization is not new, I believe we are at a particularly important juncture. If support for liberalized trade and an integrated global economy were to suffer a significant setback, the consequence could be slower economic growth and lower living standards around the world.

While considerable effort has gone into liberalizing trade and developing the existing set of trade agreements, that [does not mean they cannot be improved upon](#).

I have no doubt some trade agreements could be enhanced or updated. Some may not adequately address recent changes in the global economy-such as the rise of digital trade-and may need to be refreshed. And, important trade barriers still remain that should be addressed.

In particular, from a U.S. perspective, the access of U.S. firms to some foreign markets and the protection of intellectual property rights are issues that deserve close attention.

But, in addressing these issues, we should take care to preserve the vital benefits of trade to higher standards of living in both advanced and emerging market economies.

Our focus should be on further strengthening an open trade regime, and, as appropriate, amending and improving these agreements.

## The Pace of Globalization

To begin, let me briefly describe the [pace of globalization](#) as a reminder of what is at stake. Global economic integration has increased dramatically in recent decades.

Trade in goods and services, for example, has grown from nearly 40 percent of global GDP in 1990 to 54 percent in 2016.

Over the same period, the stock of foreign direct investment has increased from roughly 10 percent of global GDP to 36 percent.

Put simply, national economies and financial systems have become more integrated and interdependent.

This rapid growth in trade reflects falling trade barriers, declining transport costs, and improved information and communication technology.

These trends have enabled the development of complex global supply chains that allow companies to manage their production more efficiently.

Emerging market economies now make up a much larger share of global trade, the global economy, and global growth.

[As an illustration](#), emerging market economies have accounted for 70 percent of global economic growth since the crisis-double their share from two decades ago.

This growth has provided much-needed support to world economic activity, as advanced economies have recovered slowly from the crisis.

Rising economic integration is also evident when we examine the trade relationship between Brazil and the United States.

Bilateral trade flows in goods have risen from \$17 billion in 1994 to nearly \$57 billion in 2016.

The United States is Brazil's second-largest export market, and an important destination for manufactured goods.

In 2016, the stock of U.S. direct investment in Brazil was \$64 billion, up from \$18 billion in 1994.

Recent initiatives announced by the Brazilian authorities-including a large and transparent infrastructure concession program and greater foreign participation in the oil and gas and aviation industries-underscore the potential for further increases in foreign direct investment.

To read more:

<https://www.bis.org/review/r180314a.pdf>



## *Number 6*

### Largest reported DDoS attacks mitigated



The largest ever reported Distributed Denial of Service (DDoS) occurred in early March 2018, according to Netscout Arbor.

A peak of **1.7 Terabits per second (Tbps)** was recorded, **although the attack was mitigated.**

This followed a recent attack against GitHub on 28 February, with a peak of 1.35 Tbps. The largest known attack previously took place in 2016 against the US DNS provider DYN, which peaked at 1.2 Tbps.

The method used for these attacks is known as a **‘memcached server DDoS’**. Memcached servers store data in memory that applications may need access to on external databases.

Large companies often use memcached servers to help speed up and assist in dealing with large demands on their services. When memcached servers are **openly accessible over the internet via User Data Protocol (UDP)**, they can be utilised to significantly amplify data.

The attackers ‘ping’ a server with a small packet of data in order that memcached servers **reply with a response to the victim which is up to fifty thousand times the original packet size.**

If there are no mitigations such as filtering or management of networks, this could easily cause a service to go offline.

Whilst the vectors were different in the 2016 DYN attack, the incident demonstrates the potential ramifications if other services are dependent on the targeted service; for more information, see the NCSC Weekly Threat Report 24 October 2016 at <https://www.ncsc.gov.uk/report/weekly-threat-report-24-october-2016>

In the attack against GitHub, there has since been reporting of a **ransom** made in the data payload, demanding a payment of 50 Monero (worth approx. \$15 000).

There are also suspicions among various mitigation service providers that this method of amplification has now been adopted by DDoS-as-a-Service providers.

These latest DDoS attacks were mitigated, but further attacks may occur. The NCSC has previously provided DDoS advice regarding understanding the threat of attacks and also response and recovery planning. There is also a detailed catalogue of NCSC DDoS guidance.

To read more:

<https://www.ncsc.gov.uk/guidance/denial-service-dos-guidance-collection>

<https://www.ncsc.gov.uk/guidance/understanding-denial-service-dos-attacks>



*Number 7***Private cryptocurrencies and lessons from a red paperclip**

Nestor A Espenilla, Jr, Governor of Bangko Sentral ng Pilipinas, at the Shareholders' Association of the Philippines (SharePHIL) General Membership Meeting and Cryptocurrency "The Truth & The Myth Forum", Makati City.



Officers and members of the Shareholders' Association of the Philippines, guests from the public and private sectors, ladies and gentlemen, good afternoon!

It is my pleasure to share the Bangko Sentral's insights and initiatives on privately-issued cryptocurrencies. I am hopeful that in doing so, we will, as your theme suggests, be able to cut through the "truths and myths" surrounding this fairly novel medium of exchange. Notice though that I make a key distinction as there's such a thing as central bank-issued digital currency. I'm not going there today as that's a different conversation all together even as the underlying technology may be similar.

**But there it is. Cryptocurrencies are a medium of exchange.** The Bangko Sentral ng Pilipinas (BSP) recognizes this. We have defined crypto or virtual currency as any "form of digitally stored value created by an agreement within the community of virtual currency users." As far back as 2014, the BSP advised the public of the features, benefits and attendant risks in dealing with cryptocurrency.

We have adopted a **regulatory approach** to privately-issued cryptocurrency that is balanced, open and flexible. This is to allow the market to promote financial innovation and for the industry to take advantage of all its benefits and efficiencies - with prudence.

We have issued (and will be ready to issue more) responsive regulations. Last February 2017, we issued Circular No. 944. We now require businesses



engaged in the exchange of privately-issued cryptocurrency for equivalent fiat money, to register with the BSP as remittance and transfer companies.

Moreover, we strongly cautioned the public against unscrupulous individuals or groups who offer virtual currency pyramid schemes disguised as initial coin offerings or investment products.

The advisory likewise provided tips on securing virtual currency accounts (I think this thrust is something SharePHIL would appreciate given its mission with respect to consumer education and protecting investors' rights.)

To be clear, [we do not endorse](#) privately-issued cryptocurrencies as a medium of exchange. Moreover, given their highly speculative and volatile nature, we do not endorse them as investment vehicles either.

Rather, our objective as a central bank is to [address any risks](#) that they may pose to the public even as they exist as a fact of life. This is consistent with our goal of increasing consumer protection. It is also in keeping with our advocacy against money laundering, terrorist financing and other crimes (As you know, given cryptocurrency's reliance on the full anonymity of those who transact in them, there is a propensity for this mode of payment to be used for illegal purposes).

In keeping with our mandate to promote financial stability, we also aim to address any risks posed by cryptocurrency to the financial system. [These risks are not imagined.](#)

They arise as cryptocurrency necessarily interplays with the non-digital world - the regular economy - when they are exchanged into pesos or other traditional currency.

It is important to note that privately-issued cryptocurrency is not legal tender. Unlike fiat money, such cryptocurrencies are not backed or guaranteed by any central monetary authority. Only the BSP has the sole power and authority to issue currency within the Philippines.

[Under the law](#), no other person or entity, public or private, may put into circulation, notes, coins or any other object or document which might circulate as currency.

Our notes and coins are fully guaranteed by the Government and are legal tender in the Philippines for all public and private debts.

While privately-issued cryptocurrencies do not enjoy legal tender status, they are, however, as a matter of practice, used as a medium of exchange and a store of value. But aren't so many other things?

## The red paperclip story

This brings to mind a story about a red paperclip that went viral. Some of you may be familiar with it. In 2005, a Canadian blogger - Kyle MacDonald began a series of transactions which he posted on-line. [He began with a red paperclip as a medium of exchange.](#)

He exchanged this for an interesting looking fish-shaped pen, which he traded for an odd-looking doorknob-then a camp stove-so on and so forth. By his thirteenth barter - in a little over a year - MacDonald was in possession of a movie role (a chance to act in a movie), which was finally traded for a [two-story farmhouse](#) in a small Canadian town! And it all started with a red paperclip! (It's an interesting story. You can google it!)

This red paperclip story has uncomplicated elements that differ starkly from cryptocurrency's high-tech world of blockchains, miners and cryptography. I introduce it not just to keep your attention or to refresh you with its simplicity but because there are powerful and common lessons to be learned from it and from the phenomenon of cryptocurrencies.

**These are:** First, additional participants in a transaction exponentially increase value which is defined, measured and transferred through consent. Second, there is power in leveraging on digital technology as a connector of people. Finally, people always count.

Using these points, allow me to share not only more insights on cryptocurrency, but also some initiatives in the BSP's exciting financial reform agenda - initiatives which (unlike cryptocurrencies) we fully endorse.

## Exponential increase in value through wide consent

The first lesson from both the red paperclip story and the phenomenal use of privately-issued cryptocurrencies is that additional participants in a transaction exponentially increase value. [This value is defined, measured and transferred through consent.](#)

The success of the red paperclip project comes from the fact that its transactors defined and determined what they deemed to be valuable.

On the other hand, while privately-issued cryptocurrencies are fast gaining global popularity, we deem their acceptance as still limited.

We believe [privately-issued cryptocurrencies cannot completely fulfill](#) the roles of money as a store of value and as an independent unit of account.

Until such time that such cryptocurrencies are able to fully demonstrate stability, the prospect that they will replace today's fiat currencies appears to be far-off. They are simply still too volatile.

### [Power of technology to connect people](#)

The second lesson is that there is power in leveraging on digital technology as a connector of people.

In the red paperclip story, it cannot be denied that the values that were traded were not just in the objects themselves (They were, especially in the beginning, only ordinary objects and might even be considered junk by many).

Rather, [the psychic value came from the opportunity to be on-line personalities](#), from viral exposure as all trades were posted on MacDonald's blog that had gained quite a following.

As with cryptocurrencies, the great socio-experiment could also not have been possible without dynamic computer-to-computer connections.

In this regard, the BSP acknowledges the huge potential of digital technology, that includes cryptocurrencies, to transform financial service delivery, specifically in the area of payments and remittance.

High-speed digital networks allow funds to move across the globe at a much faster, cheaper and convenient way compared to traditional models.

Their use is game-changing for the unbanked, given their affordability and wider reach.

As far as the BSP is concerned, this is worth looking into as it is consistent with its financial inclusion advocacy. For this reason, we continue to [closely](#)

**engage** with various stakeholders, including fintech players, to better understand varying business models, processes and systems.

Our priority is to develop a digital financial ecosystem that supports the diverse needs of all users in a manner that is secure, sustainable, convenient and affordable.

For the service providers - whether new or incumbent, this ecosystem enables them to tap into a wider client base, diversify revenue sources and secure new growth opportunities.

To us, this line of pursuing financial inclusion is more in keeping with our financial stability objectives.

**The pillars** of such an ecosystem that leverages on technology would include: an efficient retail payment system that facilitates delivery of digital products, especially for small value transactors; an expansive network of low cost touch points to on-board new clients and facilitate the digitizing and disbursing of cash and other financial transactions; and democratized access to a transaction account, wherein every person - regardless of economic and social stature - is able to open an account and use digital finance products.

Overall, this inclusive digital finance ecosystem will support the diverse needs of all users in a safe, convenient and affordable manner.

It would have the right mix and range of service providers (banks and non-banks alike) and digital platforms to facilitate the sustainable delivery of fit-for-purpose and affordable financial services, especially designed for the low income market.

## **People always count**

The final lesson in all this is that, "people always count." This is what drives us in the BSP as we pursue game changing financial reforms to deepen financial markets, foster financial inclusion, increase consumer protection and to basically improve the quality of life of all Filipinos.

That being said, I must say that this new frontier of cryptocurrency brings up **legitimate concerns that affect people** ... that affect the public. These issues are being looked into by the BSP and other financial regulators globally.

One issue is private cryptocurrency as an investment option. Its value is volatile for starters.

Thus, we earnestly caution the public that before speculating or investing their hard-earned money in cryptocurrencies - as with any other type of investment - prospective investors should first know and fully understand the risks involved.

Because people matter, we at the BSP, like SharePHIL, value investor education. We have (together with the Department of Finance, Securities and Exchange Commission, Insurance Commission and the Anti-Money Laundering Council) [made plans to embark on a nationwide public information campaign on cryptocurrency.](#)

The purpose is to inform and educate the public on what cryptocurrencies are, their uses and risks, related policies and regulations in the Philippines, and possible pitfalls.

Another serious concern is cryptocurrencies' attractiveness to, and use by, money launderers and terrorist financiers.

This attractiveness stems from the anonymous and encrypted identities of transactors in private cryptocurrency. It is this very anonymity that cryptocurrency users value most. It [enables them to transact in the so-called "dark web."](#)

Allow us at the BSP to offer a contrary idea: There is power in identification. We believe that to significantly catalyze a digital ecosystem, there must be a reliable national digital identification system.

This system will address persistent customer on-boarding issues due to lack of acceptable IDs and the highly inefficient paper-based KYC processes which make serving small value transactors unattractive.

The BSP therefore strongly supports the [passage of the Philippine ID System bill](#) which was identified by the Legislative Executive Development Council (LEDAC) in its August 2017 meeting as an urgent measure.

The Lower House has already approved its version on third reading. At the Senate, its version is tentatively scheduled for sponsorship today, Monday, March 12 even as we speak. Truly exciting!

The envisioned national ID system will be designed to ensure universal coverage, data integrity and security, and optimum utility.

It will serve as an **enabling platform** for the efficient delivery of a whole range of government and private sector services for all Filipinos - especially the currently unserved.

Establishing a readily- verifiable digital identity will enable our people to open accounts and use financial services more efficiently.

## Closing thoughts

This message obviously comes from a Central Bank Governor wary of currencies that do not qualify as legal tender and which are not backed by any monetary authority.

But it is a message that comes too from a Central Bank Governor who has been labelled as a "disruptor" - one that leads an institution that is ready to embrace the challenges of a rapidly changing financial and economic landscape.

This message is shared with this audience, a staunch advocate of investor rights and investors' need for information. It is a good match.

As I close, to align this message better with your theme- let me summarize the truths and myths of cryptocurrency from the BSP's viewpoint:

**Myth:** Privately-issued cryptocurrencies are legal tender and shall soon replace fiat currency.

**Truth:** Cryptocurrencies, not backed by any central authority are not legal tender. Moreover, until they fully demonstrate stability, wide acceptability and other economic attributes, they will not replace fiat currency any time soon.

**Myth:** Cryptocurrencies are bad and are only used for illicit activities.

**Truth:** Cryptocurrencies, like fiat currencies, are neither good nor bad. They are neutral. But, no doubt, BSP is mindful of their wide use in illicit activities because of the anonymity of its transactors and is taking action in this regard.

**Myth:** The BSP endorses the use of and/or investment in privately-issued cryptocurrencies.

**Truth:** The BSP allows the market to develop but it has also issued responsive regulations to uphold consumer protection and to maintain financial stability. The BSP does not endorse or promote privately-issued cryptocurrencies but aims to address its risks as it intersects with the financial system.

Rest assured, the BSP maintains a forward-looking approach to ensure that regulatory and supervisory frameworks are in tune with emerging trends and developments.

Through constant surveillance and monitoring of the market environment, the BSP stands ready to adapt to future challenges and opportunities ahead.

I hope I have delivered on the terms of reference for this forum. You have been a wonderful audience. Thank you for your attention.



## *Number 8*

### Artificial intelligence (AI) in finance - six warnings from a central banker

Prof Joachim Wuermeling, Member of the Executive Board of the Deutsche Bundesbank, at the 2nd Annual FinTech Conference, Brussels.



#### 1 Don't miss out on the opportunities of AI in finance -

AI in finance could impact on the functioning of our financial system in a profound way. Some suggest that AI is [enhancing the power of the human brain](#) in the same way that electricity enhanced the power of the body 150 years ago. Hence, it could become a big thing in finance.

[Artificial intelligence and big data](#) are currently the strongest and most vivid innovation factors in the financial sector. Using AI in finance may trigger dramatic improvements in many businesses. AI elevates the role of data as a key commodity. Used wisely, big data make outcomes more reliable and may improve financial mediation. Process chains can be organised in new ways. "The scope and nature of banks' risks and activities are rapidly changing," as a recent Basel Committee analysis puts it.

This evolution towards increased use of non-human intelligence is not something that has just occurred in the last few years. The first invention of neural networks, a central pillar of most AI systems, [dates back to the year 1943](#).

Until a few years ago, the main users of big data and AI in the area of finance were certain hedge funds and high-frequency trading firms. In recent times, the application of AI in finance has begun to spread widely, via "normal" banks, FinTechs and other financial service providers, to the general public.



Since 2011, HFT has accounted for about 45-50 % of all trading in US equities. The figures for the main European indices are in the same region (with about 40 % for German DAX futures).

Taken together with all other "normal" algorithmic trading activities, we currently estimate the amount of algorithmic trading to be in the realm of 80-90 % of the entire trading volume for equities (and somewhat less but still very high in other market segments).

A single normal trading day generates about 3-6 million data points about prices, order deletions and modifications in DAX futures alone. No human can analyse these amounts of data simply by looking at them in an Excel spreadsheet. More sophisticated and sometimes also AI-driven techniques are necessary to do the job.

AI profoundly changes the functioning of our financial system in at least three areas: [products, processes and analysis](#). This is true for both front office functions (eg customer business, trading) and back office functions (eg executing trades, risk management, market research). Special-purpose AI can solve specific problems, eg in customer engagement, financial management or cybersecurity.

Applications focused on market operations cover various core areas eg trading, portfolio composition, backtesting and validation of models, market impact analysis, modelling trading of large positions and stress testing. [Dynamic portfolio adjustment, depending on the macro environment, may be strengthened by AI.](#)

With the help of AI, various human shortcomings in dealing with finance can be mitigated. As behavioural finance has taught us, biases, inertia and ignorance lead to the malfunctioning of markets. AI allows humans to reach out beyond their intellectual limits or simply avoid mistakes.

## 2 - but beware of the risks

But [opportunities are always accompanied by risks](#). As regards the financial system, if too much trust is put in "intelligent" systems, [the stability of financial markets may be at stake](#). The workings of AI can be a mystery; it can trigger loss of control, make fatal errors, and have a procyclical effect due to its mechanistic functions.

Pattern recognition has its limits. This can be dangerous particularly in crisis scenarios. An autopilot would never have been able to land a jet on

the Hudson River. Nor can algorithms stabilise in periods of financial stress.

Looking at the recent turbulence in equities and the market for VIX-related financial products, it can be concluded that the events of 5 February share many similarities with a "flash crash".

Unfortunately, as with the original flash crash of May 2010, we have only limited knowledge about the direct drivers that triggered the event. It can be assumed that algorithmic market participants were quite active during the relevant period.

But as to [which strategies were applied and to what effect, we have no knowledge so far](#). The rise in volatility in the S&P 500 then nearly instantly affected the VIX industry, making it not the cause but more the first victim of this market event, with losses up to 95 % on assets. We do not expect this phenomenon to disappear in the future. On the contrary, more of these flash events are to come.

AI is still in its infancy. Continuous processes for the entire AI lifecycle still have to be defined and scaled for business needs. That means that AI must be embedded in the process of acquiring and organising data, modelling, analysis and delivering analytics.

[The skills gap](#), particularly with regard to data science and machine learning expertise, is the foremost challenge. At this stage, non-human intelligence is far from replacing the human brain in any respect. Computers are like school pupils dividing numbers mechanically without having understood what they were doing.

### [3 Consumers should take care: they remain the risk-takers](#)

What makes this development so significant is the fact that it is not just occurring at the level of systemic institutions, markets and stock exchanges. With robo advisers, for example, [AI can directly influence and control](#) the daily financial decisions of customers and ultimately their personal wellbeing. Society has barely begun to understand the economic, ethical and social implications of AI.

While client interaction is made more convenient by mobile banking, chatbots or virtual customer assistants, banks can find out more about customer habits and provide them with tailor-made financing.

Consumers may be rated by AI when applying for a mortgage. Pooling data points from internal transactions, social networks and other sources provides a more meaningful picture of banks' borrowers. But denials may be hard to understand. It may become even harder to challenge a decision made by algorithms.

The proper functioning of the applications is not a given. Simple flaws, cyberattacks and criminal behaviour render the systems extremely vulnerable. Consumers should be cautious. They need to be protected. Laws may have to be modified to cover new threats. Responsibility and liability in the case of malfunctioning machines have to be clarified.

#### 4 FinTechs should not ignore the legitimate concerns of society and supervisors

Agile tech companies are driven by an admirable energy and inspiration. By nature, they take risks. They create an idea, build a prototype and try it out immediately in the real world. Regulation, supervision, obligations and requirements must make them extremely nervous.

But the wellbeing of society depends on rules. [The public demands cybersecurity, data privacy, consumer protection and financial stability.](#) FinTechs should not brush aside the concerns of their stakeholders. Business can only flourish if it is broadly accepted by citizens.

FinTechs usually pick up specific elements of the work chain of finance or create new features. Using technology, they modularise and customise products as a third party or standalone provider.

FinTechs are part of the finance sector but are not necessarily supervised. As long as they carry out tasks for supervised entities, these institutions are responsible for the behaviour of the FinTech.

#### 5 AI needs new forms of supervision

"Artificial intelligence" may sound [glamorous](#) from a technological perspective, but in banking supervision, the well-established principle of "same business, same risk, same rules" has so far proved to be a sound standard for innovations. Whether they employ AI themselves or outsource it to FinTechs, from the supervisors' point of view responsibility remains entirely with the bank.

For German supervisors, IT governance and information security nowadays are equally as important as capital and liquidity requirements.

All financial institutions should address the risks posed by new technologies. Banks have to implement effective control environments needed to properly support key innovations.

This includes the requirement to have appropriate processes for due diligence, risk assessment and ongoing monitoring of any operations outsourced to a third party.

The European MiFID II includes the requirement that firms applying algorithmic models based on AI and machine learning should have a robust development process in place.

Firms need to ensure that potential risks are considered at every stage of the process.

Regulators increasingly have to apply AI-supported analytical methods themselves to recognise vulnerability patterns, scan lengthy reports or analyse incoming data.

In any case, we must strike a balance between financial stability and avoiding barriers for potential new entrants, products and business models.

Alongside technological progress, regulators have to constantly reassess the current legal framework, supervisory models and resources.

## 6 Central banks should embrace AI

Central banks have access to huge amounts of very valuable data stemming from market operations, supervision, payments and statistics.

They are well positioned to tap the benefits of AI so they can enhance their ability to fulfil their mandate for price stability and the stability of the financial system.

Machine learning is already being used at the Bundesbank in different narrow segments.

The experiences of all users have been good without exception. While monitoring the technical progress, we are currently discovering further use cases and defining our AI foundation, strategy, organisation and processes.

Here is a [list of examples](#), which is by no means exhaustive:

[In risk management, neural networks](#) assess and evaluate the financial soundness of the markets. Market research is supported by adopting web mining techniques and machine learning in content analysis, topic modelling and clustering of relevant articles.

[In statistics](#), machine learning enables new methods for data quality management, eg in the context of securities holdings or the classification of company data.

Furthermore, the informational content of seasonality tests is assessed by a random forest machine learning technique.

[For our IT user help desk](#), the handling of routine requests via automated chatbot responses could be a useful support measure.

We use social media data to detect trends, turning points or sentiments. Machine learning methods can be applied for variable selection purposes in econometric models.

### [ANNEX: Use case - monitoring of real estate markets](#)

An interesting data source is internet platforms. For example, some rental and housing platforms have the potential to improve the analysis and monitoring of real estate markets via the provision of information such as list prices and structural and locational characteristics of the property market at a disaggregated level.

This is mainly [based on the assumption](#) that these data contain information on the expectations and interests of economic agents with respect to future decisions.

In such contexts, a wide range of topics or "search strings" are often potentially relevant. This can result in many different, highly correlated time series.

Furthermore, the "textual analysis" method is increasingly applied in research, as large amounts of "unstructured" information on businesses and the economy are available electronically on the internet.

In order to operationalise textual data for econometric analysis, machine learning algorithms can be helpful.

Learning methods can be applied to classify textual documents into different categories which can then be used to draw statistical inferences.



## *Number 9*

### Call for experts for TRANSSEC - Transport Resilience and Security Expert Group

ENISA launches this call for participation to invite experts in security of different sections of the transport sector to participate in its expert group



ENISA has established this expert group to cover security and resilience of transport systems as they undergo a digital transformation built around a plethora of interconnected devices and systems that facilitate automation and intelligent decision-making.

The [threats and risks associated with the digital transformation](#) of the transport sector are manifold and have a potential impact on citizens' safety, health and privacy, in addition to the availability of the critical transport services themselves.

TRANSSEC is an information exchange platform that brings together experts to ensure security and resilience of the Transport sector in Europe.

It is the intent of ENISA for this group to produce specialised work streams focusing on specific sub-sectors of transport, namely [Air, Rail and Water](#) Transport with the possibility of eventually establishing one or more specialised individual Expert Groups.

Experts of the TRANSSEC shall have technical background expertise and direct exposure on one or more of the following:

1. [Operators and infrastructure owners](#) of Transport systems with an interest in cybersecurity in one or more of the following sub-sectors:
  - air transport e.g. air carriers, airports, traffic management control operators etc.
  - rail transport e.g. infrastructure managers, service facilities etc.

- water transport e.g. water transport companies, ports, vessel traffic services etc.;
- 2. **Manufacturers or integrators** of transport systems with a focus on cybersecurity;
- 3. **Suppliers and developers** of transport hardware and/or software with a focus on cybersecurity;
- 4. **Associations** and not-for-profit organisations involved in transport security;
- 5. Relevant authorities, academia, standardisation bodies and policy makers directly involved in the above topics.

For details and registration, please visit:

<https://resilience.enisa.europa.eu/transport-security>





*Number 10*

## Making Gray-Zone Activity more Black and White

New program aims to lift the fog obscuring an adversary's intentions in slow, simmering non-traditional conflicts



An emergent type of conflict in recent years has been coined “gray zone,” because it [sits in a nebulous area](#) between peace and conventional warfare.

Gray-zone action is not openly declared or defined, it's slower, and is prosecuted more subtly—using [social, psychological, religious, information, cyber and other](#) means to achieve physical or cognitive objectives with or without violence.

The lack of clarity of intent—the grayness—makes it challenging to detect, characterize, and counter an enemy fighting this way.

To better understand and respond to an adversary's gray-zone engagement, DARPA's Strategic Technology Office today announced a new program called COMPASS, which stands for Collection and Monitoring via Planning for Active Situational Scenarios.

The program aims to develop software that would [help clarify enemy intent](#) by gauging an adversary's responses to various stimuli.

COMPASS will leverage advanced artificial intelligence technologies, game theory, and modeling and estimation to both identify stimuli that yield the most information about an adversary's intentions, and provide decision makers high-fidelity intelligence on how to respond—with positive and negative tradeoffs for each course of action.

“[The ultimate goal](#) of the program is to provide theater-level operations and planning staffs with robust analytics and decision-support tools that reduce ambiguity of adversarial actors and their objectives,” said Fotis Barlos, DARPA program manager.

“As we see increasingly more sophistication in gray-zone activity around the world, we need to leverage advanced AI and other technologies to help

commanders make more effective decisions to thwart an enemy’s complex, multi-layered disruptive activity.”

Current military decision-making follows a well-understood and effective OODA loop—Observe, Orient, Decide and Act. This is how planning is done in various geographic areas around the world, which works for traditional kinetic scenarios, Barlos said.

This process, however, is **not effective in gray zone warfare**. Signals in the environment are typically not rich enough to draw any conclusions, and, just as often, adversaries could implant these signals to induce ambiguity. COMPASS aims to add a dynamic, adaptive element to the OODA loop for complex, gray-zone environments.

The COMPASS program will leverage game theory for developing simulations to test and understand various potential actions and possible reactions by an adversary employing gray-zone activity.

Barlos quickly noted, however, that the program is **not about** developing new sensory technologies, virtual reality systems or other advanced hardware.

The program focuses rather on advanced software that would quickly present options to decision makers by assimilating a large amount of intelligence collected using existing, state of the art systems (such as standard video exploitation, or textual analysis tools) related to rapidly changing scenarios.

“We’re looking at the problem from two perspectives: Trying to determine what the adversary is trying to do, his intent; and once we understand that or have a better understanding of it, then identify how he’s going to carry out his plans—what the timing will be, and what actors will be used,” Barlos said. “The first is the what, and second is the where, when, and how.

“But in order to decide which of those actions is important you need to analyze the data, and you need to understand what different implications are and build a model of what you think the adversary will do,” he said. “That’s where game theory comes in.

If I do this, what will the adversary do? If I do that, what might he do? So it is using artificial intelligence in a repeated game theory process to try to decide what the most effective action is based on what the adversary cares about.”

The COMPASS program seeks experts in AI, machine learning, game theory, modeling and simulation, control systems, estimation and other related fields. A Proposers Day is scheduled for **March 30, 2018**, in Arlington, Virginia.

Registration instructions and more details are available on FedBizOpps (FBO): <https://go.usa.gov/xQqjt>

A Broad Agency Announcement (BAA) solicitation is expected to be posted on FBO prior to the Proposers Day and will be available on DARPA's FBO solicitation page: <http://go.usa.gov/3W53j>



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