RegTech

The start of a journey

Strictly private and confidential

2017
**RegTech**

We define RegTech as “the emerging technologies and solutions developed within the RegTech innovation ecosystem which address risk and regulatory current challenges and create future opportunities”

**PwC’s Vision**

Empower our clients and our people to anticipate RegTech disruption, deploy innovation, and grow, through deep industry intelligence and strategically defined solutions
What is the opportunity? Shifting regulatory expectations are driving compliance spend among financial institutions

**Quarterly Regulatory Changes and Enforcement Actions Trend**

- **Period of Maximum Change**

**Competitive Response To Regulatory Changes**

*Sample Additional Annual Bank Compliance Spend*

- **High spenders with low efficiency**

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<thead>
<tr>
<th>Staff Costs ($M)</th>
<th>Non-Staff Costs ($M)</th>
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**Observations**

- **Enforcement actions** in response to regulatory changes **rose significantly** from 2007 to 2010 and have remained high
- Some major banks **increased their anti-money laundering (AML) compliance spend** by ~$1B in 2014/2015
- Despite increased spending, both law enforcement and the banks are **dissatisfied with capabilities** which remain reactive and inefficient

**Potential Rationale**

- Increased lack of compliance by the banks and tougher scrutiny from regulators have resulted in a **reactive market**
- **Insufficient talent availability** has elevated the cost associated with attracting and retaining required regulatory compliance staff

*Staff cost figures based on $60k/year salary Citi stated in Financial Times report cited below*

Financial Times, [http://www.ft.com/intl/cms/s/0/e1323e18-0478-11e5-95ad-00144feabcd0.html#axzz3jN2kPKMc](http://www.ft.com/intl/cms/s/0/e1323e18-0478-11e5-95ad-00144feabcd0.html#axzz3jN2kPKMc); WSJ and Reuters Regulatory and Enforcement Data Sources: Banking Compliance Index, CFPB, FDIC, FinCEN, FRB, NCUA, OCC, and OFAC
The application of emerging technologies will continue to evolve

Robotics Process Automation

Process Efficiencies

RegTech

The emerging technologies and solutions developed in the innovation ecosystem which address Financial Services risk and regulatory challenges

Blockchain

Industry Transformation

RegTech Landscape

- Point solutions targeting specific use cases
- Big Data and AI solutions that provide firm-wide insights
- DeNovo RegTech Channel trends and industry highlights

**Vendors**

- Blue Prism
- UiPath
- Automation Anywhere
- WorkFusion
- OpenSpan

**Vendors**

- Bloq
- Bridge
- Stellar
- BlockCypher
- Rubix

**RegTech Response**

1. Readiness of Infrastructure
2. Comfort with Emerging Tech
3. Compliance with Rules & Policy
4. Demonstrated Effectiveness

**Blockchain**

Traditional transaction model

- Providers: Firms, electricity producers, lenders
- Customers: E.g., buyers, energy companies

Blockchain transaction model

- Intermediary platforms: Exchanges, traders, banks, energy companies
- Customers: E.g., buyers, energy companies

Responses will vary based on all dimensions and could include executing different channels & tactics like PoCs, building ARMs, spinning out home grown solutions, participating in incubators & accelerators, or investing in RegTech.

PwC
What is driving RegTech and where do we see the innovation?

The emergence of the RegTech ecosystem is driven by both external and internal industry factors

- Post-crisis regulatory requirements are a significant cost burden to the industry
- Risk and regulatory technology is often old, decentralized, and not necessarily fit for digital environment

While the RegTech is smaller than FinTech, similar funding and deal patterns are emerging, indicating high growth potential

- There are currently 200 – 250+ RegTech startups in the market with cumulative funding of approximately $2.0bn – $2.5bn since 2011
- This compares to approximately 5,000 FinTech startups with cumulative funding of approximately $35.5bn over the same time

Banks struggle to engage in the RegTech due to challenges in:

- Assessing startup viability – 100’s of RegTech startups must be identified and thoroughly vetted to determine viability...all while they continuously pivot as new use cases and markets are identified
- Articulating impact to regulators – communicating with regulators to articulate the benefits of emerging solutions and impact relative to old processes
- Where and how to adopt RegTech within the organization given the maturity of the solutions

The RegTech industry is highly fragmented with the presence of a large number of startups and small players. However, several RegTech clusters are emerging to meet risk and compliance capabilities

RegTech Strike Zones

- Digital ID
- Front Office Compliance
- Financial Crime Surveillance
- Scenario Modeling & Analytics
- Risk Aggregation & Reporting
- Enterprise Risk Management
- Regulatory Affairs
RegTechs have minimal barriers to entry to address these issues which will lead to continuous innovation

Annual Cost and Series Funding Counts for Startups

Discussion

- Historically, there has been significant investment required to launch and scale startups (e.g., significant Series B funding to invest in resources and tools needed to build capabilities); however, learning is being done sooner & faster
- The market has evolved over the years offering open source tools, technology advancements, and ready access to resources reducing the complexity and cost for startups – e.g.,
  - **Subsidization of Infrastructure Costs** – large tech vendors, e.g., AWS, real estate plays, e.g., incubators
  - **Open Source Frameworks & Knowledge** – access to resources and knowledge from dev to Lean Launchpad on Coursera
  - **Scaled Cloud Computing** – scalable security, agile expansion of computing capability, and dynamic marketplace for apps
  - **Global Talent Delivery Model** – highest expertise, lowest cost with short idea-product creation, agile dev cycles

Source: Market research on startups
VC investment shows that they see the market opportunity as a logical adjacency to the momentum of FinTech

- 2015 saw a spike in RegTech funding activity, deal flow is expected to continue in 2017
- Financial Crimes continues to be a high priority area of focus
- Majority of funding continues to be classified as angel / early stage, however, share of funding classified as later stage is trending up

Source: DeNovo
FinTech Innovation Lab has the most investments in RegTech, while top VCs and Corporate VCs are beginning to show interest.

Source: DeNovo
We see the following trends within each RegTech strike zone

<table>
<thead>
<tr>
<th>RegTech Strike Zones</th>
<th>RegTech Trend</th>
<th>Illustrative RegTech Startups Leveraging Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Identification</td>
<td>• Rise in technologies to create digital identities to authenticate and authorize counterparties</td>
<td><img src="image1" alt="identityMind" /> <img src="image2" alt="trunomi" /></td>
</tr>
<tr>
<td>Front Office Compliance and Controls</td>
<td>• Increase in automation of a traditionally manual regulatory and compliance processes</td>
<td><img src="image3" alt="DROIT" /></td>
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<tr>
<td>Financial Crime Surveillance</td>
<td>• Fraud, Use of advanced methods, tools and technologies to improve information security and predict, detect, and analyze fraud</td>
<td><img src="image4" alt="Behavox" /> <img src="image5" alt="ANCOA" /></td>
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<tr>
<td></td>
<td>• AML / KYC, Increased automation of customer identification processes (e.g., KYC) and Anti Money Laundering tools to reduce fraud and improve client interaction</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<td></td>
<td>• Market Surveillance, Use of advanced methods, tools, and technologies to comprehensively surveille financial markets and employee conduct in the capital markets</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<td></td>
<td>• Information / cyber security, Improve information security technologies to predict, detect, and analyze external breaches</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<tr>
<td>Scenario Modeling and Analytics</td>
<td>• Increased sophistication of data models and analytics for use in capital and liquidity stress testing programs such as CCAR, Resolution Planning, etc.</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<tr>
<td>Risk Aggregation and Reporting</td>
<td>• Processes are leveraging improved data lineage and aggregation tools to and support management dashboards and global regulatory reporting regimes in line with BCBS 239 requirements</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<tr>
<td>Enterprise Risk Management</td>
<td>• Increased automation of enterprise risk management processes for the identification, measuring, and timely testing of financial and operational risk</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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<tr>
<td>Regulatory Affairs</td>
<td>• Use of technologies to automate regulatory interpretation and compliance certification to address changing regulatory expectations</td>
<td><img src="image6" alt="Ayasdi" /> <img src="image7" alt="Fintellix" /></td>
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</tbody>
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### RegTechs are leveraging emerging technologies to meet current client challenges

<table>
<thead>
<tr>
<th>Emerging Technology</th>
<th>Implications for Risk and Regulatory</th>
<th>Emerging RegTech Startups Leveraging Technology</th>
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</table>
| **Blockchain**           | • Distributed clearing and settling can dramatically disrupt swap dealership processes and clearing house services  
                          | • Potential for new FMUs supported through distributed ledgers (e.g., back office processes)               | [Digital Asset Holdings](#)  
                          |                                                                                                        | [Chain](#)  
                          |                                                                                                        | [Trade](#)  |
| **Artificial Intelligence / Machine Learning** | • Tools for assessing multiple sources of unstructured and structured data in real time  
                          | • Internal and External fraud monitoring tools that improve over time  
                          | • Simulated market environments to test and develop models                                                      | [IdentityMind](#)  
                          |                                                                                                        | [Transparex](#)  
                          |                                                                                                        | [IMPROBABLE](#)  |
| **Robotic Process Automation** | • Tools for automating risk management processes including trade compliance, report generation, trade alert notifications, data lineage, and control testing | [DROiT](#)                                                                 |
| **Natural Language Processing** | • Ability to track and assess internal and external communications through automated processes  
                          | • Tools to support interpretation of financial contracts and agreements and generate reporting               | [OPUSDATUM](#)  
                          |                                                                                                        | [CORLYTICS](#)  |
| **Big Data Analytics**   | • Capabilities to assess large volumes of data and build the appropriate risk management analytics      | [AYASDI](#)                                                                 |
|                          | • Tools to review large amounts of internal and historical data to develop enhanced predictive modeling capabilities | [SCALED RISK](#)                                                             |
| **Identity Management**  | • Enhanced governance and controls over client and internal data                                         | [IdentityMind](#)  
                          | • Reduced dependency on risk and finance IT infrastructure                                                        | [TruNomi](#)  |
| **Open APIs**            | • Speeds up the process of innovation through connecting to compliance applications and processes and identifying program enhancements | [Behavox](#)  
                          |                                                                                                                | [Trulioo](#)  |
RegTech is overall nascent and distributed across markets & regulators; however, the US & Great Britain are clear early leaders.

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RegTech Players

- US
  - Avalara
  - Checkr
  - Quarule
  - Finntelligence
  - Riskalyze
  - CompliancoScience
  - IdentityMind
  - Percantage
  - commcise
  - Shield
  - Darktrace
  - Skry
  - NEXTRA

- UK
  - AlgoDynamic
  - ComplyAdvantage
  - PASSPORT
  - CVI Analytics
  - SYBENITIX
  - Opusdatum
  - Silverfinch
  - FundRocs

- Ireland
  - Vizor
  - MoneyMate
  - VIClarity
  - Vigtrust
  - Fenergo

- Switzerland
  - CORLYTECS
  - QUMRAM

- Germany
  - DROIT
  - Let's Talk Payments

- Luxembourg
  - KYC3
  - invoxis

- France
  - Scaled Risk
  - Algorithmica Research AB

- Sweden
  - Assent

- Canada
  - Canada

- Australia
  - Australia

- Israel
  - Israel
Regulators globally are clearly beginning to enable the FinTech and RegTech transformation of the industry

Regulatory agenda
- Regulatory support for FinTechs to stimulate competition
- Use of RegTech to enhance effectiveness/reduce cost of regulatory compliance
- Incorporation of FinTechs into the regulatory framework

US (CFPB)
- Project Catalyst launched to encourage innovation through collaboration
- Bureau staff permitted to issue “no-action letters” in situations with uncertainty over regulatory requirements

US OCC:
- Office of Innovation point of contact for requests related to innovation

UK (FCA):
- Firms can experiment in the regulatory sandbox to develop innovative products and services
- The FCA launched a Call for Input (CfI) to support development and adopters of RegTech
- Project Innovate and the Innovation hub were set up to support firms to understand the regulatory framework and apply for authorisation.

Switzerland (FINMA):
- Proposed rules for creating a “sandbox” area for firms to experiment with innovative products, services and business models
- Proposed issuance of a new “FinTech license” for smaller deposit-taking firms and easing rules on crowdfunding

Europe

Asia

Singapore (MAS):
- Launch of regulatory sandbox, Innovation Lab to facilitate FinTech experimentation/development
- Launch of FinTech and Innovation Group (FTIG) for regulatory policy and development strategy

Australia (ASIC):
- Innovation Hub set up to provide informal guidance and help FinTechs navigate regulation
- Beginning to engage 30 RegTech vendors to expand sandbox into regulatory use cases

Hong Kong (HKMA):
- Innovation hub and FinTech Supervisory Sandbox set up
- FinTech Facilitation Office to act as industry and regulator liaison as well as initiate research

China
- Five Financial Services regulators have issued joint rules over internet-based payments, insurance, credit and fund sales

Regulatory agenda

Regulatory support for FinTechs to stimulate competition
Use of RegTech to enhance effectiveness/reduce cost of regulatory compliance
Incorporation of FinTechs into the regulatory framework
Each RegTech strike zone needs to be considered from both the perspective of the solution readiness and client need.

Responses will vary based on all dimensions and could include executing different channels & tactics like PoCs, building JVs, spinning out home grown solutions, participating in incubators & accelerators, or investing in RegTechs.
RegTech strike zone solutions can be prioritized based on cost of current processes and startup activity

Example | Approach
---|---
**Incubate** | Solutions maturing, but currently support existing programs & not a candidate for wholesale replacement
**Regulatory Affairs** | Invest in growing the space with startups to allow solutions to mature for future implementation

**Accelerate** | Solutions moderately mature, but often lack deep expertise with regulatory reporting challenges
**Risk Aggregation & Reporting** | Participate in external accelerator programs to provide to shape Risk Aggregation and Reporting solutions

**Implement** | Solutions running multiple POCs at large clients demonstrating nearness of adoption likelihood
**KYC / AML** | Engage directly with partners to implement in single business / desk with the potential to expand
**Market Surveillance** |

*RegTech Prioritization Scale*

Costs Incurred by Financial Institutions

RegTech Startup Funding

*Size of bubble indicates number of RegTech startups
RegTech strike zone solutions can be prioritized based on cost of current processes and startup activity

<table>
<thead>
<tr>
<th>Focus Areas</th>
<th>Vendors</th>
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<td>Onfido</td>
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<td>ConTego</td>
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<td>AML</td>
<td>CoMply Advantage</td>
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<td>GIANT OAK</td>
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<td>IdentityMind</td>
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<td>Fenergo</td>
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<td>Regulatory Reporting</td>
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<td>Funds Axis</td>
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<td>Sales Surveillance</td>
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<td>Regulatory Compliance</td>
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<td>Technologies with wide</td>
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<td>spectrum of use cases</td>
<td>squirrel</td>
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<td>Scaled Risk</td>
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**Insurance CCO Areas of Focus**

- **Financial Crimes**
  - Anti-Bribery & Anti-Corruption
  - AML & Counter Terrorist Financing
  - Trade and Economic Sanctions

- **Business Conduct**
  - Pre-sale
  - Sales & Distribution
  - Post-sale
  - Anti-Trust and Fair Competition

- **Employee Conduct**
  - Conflict of Interest
  - Dealing in Securities and Related Conduct
  - Market Abuse

- **Big Data and AI Solutions**
  - Solutions targeting firm-wide challenges
**The industry is at the start of the journey to harness RegTech to drive down the regulatory cost & improve effectiveness**

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
<th>Considerations</th>
<th>Examples</th>
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<tbody>
<tr>
<td><strong>In House Proprietary</strong></td>
<td>Firms are utilizing automation and process reengineering to achieve efficiencies, drive consistent quality, and deliver economies of scale</td>
<td>• High level of ownership but bearing the entire cost of development</td>
<td>• Several large banks are exploring licensing scenario modeling tools internally or possibly spinning out</td>
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<tr>
<td><strong>RegTech Solutions</strong></td>
<td>Near term solutions are being built by traditional third party providers and tech players to embed within the existing infrastructure to address complex compliance requirements</td>
<td>• Startup ecosystem infrastructure is bearing the cost of development</td>
<td>• Credit Suisse &amp; Palantir have a JV, Signac, for trade surveillance with CS as the first “customer”</td>
</tr>
<tr>
<td><strong>Shared Compliance Utility</strong></td>
<td>Market participants are investing in shared utilities to leverage wider universe of data from the syndicate of firms and reduce costs by leveraging utility functions for common activities</td>
<td>• Plays well for industry-wide problems which need complete view of transaction to be effective</td>
<td>• Innovative regulators are looking at sandboxes to create a “reg stack”, i.e. software sub-systems &amp; components, for the FinTech ecosystem</td>
</tr>
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So what are the next steps to figure out how to address RegTech?

- Survey the RegTech landscape to identify the “best in class” technology and functional capabilities – immerse yourself to understand what is out there.
- Build your innovation operating model with targeted approaches for RegTech by leveraging the existing infrastructure and lessons learned from FinTech.
- Frame future state strategy & target operating model to gauge cost savings, expected capabilities, and the vision for the role of risk and compliance as a strategic partner.
- Perform feasibility studies and proof of concepts with emerging solutions to determine readiness and suitability for potential adoption.
- Engage corporate innovation, accelerators, universities, and internal / external venture capital teams to develop continuous monitoring & development capabilities.
- Develop a strategy for implementing emerging solutions that leverages existing infrastructure to support the future state.
  - Develop a framework for the future state architecture and roadmap for implementation.
- Perform implementation and operationalize emerging solutions to facilitate risk and compliance processes.
PwC RegTech will be launching a RegTech channel in DeNovo in early June

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