



**THE Nigerian  
STOCK EXCHANGE**

# EMERGING TECHNOLOGY GAME-CHANGERS

**NSE 2<sup>nd</sup> Annual Market Data Workshop**

Presented by

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Executive Director,

Market Operations and Technology

October 4, 2017

# Overview



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## Advanced Analytics & AI

A wide range of historical, current, and forecast data are being used to generate greater actionable insights and build predictive and machine-learning models to identify trends which will inform investment decisions and business strategies.



## Blockchain Technology

Digital revolution powered by blockchain and other financial technology will deliver *“the internet of value”*, creating cost savings across the financial services industry.



## Mobile Trading & Smart Apps

Trading and investment management apps have transformed the investment experience of this age. Mobile apps will become a *“go to”* platform for mass market investing.



## Algorithmic Trading

Human intervention in trading and investment will increasingly devolve to algorithms. While HFT is still important, firms are diversifying into longer duration strategies.



## Cloud Technologies

Cloud platforms are no longer the “new normal” for just developers but a standard solution for enterprises. Offering faster deployment; scalability; agility, mobility, and business continuity; and lower total cost of ownership.



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# 1 Advanced Analytics & AI

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# A New World Of Data



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Vast amounts of unstructured data are being generated today.....

**>500 Million**  
tweets per day



**1 Billion**  
hours of video  
watched on  
YouTube daily



**269 Billion**  
emails sent  
daily

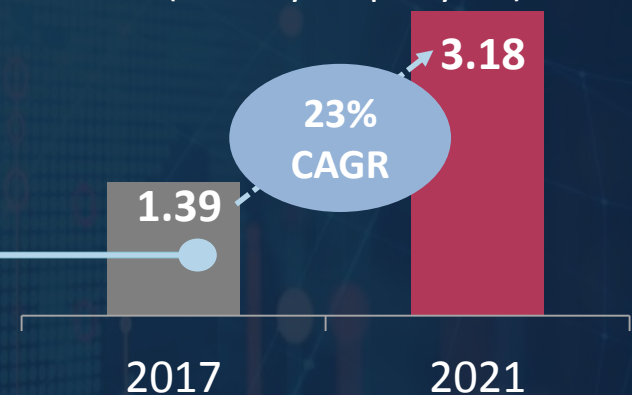


**3.2 Trillion**  
searches on  
Google daily



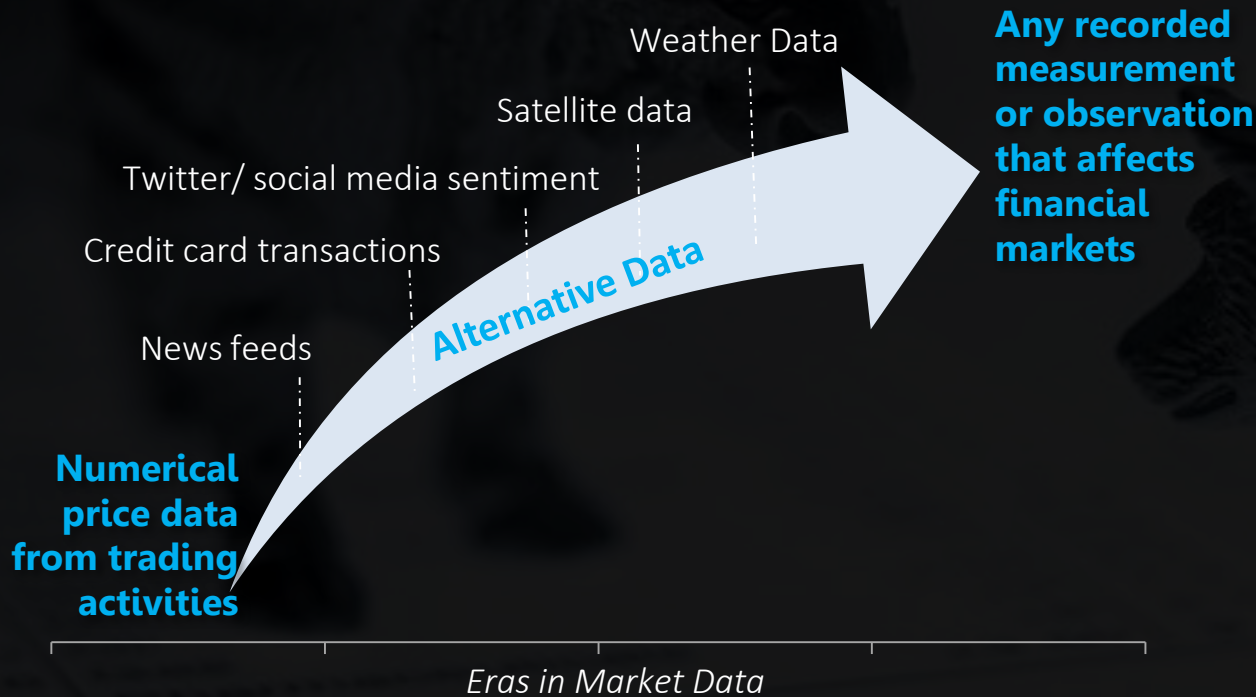
.. with a significant increase  
expected over the next 4 years

Global IP traffic  
(Zettabytes per year)



# The Rise of Alternative Data

Alternative data is increasingly being used to inform trading strategies



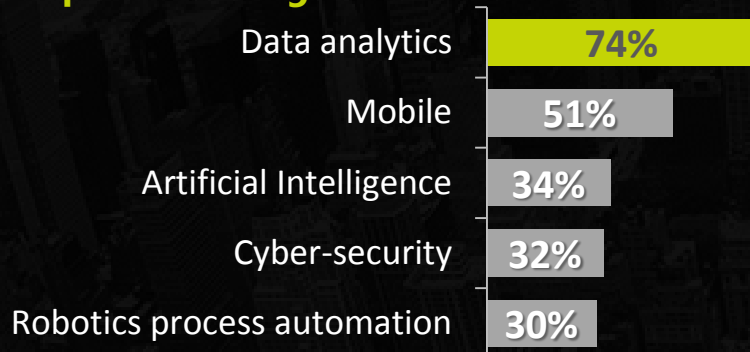
- New datasets and applications to the capital market are emerging. E.g. :
  - Twitter sentiment is being used to predict market movement and corporate earnings
  - Weather data now informs commodity trading strategies
- Advanced analytics (i.e. the structuring and visualization of unstructured data) enables users to extract actionable insights from aggregated data.

# Data Analytics is Key

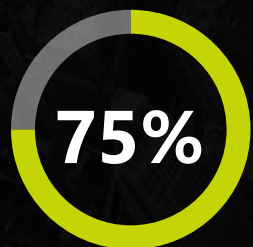


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## Top 5 Technological Areas of Investment



## IBM study of data analytics in global financial services firms shows:



are implementing  
or investigating big  
data and advanced  
analytics projects



are focused on  
developing new  
business lines to  
monetize Big Data

## What does this mean for the Nigerian Capital Market?

- **Advanced analytics can support:**
  - New trading and investment insights
  - Automated reporting and risk management
  - Market surveillance and compliance
- **Harnessing these benefits requires** access to a greater volume of varied data, as well as strong analytics capabilities (i.e. tools and personnel).
- **Opportunities exist for exchanges, data vendors and software providers, amongst others, to develop new data and analytics products**
  - E.g. Nasdaq aggregates its internal feed and third party data (e.g. social media) to develop alpha signals (predictive analytics), to sell to fund managers & traders.



# Creating Value through Data Integration



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The **NSE Market Data API and Widget** offer users a simple and inexpensive way to download & integrate market data into their businesses in order to create competitive product and service offerings.

## Broad Coverage

Get comprehensive NSE market data such as stock quotes, security prices, trade and fundamental data in single package.

## Multiple Formats

With wide formats supported, market data integration to business solutions cannot be simpler. Options include; widget format, CSV, XML, JSON, Atom & RSS feeds.

## Metered Usage

Why buy data in bits and pieces when you can access all on your chosen data usage band.

## What do APIs do?

API is a technology that allows and manages the interaction between two online/internet connected services.

An example is: The pulling of share price data from the Nigerian Stock Exchange API into a website.

## Why APIs Rock!

- APIs provide remote processing power for business intelligence.
- APIs facilitate the development of mobile apps with seamless data connectivity, dynamic functionality and power.

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# Artificial Intelligence Matters

## Growth in Artificial Intelligence (by 2021)

**\$2.8Bn**

in investment  
by financial  
services firm  
in AI tech

**>\$47Bn**

in revenue  
from AI  
business  
activities

## AI Opportunity Areas in The Capital Markets

### Robotics Process Automation

- Client on-boarding
- Issuance, M&A
- Data Management
- Post-trade Operations
- Finance control
- KYC
- IT service operations
- HR
- Legal

### Machine Learning

- Client research
- Client relationship management
- Trade execution
- Reconciliations
- Transaction reporting
- Cyber security

### Cognitive Analytics

- Client insights/ analytics
- Pre-trade/ post-trade analytics
- AML/ surveillance
- KYC
- Enterprise risk management
- Financial/ regulatory reporting

## Evolution of AI

- Big Data has supported AI to move from automation to intelligence, and will remain critical to the success of AI as more and new data is used to train AI systems






# Getting Ahead With A.I.

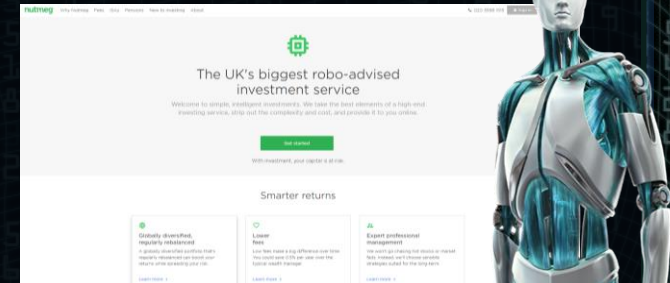


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## Advantages of Artificial Intelligence

 New Businesses	 Customer Outcomes	 Operational efficiency
New and innovative products, services and business models powered by AI	<p>Growth in customer acquisition, retention and overall satisfaction via:</p> <ul style="list-style-type: none"><li>• Superior experience to customers and users based on hyper-personalization and curation of real-time information</li><li>• Ability to attract and engage with customers across various channels e.g. online customer services modules and financial advisors</li></ul>	<p>Intelligent automation enhances profitability through more efficient processes, activities and services</p> <ul style="list-style-type: none"><li>• Supports 'lean' strategies and headcount reduction</li></ul>

## Case Use: Robo-Advisors



Robo-advisors provide financial advice and/or online portfolio management with moderate to minimal human intervention, using algorithms. Advantages to businesses/ beneficiaries include:

- Low-cost advisory services
- Greater accessibility (leading to greater customer acquisition)
- Consistent customer support (i.e. investment advice)





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**The data revolution is  
upon us, and it is  
absolutely critical for  
the Nigerian capital  
market to get  
involved, otherwise  
we will be left  
behind.**

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# 2 Blockchain Technology

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# Components of a Distributed Ledger



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## BLOCKCHAIN – THE KEY FIVE PARTS

COMMON  
DATABASE



**Tokenisation  
of assets/  
contracts**

- Underlying assets are uniquely identified
- Form a database with ownership rights assigned
- **Disruption: Custodians and banking**



**Universal  
ledger**

- Creates a universal record of ownership and transactions
- Updated in realtime with automatic reconciliation
- **Disruption: Removes reconciliations from finance**

AUTO-  
EXECUTION



**Self-enforcing  
smart contracts**

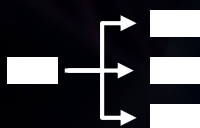
- Automatic settlement of financial obligations between counterparties
- Convert terms of a transaction into “financial code”
- **Disruption: Removes financial intermediaries in post trade**



**Cryptography  
and update by  
consensus**

- Cryptographically enforced database
- Decentralized nature of the database maintains confidentiality
- **Disruption: No central point of failure**

DISTRIBUTED  
ARCHITECTURE



**Distribution of  
ledger**

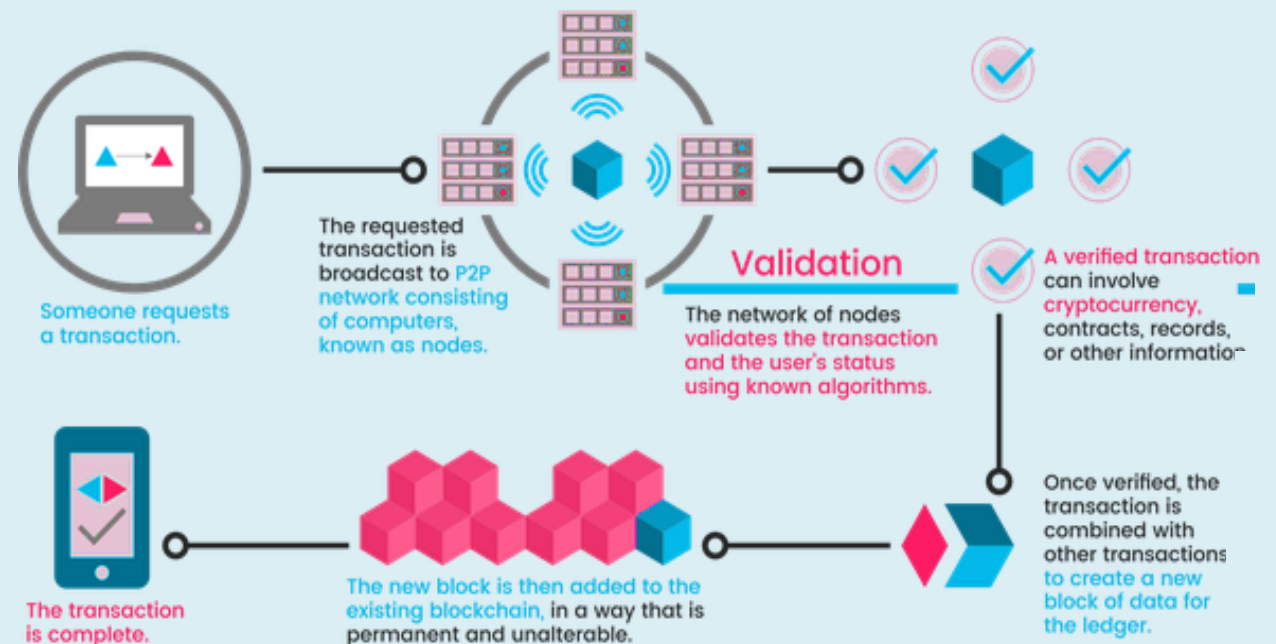
- Participants mutually agree updates to the database
- All work off a local copy without connectivity to a central source
- **Disruption: Removes multiple reconciliations and enhances P2P**

# Blockchain: Disrupting Data Management

**Blockchain supports the creation of secured, shared data for seamless transfer of digital assets.**

- Blockchains are **built on encryption, mutual consensus data and smart contracts**.
- They reconcile data between independent parties to create a **single true record, used by all participants**, containing richer datasets than those existing today.
- This in turn **enables new industry processes to be developed**, based on the use of transparent real-time data, immediate settlement of transactions and the expansion of auto-executing 'smart' contracts.

## Mechanism of Blockchain Technology



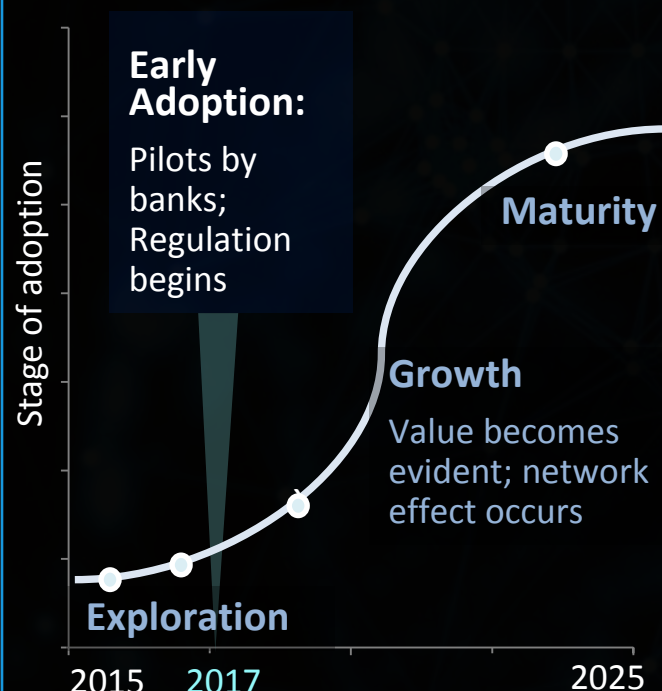
Sources: Oliver Wyman: Blockchain in the Capital Markets; Mechanism culled from PC Magazine



# Blockchain in the Capital Markets

## Blockchain is still in its infancy...

..But will be mainstream and integral to the capital markets by 2025.



## Potential benefits of Blockchain to the capital markets

Pre-trade	Trade	Post-trade	Custody and securities servicing
<ul style="list-style-type: none"> <li>• Transparency and verification of holdings</li> <li>• Reduced credit exposures</li> <li>• Mutualisation of static data</li> <li>• Simpler KYC/KYCC via look through to holdings</li> </ul>	<ul style="list-style-type: none"> <li>• Secure, real-time transaction matching, and immediate irrevocable settlement</li> <li>• Automatic DVP on a cash ledger</li> <li>• Automatic reporting &amp; more transparent supervision for market authorities</li> <li>• Higher AML standards</li> </ul>	<ul style="list-style-type: none"> <li>• No central clearing for real-time cash transactions</li> <li>• Reduced margin/collateral requirements</li> <li>• Faster novation and efficient post-trade processing</li> <li>• Fungible use of assets on blockchains as collateral</li> <li>• Auto-execution of smart contracts</li> </ul>	<ul style="list-style-type: none"> <li>• Primary issuance directly onto a blockchain</li> <li>• Automation of servicing processes</li> <li>• Richer central datasets with flat accounting hierarchies</li> <li>• Common reference data</li> <li>• Fund subscriptions/redemptions processed automatically on the blockchain</li> <li>• Simplification of fund servicing, accounting, allocations and administration</li> </ul>





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# 3 Mobile Trading & Smart Apps

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# Mobile Goes Mass Market

TYU division  
FRT division



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## Global Mobile Landscape (2017)

**5.1  
billion**

unique mobile  
subscribers globally

**11  
exabytes**

of mobile data traffic  
generated monthly

**50%**

of global web traffic is  
from mobile phones

**81%**

of web traffic in Nigeria  
is from mobile phones

- Mobile technology is critically important to Nigeria
  - ✓ High mobile - low broadband penetration
- In January 2017, Nigeria topped the global mobile share ranking, as phones accounted for more than 4 out of 5 web pages served.

Source: Cisco, IBMA

## Evolution of Mobile Trading Apps

Phase  
1

**View-Only Buy-  
Side Mobile  
Apps**

- Limited ability to only view account/trading dashboards

Phase  
2

**Action-  
Oriented Buy-  
Side Mobile  
Apps**

- Ability to provide trade alerts, route orders etc.

Phase  
3

**Dynamic  
Multifunctional  
Systems & Buy-  
side Apps**

- Ability to route orders, monitor bank balance, transfer money etc



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# 4 Algorithmic Trading

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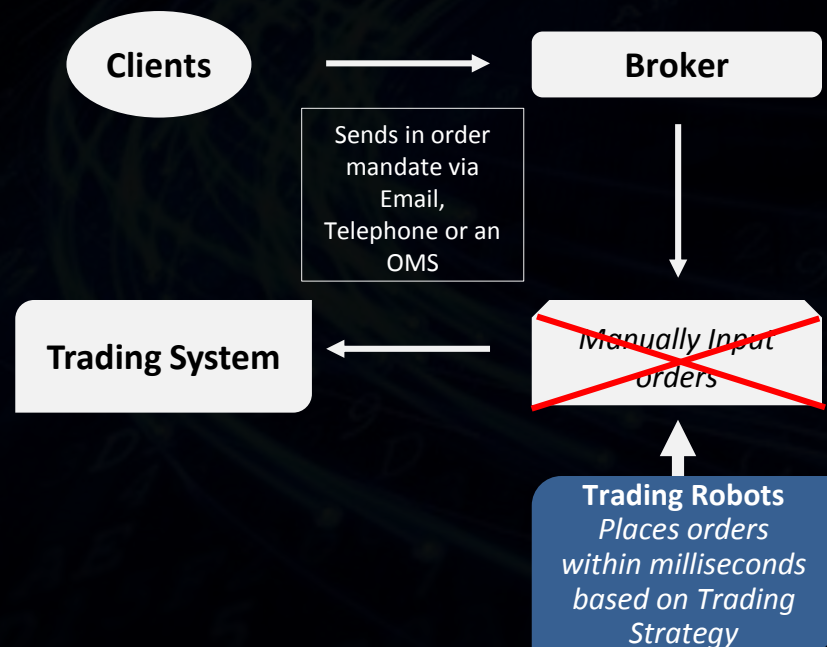
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# The Race to “Zero” and Rise of Algos

**Timely access to market intelligence and swift trade execution remain key to wealth creation.**

- Today, traders rely not only on high-speed information networks for timely access to news and **market data**, but also on algorithms to swiftly generate and execute trading decisions in “sub-milliseconds”.



- Market research company *Technavio* predicts the market for global algorithmic trading will grow:

**10.3%↑**

CAGR between 2016 and 2020

- Meanwhile, the “**Quantum Computing** Supremacy Race” is expected to result in groundbreaking computing power, enabling disruptive new technologies that will power the future of algo trading.
- The race is projected to propel the Quantum Computing Technologies & Global Market to:

**\$10.7bn↑**

By 2024

# *Value from Algo Trading*



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**Better investment decisions**

- Opportunity to back-test the algorithm, based on available historical and real time data
- Simultaneous automated checks on multiple market conditions
- Reduced possibility of mistakes by human traders based on emotional and psychological factors

- Instant and accurate trade order placement avoids significant price changes
- Reduced transaction costs
- Reduced risk of manual errors in placing trades

**Enhanced efficiency**

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# 5 Cloud Technologies

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# The Rise of Cloud Computing

**Cloud computing** is increasingly enabling new, complex business models through various platforms...

...and is projected to increase from \$67B in 2015 to \$162Bn in 2020



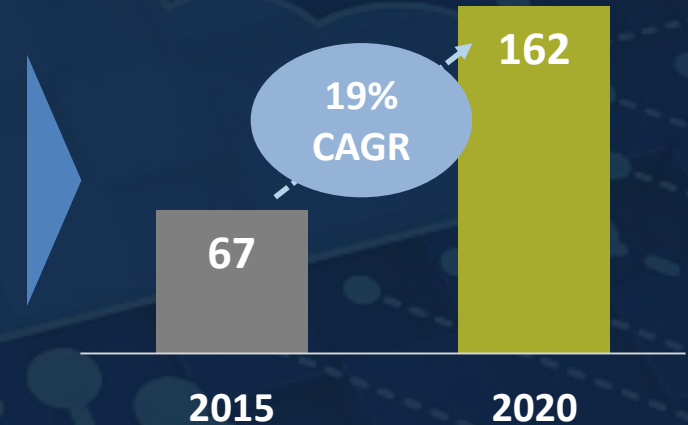
Expected to increase **20.1%**, reaching **\$46.3Bn** in 2017.



Fastest-growing sector of cloud platforms with **32% adoption** in 2017.



Projected to grow **36.8% to reach \$34.6Bn** in 2017.





# NSE X-Cloud Offering

**The NSE X-Cloud is a fully managed, innovative and integrated hosting platform.**

					
<b>MOS Compliance</b>	<b>Increase Performance</b>	<b>Cost Effective Solution</b>	<b>Dedicated Support Staff</b>	<b>Flexibility and Service Availability</b>	<b>Security</b>
<ul style="list-style-type: none"><li>• Achieve the NSE minimum operating standard requirements by putting in place strong BCP.</li></ul>	<ul style="list-style-type: none"><li>• Achieve success in trading strategies with low latency access to the NSE trading servers.</li></ul>	<ul style="list-style-type: none"><li>• Avoid fixed infrastructure investment costs and focus on managing your core business.</li></ul>	<ul style="list-style-type: none"><li>• Get access to a dedicated support team and a 24/7/365 monitoring system.</li></ul>	<ul style="list-style-type: none"><li>• Grow your business at your own pace with guaranteed power and 100% uptime.</li></ul>	<ul style="list-style-type: none"><li>• Multiple levels of physical and digital security giving you the highest levels of protection.</li></ul>

**Low Cost – High Value Cloud Solution.**

# The NSE Provides...



## **Issuer Info Display**

Enables listed companies display own stock quotes on corporate website on a near real time or delayed basis.



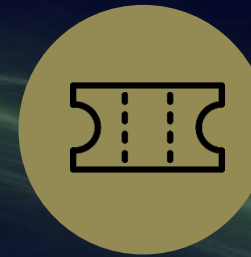
## **TV End of Day**

Enables authorized user to display the end of day all share index and top traded stocks in each sector.



## **X Gen News**

Receive e-mail alerts on company disclosures as they are disseminated on the trading floor.



## **Ticker Licenses**

Enables a contracted user to display the NSE scrolling Ticker across TV, website, video walls or other public spaces.



## **Hosting Services**

Includes co-location, disaster and recovery plans and hosting solutions.





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*“You can’t use up creativity. The more  
you use, the more you have.”*

**— Maya Angelou**

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# THANK YOU

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