NEXEN Ecosystem Foundation Introduction

Lucille Mayer
Chief Information Officer, Client Experience Delivery

August 24, 2016
The NEXEN Benefits to be Demonstrated Today

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</table>
Servicing Multiple Needs Through Common Components

- Professionals
- Investors
- Developers
- Employees
- Traders
- Machines

Access

- Browser / Mobile
- Electronic (APIs)

Services

- Foundational Services
- Business Services
- Data Solutions
  - Digital Pulse
- Workflows
- Third-Party Solutions

Infrastructure

- Legacy Solutions
- BXP
- Private Cloud
- Public Cloud

Non BXP
Servicing Multiple Needs Through Common Components

- NEXEN Gateway delivers a cohesive, integrated user experience; including mobile access
Servicing Multiple Needs Through Common Components

- NEXEN API store empowers clients by extending their own technology investments
- NEXEN APIs provide standard, accessible electronic service delivery to developers
- NEXEN leverages industry-standard technology protocols for ease of use
Servicing Multiple Needs Through Common Components

- Professionals
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Foundational Services
Business Services
Data Solutions
Digital Pulse
Workflows
Third-Party Solutions

Browser / Mobile
Electronic (APIs)

Private Cloud
Public Cloud
Servicing Multiple Needs Through Common Components

Converging and standardizing common services across all products. Examples include:

- Reporting
- Documents
- Workflow
- Alerts
- Common entitlements
Servicing Multiple Needs Through Common Components

- Extending our platform across the entire investment lifecycle; improving cross business collaboration to create innovative compound solutions.
- Leverage common service inventory via APIs enabling interoperability of business services and service reuse.
Servicing Multiple Needs Through Common Components

- A data-centric approach to deliver solutions more quickly and drive business insights through Digital Pulse and NEXEN data
- Common, “single source of truth” for data – easily accessible data rather than local information warehouses
- Information unlocked for clients, including:
  - Improved risk management
  - Evidence-based analytics
Servicing Multiple Needs Through Common Components

- Generic workflow capabilities and intelligent routing through configurations, meeting a majority of workflow needs
- Common experience across products and services
- Full client transparency of transaction status
- Reduced inquiries due to direct access
- Continuous service level improvement experience
Servicing Multiple Needs Through Common Components

- NEXEN provides client access to a broad set of complementary third-party solutions
- NEXEN App store provides selection and choice; bringing entirety of our offerings to clients
- Creates client economies of scale for data integration with third-party tools
Servicing Multiple Needs Through Common Components

- Offers innovation, speed and elasticity of cloud computing
- Creates standardization and resiliency
- Removes infrastructure steps from the software deployment lifecycle
Servicing Multiple Needs Through Common Components

Professionals
Investors
Developers
Employees
Traders
Machines

Access

Browser / Mobile
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Services

Foundational Services
Business Services
Data Solutions
Digital Pulse
Workflows
Third-Party Solutions

Infrastructure

Legacy Solutions
BXP
Non BXP

Private Cloud
Public Cloud
Our NEXEN Gateway to a Transformed Client Experience

Milestones

12K+
Entitled Gateway Users

5M
Total API Calls/Requests (Consumed)

25B
Total Pulses Generated

Create an integrated client experience
Add new solutions on NEXEN
Client and business collaboration
New capabilities put into place:
NEXEN Gateway
BXP (Cloud)
Digital Pulse (Data and Analytics)
API Store
Insourced talent strategy

Provide New Solutions and Generate New Revenue Streams
2016 and beyond

Transition Clients
2016 / 2017

Build the Foundation
2015

Key Benefits to Clients

- Deliver one digital ecosystem experience
- Provide faster speed to market for existing and new applications
- Enable greater ease of use
- Increase productivity
- Achieve cost savings
NEXEN Gateway –
Single Portal to Access BNY Mellon Services

Neil DiCicco
Technology Product Manager

August 24, 2016
**NEXEN Gateway**

**BUSINESS LEADER**
Neil DiCicco
NEXEN Gateway
Product Manager

**TECHNOLOGIST**
Michael Pettenato
NEXEN Gateway
Development Manager

**BUSINESS CHALLENGE TO SOLVE**
- Clients access BNY Mellon’s solutions via different portals, organized by line of business, resulting in inefficiency, inconsistent service levels and redundant functionality

**TECHNOLOGY SOLUTION**
- Developed a single portal to access BNY Mellon solutions delivering a consistent client experience regardless of product, service or region

**NEXEN BUILDING BLOCK COMPONENT(S)**
- BXP; API Store; Digital Pulse; Gateway

**BENEFITS**

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<tr>
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**Client**
- Delivers BNY Mellon services, third-party and client solutions in a single, integrated portal rather than a wide array of systems
- Consistent client experience regardless of product, service or region
- Business solutions, capabilities and data across all access devices (mobile)
- Client reporting consistency across lines of business

**BNY Mellon**
- Increased efficiency enables relationship managers to spend more time providing value-added insights
- Scalable solutions leveraged across lines of business reduces redundancy, lowers costs and improves cross business collaboration
- Increased developer productivity; deliver solutions faster
- Changes the development culture to be agile
NEXEN Digital Pulse –
Big Data Analytics and Insights

Gerald Verrilli
Big Data Architect

August 24, 2016
Digital Pulse – Big Data Analytics and Insights

TECHNOLOGIST
Gerald Verrilli
Big Data Architect

BUSINESS CHALLENGE TO SOLVE
- Establish a centralized production platform to capture, store, analyze and drive actionable insights on large amounts of data from disparate business data sources

TECHNOLOGY SOLUTION
- Developed a cost-effective, real-time Big Data analytics and visualization solution that is reusable across a multitude of business cases
- Enables rapid collection of new data streams with standardized capture APIs and provides self-service analytics for business teams

NEXEN BUILDING BLOCK COMPONENT(S)
- BXP; API store; Digital Pulse; Gateway

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Client
- Provides insights that create value and improve decision-making
- Single source of the truth
- Allows massive amounts of information to be organized and visualized in a consistent manner
- Creates metrics targeted to improve client service quality and behavior

BNY Mellon
- Drives process improvement, waste elimination, and unit cost reduction
- Supports evidence-based management culture
- Enables monitoring and measurement to increase performance improvement opportunities
NEXEN Digital Ecosystem
A Foundation for Clients and the Industry to Build Upon

Digital Pulse

Digital Pulse is the component of the NEXEN ecosystem that has digitized BNY Mellon enabling us to “work smarter” and deliver analytical capabilities across a vast range of themes and businesses to drive measureable improvements.

At its core, Digital Pulse is our internally-developed, real-time Big Data analytics and visualization platform.

Enables business leaders to discover and deliver actionable insights that improve business performance through evidence-based management.
NEXEN Digital Pulse - An Evidence-Based Ecosystem

Transforming Our Business and Culture

Digital Pulse is comprised of four core pillars that combined deliver a data immersive experience

<table>
<thead>
<tr>
<th>Value to BNY Mellon</th>
<th>Driving Outcomes</th>
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| **1. Capture** Collecting event-based data | • Improving Client Experience  
• Maximizing Client and Product Profitability  
• Resource Effectiveness and Productivity  
• Straight-Through Processing  
• Service Level Improvement  
• Process Optimization  
• Resource Planning and Deployment  
• Real-Time Risk Monitoring  
• Proactive Threat Mitigation  
• Talent Analytics  
• Facilities Cost Optimization  
• Value Creation for Clients  
• Business Continuity  
• Process Automation  
• Business Monitoring  
• Workforce Strategy and Optimization  
• Practice Management  
• Information Security Insights |
| • Consistency of data publishing across various platforms, technologies and processing environments  
• Simple, fast data ingestion | |
| **2. Store** Big Data repository |  |
| • Scalability at a lower cost to the enterprise  
• Single Source of Truth  
• Quicker adaptability to the changing technology landscapes | |
| **3. Analyze** Consistent, meaningful analytics | |
| • Makes analytics accessible  
• Common reusable analytics across businesses for defined themes  
• Increases transparency and awareness  
• Identifies waste and opportunities | |
| **4. Act** Delivering actionable insights | |
| • Empowers employees with real-time insight  
• Provides easy to understand visualizations on complex data  
• Actionable insights to improve processes and business | |
NEXEN Digital Pulse Delivers Transparency Through Data Analytics and Insights

**FAST DATA CAPTURE**
- Standardized payload structures and wide range of interface protocols facilitate data capture from disparate sources
- Capture data from 106 business processes
- Onboarding another 105 applications

**EFFICIENT DATA ORGANIZATION**
- Rapid data ingestion is coupled with a high performance database to provide a centralized, cost-effective solution
- Collecting >1.4 billion events/month
- Providing data insights for over 25 billion pulses

**SELF SERVICE DATA ANALYTICS AND INSIGHTS**
- Non-technical end user interactive dashboards support visualization, aggregation, drill down, and download
- 3,700 active users
- Deliver 768 visualizations and analytics

**BUSINESS THEMES – CAPTURE AND EXTENSION**
- Metadata layer and reusable dashboard components enable common business themes to be extended across the enterprise
- Represent 35 different business areas as well as enterprise-wide insights
Digital Pulse, Unlocking the Value – Business Example

Liquidity Plus
Real-time liquidity monitoring of Fed Wire, Clearing House Funds, and Fed Securities payments versus market deadlines
Digital Pulse, Unlocking the Value – Business Example

Real-time tracking of daily NAV production activities against client deadlines with projected completion times based on historical trends.
NEXEN – Application Programming Interface (API) Store

Matt Joseph
Head of Jersey City Innovation Center

August 24, 2016
Application Programming Interface (API) Store

**TECHNOLOGIST**
Matt Joseph
Head of Jersey City Innovation Center

**BUSINESS CHALLENGE TO SOLVE**
- Provide data and functionality to clients that was manually intensive, requiring lengthy customized set-up and numerous touch points

**TECHNOLOGY SOLUTION**
- Developed APIs that provide access and simplicity for integrating and processing data between client and BNY Mellon

**NEXEN BUILDING BLOCK COMPONENT(S)**
- BXP; API store

**BENEFITS**

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**Client**
- Utilizes industry standards and open source solutions making it easier for clients to extend their technology investments
- Invokes BNY Mellon services directly, improves the speed to access our solutions as well as developer productivity
- Enables the creation of new solutions that combine data and functionality
  - App store, third-party solutions and FinTech APIs

**BNY Mellon**
- Transforms business operations to be more agile, flexible and dynamic in the new digital economy
- Creates operational efficiencies by making services interoperable
- Increases speed-to-market, accelerates innovation, enables monetization of data and functionality
NEXEN – BNY Mellon eXtreme Platform (BXP) / Cloud Technology

John Wetherill
Principal Architect, Silicon Valley Innovation Center

August 24, 2016
BNY Mellon eXtreme Platform (BXP) – Cloud Technology

TECHNOLOGIST
John Wetherill
Principal Architect, Silicon Valley Innovation Center

BUSINESS CHALLENGE TO SOLVE
• Reduce manual software installations, application-specific maintenance complexities and specialized skills to increase efficiencies and reduce overall costs and risk

TECHNOLOGY SOLUTION
• Created environment that enables consistent application and data portability of software solutions through “containerization” and efficient use of available resources

NEXEN BUILDING BLOCK COMPONENT(S)
• BXP; API store; App store; Digital Pulse; Gateway

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Client
• Reduces costs and risks
• Increases resiliency
• Reduces time spent on maintenance
• Onboards clients faster
• Improves client experience

BNY Mellon
• Supports public / private cloud, pay-on-demand
• Delivers software faster
• Enables higher productivity
• Enables investment in and delivery of value-added solutions to clients
BXP Cloud Technology Powering Investments

- Hosts BNY Mellon business applications
- Hybrid cloud strategy supports private and public cloud
- Significantly improved software delivery times from months to hours to provision application stacks
- 300+ Apps deployed
- Thousands of deployments, billions of transactions per month
Containers Revolutionized Global Commerce
We Now Have Containers for Code

Pack all software in the same way
Transport software efficiently
Run software consistently

Break today’s software into smaller pieces
Run more of them to scale
Re-assemble into business opportunities

The Journey to Cloud Native
NEXEN Ecosystem – Business Solutions

Mike Keslar
Head of Investment Services Technology

August 24, 2016
Building Business Solutions Differently

From How we Build Solutions to How we Work Together, we are Eliminating Redundancies, Increasing Developer Productivity and Improving the Client Experience

- NEXEN Components
  - Leveraging NEXEN’s reusable building blocks to drive lower development costs and faster speed to market

- Service Ownership
  - Transforming application teams into client-focused service organizations measured on service quality

- Agility
  - Adopting Agile / Lean development principles and increasing business engagement

- Enterprise Services
  - Transitioning from business unit solutions to enterprise services that optimize processes across the firm

- Resiliency
  - Leveraging new approaches to resiliency to ensure that platforms are highly available
Today You Will See Various Demonstrations of How We Are Building Business Solutions Differently, Including…

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<th>Business Benefit</th>
<th>Gateway</th>
<th>API Store</th>
<th>App Store</th>
<th>Workflow</th>
<th>Digital Pulse</th>
<th>BXP</th>
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<tr>
<td>Enterprise Risk Integration</td>
<td>• Improved ability to manage risk</td>
<td>✔️</td>
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<td></td>
<td>• Increased visibility and transparency into risk exposures</td>
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<td>Enterprise Client Onboarding</td>
<td>• Improved and consistent client experience</td>
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<td>• Improved time to revenue recognition</td>
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<td>Trade Capture Analytics</td>
<td>• Improved straight through processing rates</td>
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<tr>
<td>Sentiment Application</td>
<td>• Integrating social and conventional media analytics into investment portfolios</td>
<td>✔️</td>
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<td>Distributed Ledger for Broker-Dealer Services (BDS)</td>
<td>• Improved resiliency – potential alternative if primary system is down</td>
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* Future
NEXEN Ecosystem – Collaboration

John Lehner
Chief Executive Officer, BNY Mellon Technology Solutions

August 24, 2016
## BNY Mellon Technology Solutions Vision

**Capitalize on our Technology Expertise and Assets to Achieve Our Goal of Being the Investments Technology Solutions Leader**

### Rationale
- Greater demand for integrated front and back office
- Need for agile, flexible, scalable IT infrastructure
- Increased focus and investment in data management and analytics
- Stronger focus on managing risk at the enterprise-level

### Approach
- Extend our variable cost business model across the investment life cycle
- Unlock value of technology assets and change the value perception of technology from a cost to a revenue driver
- Offer a continuum of deployment options (SaaS, PaaS, full outsourcing)
- Leverage NEXEN collaboration solutions, leveraging data and third-party applications
- Build FinTech portfolio through internal development, partnerships, and equity investments

### Factors Positioning BNY Mellon for Success
- Clients trust BNY Mellon
- Strong domain knowledge
- Proven track record

### Benefits
- Diversify BNY Mellon revenue streams
- Create stronger strategic client relationships
- Improve our technology return on investment
Combining Size and Scale with Data-Centric Solutions

- Our technology and service is comprehensive, flexible, scalable and global
- Integrated middle office platform offering that draws upon our innovative data, operational and technology expertise to service today’s multi-layered outsourcing arrangements
- Ability to combine back office functions with middle office servicing across multiple books of business via a single platform
Why Clients are Choosing Us

Lessons learned from other recent large client deals

1. Manage data complexity
2. Higher quality and consistency supporting front office and client data challenges
3. Flexibility in addressing changing data requirements

Data-Centric Solutions

Commercial Impact

1. More efficient than previous operating models
2. Faster time to value and lower risk deployments
3. Best-in-class technology enables competitive price point

Business Benefits

1. Provides a solution that addresses complexity and commodity requirements
2. Reusable and scalable components delivered in client-specific configurations
3. Variable cost structure