HP Big Data Conference
Empower data driven organizations through innovation built for HPC and Big Data analytics

Bill Mannel
VP/GM, Apollo HPC and Big Data Servers
HP – Empowering a Data Driven Organization

Bill Mannel – VP/GM, Apollo HPC and Big Data Servers
It is time to reinvent compute for the New Style of Business

From an IT service:

- IT outcomes
- Conventional hardware
- General purpose
- Cost

To a competitive advantage:

- Business outcomes
- Software-defined Compute
- Workload Optimized
- Differentiated value

Transform to a hybrid infrastructure
Protect your digital enterprise
Enable Workplace productivity
Empower the data-driven organization
The innovation engine for the New Style of Business

**Infrastructure**
- Build the best foundation
  - Server
  - Storage
  - Networking
  - Converged Solutions

**Software**
- Turn data into insight, and insights into action
  - App Delivery
  - IT Operations Management
  - Big Data
  - Security

**Cloud**
- Deliver speed and agility
  - Private Cloud
  - Managed Private Cloud
  - Managed Virtual Private Cloud
  - Public Cloud

**Services**
- Manage and transform traditional to new
  - Consulting Services
  - App Transformation
  - Support Services
  - Managed Services

**Financial Services**
- Support partners and customers with the right financial model
HP is helping customers **transform, protect, enable and empower** their businesses to get better business outcomes

**Customer business outcomes**
- Increase agility and flexibility
- Reduce cost
- Generate revenue and profit growth
- Reduce risk
- Improve customer experience
- Enhance employee experience

**Businesses are transforming** – they need to be more agile to compete in the market today.
Empowering a data-driven enterprise

Turning data into insights and insights into actions

Use cases

- Analyzing high volume machine data from connected devices
- Sorting unstructured data including images, audio and video
- Generating real time insights
- Dealing with your data – back up, archive and recovery – to manage risk and compliance

The ability to collect and store all of this data presents a huge opportunity to those who are equipped to understand and use it.

Empowering a data-driven enterprise
HP compute strategy: Compute solutions optimized for business outcomes from the core to the innovative edge

HP compute optimized for business outcomes

Software-defined

Core business operations

TCO

Automation

Composable and scalable

Modular, converged, flexible capacity

ProLiant

Apollo

Moonshot

Cloudline

Integrity

Apollo

OneView

SEIZE THE DATA. 2015

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This is the path **HP compute** is forging – workload optimized solutions, technology innovation, portfolio specialization... at **full speed**

**2015-2018 HP Server Strategic Priorities**

1. **Deliver workload optimized solutions**
   - Provide *workload optimized solutions* to accelerate transformation and drive business outcomes

2. **Differentiate with exceptional technology innovation**
   - Lead innovation with *software-defined compute* and flexible consumption models

3. **Enhance portfolio specialization by growth segments**
   - Align our portfolio, organization, ecosystem, and GTM to high growth customer segments

4. **Transformation beyond the Data Center**
   - Innovate/execute to position HP as a leader in IOT with *Edge Computing* and a bridge to *The Machine*
HP Servers: Enhanced portfolio specialization to drive customer needs across all segments
Because one size does not fit all

Strategic growth driver for HP servers

- **Enterprise**
  - Modernize Core Business Operations
  - HP ProLiant Racks, Blades

- **SMB**
  - Optimize Productivity
  - HP ProLiant Towers

- **Mission critical**
  - Mission Critical Renaissance
  - HP Integrity

- **HPC and Big Data**
  - Performance goes Mainstream
  - HP Apollo

- **Next generation**
  - Solutions for Next Gen Workloads
  - HP Moonshot

- **Service provider**
  - Open Infrastructure
  - HP Cloudline

- **OEM**
  - Innovation through Partnerships
  - Cross Portfolio

---

The Right Compute for the Right Workload at the Right Economics

- Modular, Converged, Utility
- Software-defined, Virtualized, Secure
- Open, Agile, Scalable
Deliver workload optimized solutions

Provide a breadth of workload optimized solutions to accelerate our customers’ transformation

- Hybrid Cloud Solutions
- Virtualization Solutions
- Data center Modernization
- Mobile Workplace Solutions
- SMB Collaboration Solutions
- Converged Systems
- Mission critical availability
- Big Data Encryption
- Secure Management
- HPC & Big Data Solutions
- Server based Storage
- Mission critical Databases
Empowering a data driven organization for the New Style of Business

To succeed, data driven orgs need “extreme” performance solutions.
Data driven organizations need “extreme” performance solutions to help process, analyze and manage their data

**Storage centric (Big Data)**

**Key challenges**

“I need to manage and analyze massive amount of data along with the right performance, scalability, density and security”

**Common use cases**

- Image capture and storage
- Video production
- Business intelligence analysis
- Modeling: energy, science, banking

**Compute centric (HPC)**

**Key challenges**

“I need an extremely powerful end-to-end workload optimized compute solution to create and analyze data, which typical architectures can’t provide.”

**Common use cases**

- CAD/CAE
- Fluid dynamics
- Genomics
- Seismic analysis
### Typical workloads and use cases

#### Big Data

**Hadoop**
- Business intelligence analysis
- Modeling: energy, science, banking
- Medical record access and retention
- Shared data access for big data

**Object Storage**
- Image capture and storage
- Video production
- Regulatory data & access
- Unstructured data management
- Social Media storage and access

#### HPC

**Supercomputing**
- Pharma research
- Wide array computations
- Seismic analysis
- Machine Learning
- Econometric modeling
- FSI simulations
- Genomics

**Enterprise/Mid Mkt**
- Research-based apps
- Finite element analysis
- CAD/CAE
- Fluid dynamics
- Solid modeling
- Circuit simulations
Big Data meets High Performance Computing

Data Driven organizations using Big Data will to consider and deploy new forms of HPC configs to unlock insights housed in large volumes of data.
### Compute optimized for Big Data requirements

Traditional data processing technologies are no longer adequate.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Mass Content Storage</th>
<th>Block and File Storage</th>
<th>Unstructured Data Analytics</th>
<th>Simple Database</th>
<th>Real-Time Analytics</th>
<th>Transactional Database</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Big Data Types</strong></td>
<td>Object Storage</td>
<td>Virtualized Storage</td>
<td>Hadoop</td>
<td>NoSQL Database</td>
<td>In-Memory Database</td>
<td>Structured Database</td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
<td>• Simple, cost efficient storage at extreme scale</td>
<td>• Cost efficient DAS with simplified management</td>
<td>• Fast parallel processing capability with extreme scale and efficiency</td>
<td>• Simple query processing with extreme scale and efficiency</td>
<td>• Extreme performance for streaming data analytics</td>
<td>• Complex transactional and analytical query processing</td>
</tr>
<tr>
<td><strong>Compute Requirements</strong></td>
<td><strong>SCALE-OUT</strong></td>
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<td>• Performance scalability</td>
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<td></td>
<td>• Density optimization</td>
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<td></td>
<td>• Storage simplicity</td>
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<tr>
<td></td>
<td>• Configuration flexibility</td>
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<tr>
<td><strong>SCALE-UP</strong></td>
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<td>• High Availability</td>
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<td>• High Reliability</td>
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<td></td>
<td>• Disaster Tolerance</td>
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</tbody>
</table>
# Compute optimized Enterprise HPC Workloads

<table>
<thead>
<tr>
<th>Industries</th>
<th>Life Sciences / Bio-Sciences</th>
<th>Manufacturing</th>
<th>Financial Services</th>
<th>Oil &amp; Gas</th>
<th>Government Labs/Defense</th>
<th>University (Academic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workloads</td>
<td>• Medical</td>
<td>• Computer aided engineering</td>
<td>• Online Trading</td>
<td>• Exploration</td>
<td>• Research</td>
<td>• Research</td>
</tr>
<tr>
<td></td>
<td>• Drug Testing</td>
<td>• Design modeling</td>
<td>• Risk Mgt.</td>
<td>• Modeling</td>
<td>• Defense</td>
<td>• Medical</td>
</tr>
<tr>
<td></td>
<td>• Research</td>
<td></td>
<td>• Fraud Detection</td>
<td>• Analysis</td>
<td>• Analytics</td>
<td>• Climate</td>
</tr>
<tr>
<td>Workload Characteristics</td>
<td>Packaged Workloads</td>
<td></td>
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</tr>
<tr>
<td>Compute Requirements</td>
<td>Enterprise HPC</td>
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<td>Supercomputing</td>
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<tr>
<td></td>
<td>• Performance scalability</td>
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<td>• Maximum performance</td>
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<td></td>
<td>• Density optimization</td>
<td></td>
<td></td>
<td></td>
<td>• Maximum density</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Purpose built for target workloads</td>
<td></td>
<td></td>
<td></td>
<td>• Optimized energy</td>
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<td></td>
<td>• Flexible with standardized Management/Maintenance</td>
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<td></td>
<td>utilization</td>
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<td></td>
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<td></td>
<td></td>
<td>• Optimized cooling</td>
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</tr>
</tbody>
</table>
HP Optimized Compute Portfolio for Data Driven Organization

Innovative purpose built Compute platforms to support scale-out and scale-up workloads

Big Data, HPC
- Optimized for Hyperscale
- Optimized for Storage Density
- Rack Scale Efficiency
- Performance Density and Green Cooling

Next Gen Applications
- Optimized for Lowest TCO
- Performance

Mission Critical
- Leading x86 performance & availability
- Integrity Superdome X

Core Business & Infrastructure
- Optimized for Virtualization
- ProLiant Scale Up Racks
- BladeSystem

Scale-Out Compute
- Apollo

Scale-Up Compute
- Moonshot

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Big Data and HPC strategy: Design and deliver comprehensive solutions

1. Innovate, design & deliver the best-in-class hardware and software to support foundational infrastructure needs of the Big Data customers

2. Provide vertical solutions by building software stack and partner ecosystem

3. Enable Advisory Services to help manage customer’s technology journey
Performance **goes mainstream** with HP Apollo

Optimized scale out compute for highly parallel data processing

**HP Insight Cluster Management Utility, HP Cluster Test, HP Application Performance Management (APM) solutions**

**HP Apollo 2000**
Traditional 2U Form Factor

- 2X Compute Density HPC Workloads
- Flexible Configuration

**HP Apollo 4200**

Industry’s densest 2U Server

- Up to 224 TB Storage
- Plug and Play
- Flexible Configuration

**HP Apollo 4530**

Rack scale storage density

- Up to 544 TB Storage
- Power, space efficiency
- Storage Workloads

**HP Apollo 4510**

- Up to 250 teraflops of compute per rack
- Specialized Workloads

**Supercomputing**

- HP Apollo 6000
- HP Apollo 8000
Solutions - Optimized platforms, leading partner ecosystem and end-to-end services

<table>
<thead>
<tr>
<th>Big Data Workloads</th>
<th>HPC Workloads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Storage</strong></td>
<td><strong>Mfg. CAD/CAE</strong></td>
</tr>
<tr>
<td>Ceph</td>
<td>BIOVIA</td>
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<tr>
<td>Cleversafe</td>
<td>ANSYS</td>
</tr>
<tr>
<td>OpenStack</td>
<td>Synopsys</td>
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<tr>
<td>Scality</td>
<td>Halliburton</td>
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<td></td>
<td>Paradigm</td>
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<tr>
<td><strong>Virtualized Storage</strong></td>
<td><strong>Oil &amp; Gas</strong></td>
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<tr>
<td>Microsoft</td>
<td>Schlumberger</td>
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<tr>
<td>VMware</td>
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<tr>
<td><strong>Data Analytics</strong></td>
<td><strong>Financial Services</strong></td>
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<tr>
<td>Cloudera</td>
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<td>Hadoop</td>
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<tr>
<td>Hortonworks</td>
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<tr>
<td><strong>Academia/Research</strong></td>
<td><strong>Custom apps</strong></td>
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<tr>
<td>Life Sciences</td>
<td>Custom apps</td>
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<tr>
<td>Mfg.</td>
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<tr>
<td>CAD/CAE</td>
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<tr>
<td><strong>Intel</strong></td>
<td><strong>NVIDIA</strong></td>
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<td><strong>Mellanox</strong></td>
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<td><strong>Seagate</strong></td>
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<td><strong>Ceph</strong></td>
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<td><strong>Cloudera</strong></td>
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<td><strong>Schlumberger</strong></td>
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<td><strong>Redline</strong></td>
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## Solutions - Optimized platforms, leading partner ecosystem and end-to-end services

### Big Data Workloads

<table>
<thead>
<tr>
<th>Storage</th>
<th>Virtualized Storage</th>
<th>Data Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
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<tr>
<td>Storage</td>
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</tr>
</tbody>
</table>

HP partners with Big Data ISVs to deliver:
- Deliver lowest dollar/GB or the most Flops per rack
- Hone analytics engines with ISV engineers
- Co-develop Reference Architectures, sizing and tuning

### HPC Workloads

<table>
<thead>
<tr>
<th>Workloads</th>
<th>Academia/Research</th>
<th>Life Sciences</th>
<th>Mfg. CAD/CAE</th>
<th>Oil &amp; Gas</th>
<th>Financial Services</th>
</tr>
</thead>
</table>
| Big Data Workloads | HP partners with HPC ISVs and Best in Class component suppliers to provide:
- Provide Optimal Compute for real time analysis of large data pools;
- Develop Vertical Solutions by integrating GPU accelerators, high density, fast networking, and latest processors in purpose built Apollo platforms running vertical specific software

### Partners

- Intel
- Mellanox
- NVIDIA
- Seagate
HP Services for Big Data solutions

Consulting Services
Data center planning/design services that enable efficiency, simplicity, and speed

Support
Comprehensive support providing better resource utilization and improved productivity

Implementation
Infrastructure solutions capable of cost-effectively supporting your business goals

HP Financial Services
Flexible approach to IT investments to accelerate your business transformation
HP Big Data Reference Architecture for Hadoop

Leveraging HP innovation to deliver unique value to customers and the open source community

Apollo & Moonshot Combined Solution

Unique Value

Data Consolidation
Shared storage pool for multiple Big Data environments

Flexible Scalability
Define and scale compute and storage independently

Maximum Elasticity
Dynamic cluster provisioning of compute pools without repartitioning data

Breakthrough Economics
Workload optimized components for better density, cost and power
HPC and Big Data solutions using Haven

<table>
<thead>
<tr>
<th>Haven Enterprise</th>
<th>Haven OnHadoop</th>
<th>Haven OnDemand</th>
</tr>
</thead>
</table>
| • SQL / BI / Reporting  
  • Predictive Analytics  
  • Machine Learning  
  • Log Analytics  
  • Search  
  • Image/Audio/Video | • Secure Data Lake  
  • Exploration  
  • Open Data Format  
  • Yarn-ready  
  • Governance | • Open APIs  
  • Elastic / Multi-tenant  
  • Private Cloud-ready  
  • Easy to try, buy & expand  
  • Pay-as-you-go |

Business outcomes
- Harness **100%** of your data
- **Extreme scale** of your data
- **Extreme speed** in performing analytics
- ** Seamlessly deploy** next-gen apps anywhere
- **Support Cloud** with Haven On-Demand
- Delivers **advanced analytics** leveraging power of the cluster
- **Turbocharges predictive analytics** with cluster friendly R-Languages

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**HP Haven platform**

- **Haven Enterprise**
  - SQL / BI / Reporting
  - Predictive Analytics
  - Machine Learning
  - Log Analytics
  - Search
  - Image/Audio/Video

- **Haven OnHadoop**
  - Secure Data Lake
  - Exploration
  - Open Data Format
  - Yarn-ready
  - Governance

- **Haven OnDemand**
  - Open APIs
  - Elastic / Multi-tenant
  - Private Cloud-ready
  - Easy to try, buy & expand
  - Pay-as-you-go

---

**Servers, Storage, networking**

- HP BladeSystem
- HP ProLiant Racks
- HP Apollo

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**Services**

- Proactive Care Services
- Datacenter Care
- Foundation Care
HP – rich programs and services portfolio to deliver customer value

**Full lifecycle of services**
- Consulting services to maximize ROI
- Deep pool of expertise
- Support services prevent and solve problems
- Personalized experience and global delivery

**Rich ecosystem of partners**
- Optimized ISV applications
- Best-in-class channel partners
- Breadth of OEM offerings
- Integrated solutions

**HP Financial Services**
- Flexible financing solutions
- Lifecycle asset management
- Transition services

Enhancing our customers’ ability to meet evolving business needs
HP’s vision for the evolution of Big Data and HPC

Increasing levels compute optimization eventually leading to The Machine

**System optimized**
To maximize platform performance and resource utilization

**Rack optimized**
To maximize density, space, fabric and storage utilization

**Data center optimized**
To maximize facility space and energy utilization

**Distributed mesh compute**
Highly innovative hardware, photonics and universal memory

**Present**

**Future**
Customers realize better business outcomes with HP Big Data and HPC solutions

<table>
<thead>
<tr>
<th>Apollo with Scality Software</th>
<th>Apollo 8000 Supercomputing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 90% transfer time reduction - 60 to 6 min</td>
<td>• Realize around $1 million in annual energy savings and cost avoidance through efficiency improvements.</td>
</tr>
<tr>
<td>• 50% reduced footprint</td>
<td>• One megawatt of power in under 1,000 square feet - very energy-dense config</td>
</tr>
<tr>
<td>• Scalability - 3.5 PB</td>
<td></td>
</tr>
<tr>
<td>• Reduced TCO - Power, Cooling, Management</td>
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</tr>
</tbody>
</table>

German TV station challenged managing a rapidly growing archive for on-demand video streaming

The National Renewable Energy Laboratory (NREL) focuses on creative answers to today’s energy challenges.

<table>
<thead>
<tr>
<th>Financial Services Company</th>
<th>Apollo 4000 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apollo with Cloudera Software</td>
<td></td>
</tr>
<tr>
<td>• Improved Time-to-value: &lt; 7 days</td>
<td>• Deployment time - from 2 days to 2 hours</td>
</tr>
<tr>
<td>• Reduced TCO; 40% less space / 47% less power</td>
<td>• Saves hosted customers thousands of euros per month in rack space and reduced admin</td>
</tr>
<tr>
<td>• Reduced Complexity - 41% fewer cables</td>
<td>• manage hosted environments - fewer people</td>
</tr>
<tr>
<td>• Easier manageability – CMU, single pane</td>
<td></td>
</tr>
</tbody>
</table>

Financial services company (confidential) needs to drive business growth by offering new products and services to existing customers

NFOorce Entertainment is a hosting company offering customers a fully customized hosted environment based on exact workload requirements
When you choose **HP Compute**, you get so much more than servers

<table>
<thead>
<tr>
<th>Trust</th>
<th>Innovation</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+% 9-1-1 calls in U.S. powered by HP Servers¹</td>
<td>R&amp;D 2014 100 Winner HP Apollo Top Innovation of the Year</td>
<td>#1 Quality CRN ranks HP product quality over Dell, IBM, and Lenovo</td>
</tr>
<tr>
<td>3.6 Trillion credit card/debit transactions processed by HP NonStop Servers²</td>
<td>InfoWorld’s 2015 Technology of the Year HP Moonshot</td>
<td>2015 Reliability leader 2015 Innovation Leader 2015 Performance Leader Enterprise Rackmount Servers</td>
</tr>
<tr>
<td>450M+ Mobile Subscribers supported by HP NonStop Servers³</td>
<td>Guinness World Record Fastest Loading of Big Data HP ProLiant DL980</td>
<td>#1 HP Customer relationships TBR ranks HP customers likely to recommend and buy again over Dell and IBM</td>
</tr>
</tbody>
</table>

**HP is the leading vendor in the 2015 Gartner Magic Quadrant for Modular Servers**

¹Source: Gartner, Inc. Magic Quadrant for Modular Servers; Andrew Butler, George J. Weiss, Errol Rasit, Carl Claunch, Hiroko Aoyama, 04 May 2015
Q&A
THANK YOU