DIGITAL TRANSFORMATION & CYBER EXPOSURE

Renaud Deraison
Chief Technology Officer & Co-Founder
Tenable
“Driving the digital agenda and cognitive autonomous analytics is the new frontier: software and hardware that detects, learns and/or causes a change of state, through the direct monitoring and/or control of physical devices, processes and events in the enterprise utilizing digital data. Autonomous solutions are the future.”

Jason Molfetas, CIO @ Amtrak
Fixed Income, Currency and Commodities
Progress across FICC initiatives

- Close market share gaps with Asset Managers and Banks
- Strengthen corporate offering
- Client inventory financing

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close market share gaps with Asset Managers and Banks</td>
<td>Enhancing cash/flow trading capabilities</td>
</tr>
<tr>
<td>Strengthen corporate offering</td>
<td>Built deeper, more granular client coverage model</td>
</tr>
<tr>
<td>Client inventory financing</td>
<td>Using detailed third-party data to identify client gaps</td>
</tr>
</tbody>
</table>

- Holding ourselves accountable to deliver top 3 rankings

- 18 of 21 market share metrics across products higher YoY
- 16 new commodity-related transactions resulting from J.V. with Investment Banking
- $400mm of balance sheet deployed

Deploying engineering capabilities to support growth efforts

- 7,000 Unique Marquee users/month across 2,000 institutions, up ~60% YoY
- ~25% Engineers as % of FICC headcount
- ~33% YoY growth in clients trading via Systematic Market Making (SMM)

1 Represents Marquee users across FICC and Equities as of December 2017
2 Includes Sales, Strats and Market-Making functions within FICC
Investment Banking
Progress in client coverage

Debt Underwriting League Table Ranking

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Yield</td>
<td>#6</td>
<td>#2</td>
</tr>
<tr>
<td>Leveraged Loans</td>
<td>#5</td>
<td>#3</td>
</tr>
<tr>
<td>Investment Grade</td>
<td>#8</td>
<td>#5</td>
</tr>
</tbody>
</table>

League table rank improvements

Debt Underwriting Net Revenues ($bn)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.0</td>
<td>$2.9</td>
<td>1.5x</td>
</tr>
</tbody>
</table>

Investment Banking Client Coverage

- New coverage assigned on >30% of targeted clients
- Regional strategy implemented (Seattle, Toronto, Atlanta, Dallas)
- Expanding coverage model by optimizing existing senior talent and making additional lateral hires
- Awarded >75 new mandates to date from client coverage expansion efforts

Expected increase in client coverage by 2020

$9,000

Engineering enhances client engagement through apps, machine learning and big data analytics

1 High Yield and Investment Grade Underwriting sourced from Dealogic. Leveraged Loans sourced from Bloomberg
Wall Street’s Big Banks Are Waging an All-Out Technological Arms Race

Dimon, Blankfein, Gorman: Three great rivals are battling to control the $58 billion-a-year equities industry.

By Hugh Son and Dakin Campbell
April 5, 2018, 11:00 AM GMT+2
From Bloomberg Markets

Sunlight bounced off Goldman Sachs Group Inc.’s glass-and-steel Manhattan headquarters on a warm August morning in 2013. Eyes locked on their screens, traders and engineers shifted in their seats as exchanges prepared to open.

Unbeknownst to anyone, the machines were about to revolt.
THREE MAJOR SHIFTS
#1: IoT
AVOID BACK PAIN PROBLEMS WITH OUR CONNECTED CUSHIONS
IoT: Spectrum of Hurt

Less Secure

Vendors with no software experience but used to maintain devices for 30 years

More Secure

Vendors with extensive software experience but used to maintain devices for 5 years at most
IoT: Attack Surface on Multiple Levels

- Hardware
- OS
- App
- Transport Layer
- Data in the Cloud
Several companies building their own IoT devices

Most new offices use IoT extensively

Industrial control systems are now connected to the internet

Healthcare can better centralize patients’ data

No oversight from traditional IT teams as far as deployment goes. Security will “figure it out”
#2: BUSINESS APPLICATIONS
Why Software Is Eating the World

by Marc Andreessen

This article was originally published in The Wall Street Journal on August 20, 2011.

This week, Hewlett-Packard (where I am on the board) announced that it is exploring jettisoning its struggling PC business in favor of investing more heavily in software, where it sees better potential for growth. Meanwhile, Google plans to buy up the cellphone handset maker Motorola Mobility. Both moves surprised the tech world. But both moves are also in line with a trend I’ve observed, one that makes me optimistic about the future growth of the American and world economies, despite the recent turmoil in the stock market.

In short, software is eating the world.

More than 10 years after the peak of the 1990s dot-com bubble, a dozen or so new Internet companies like Facebook and Twitter are sparking controversy in Silicon Valley, due to their rapidly growing private market valuations, and even the Wall Street is taking notice.
Software is still eating the world

Posted Jun 7, 2016 by Jeetu Patel (@jpatel41)

Crunchbase

Marc Andreessen

BIO
Marc Andreessen is a cofounder and general partner of the venture capital firm Andreessen Horowitz. He is an innovator and creator, one of the few to pioneer a software category used by more than a billion people and one of the few to establish multiple billion-dollar companies. Marc co-created the highly influential Mosaic Internet browser and cofounded Netscape, which later sold to AOL for $4.2 ...

Full profile for Marc Andreessen
Project Execution Methodologies – The Change

**WATERFALL**

- Design
- Code
- Test
- Deploy

**AGILE**

- Design
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Deploy

**DEVOPS**

- Design
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Code
- Test
- Deploy
Every company is a software company
DevOps is being adopted mostly everywhere
Public Cloud is being adopted mostly everywhere
New technologies are changing the definition of a “server” (microservices, containers, lambda…)
SaaS is being adopted mostly everywhere – as a building block or a standalone app
Developers have more and more say about the entire company’s infrastructure
Little to no oversight from traditional IT teams as far as deployment goes. Security will “figure it out”
#3: ENDPOINTS & END-USERS
Endpoints Are More Secure

A Top-Shelf iPhone Hack Now Goes for $1.5 Million

As iOS and Android mature, the stand-off between platforms and hackers escalates in kind. Each release brings new security measures, while those who want to break in—nation-state intelligence agencies and law enforcement among them—redouble their efforts. And one security startup that buys and sells exploits is offering to pay more than ever for exclusive access to premium vulnerabilities.

On Thursday, exploit broker Zerodium announced that its bug bounty for zero-day (previously undisclosed) exploits now tops out at $1.5 million for Apple’s new iOS 10. That’s

Hackers Claim Million-Dollar Bounty for iOS Zero Day Attack

Hacking Apple’s iOS isn’t easy. But in the world of cybersecurity, every hardest target isn’t impossible—only expensive. And the price of a working attack that can compromise the latest iPhone is apparently somewhere around $1 million.

On Monday, the security startup Zerodium announced that it’s agreed to pay out that seven-figure sum to a team of hackers who have successfully developed a technique that can hack any iPhone or iPad that can be tricked into visiting a carefully crafted web site. Zerodium describes that technique as a “sailbreak”—a term used by iPhone owners to hack their own phones to install unauthorized apps. But make no mistake: Zerodium and its founder Chaokui Bekerz have made clear that its customers include governments who no doubt use such “zero-day” hacking techniques on unwitting surveillance targets.

In fact, Bekerz tells Wired that two teams of hackers had attempted to claim the bounty, which was announced in September with an October 31 deadline. Only one proved to have developed a complete, working iOS attack. “Two teams have been actively working on the challenge but only

tenable
Endpoints Are More Secure

The Apple Sandbox

- Introduced way back in Mac OS 10.5 as “Seatbelt”
  - Very naïve implementation originally, bypassed and opt-in
- Revamped in Mac OS 10.7 as “The App Sandbox”
  - Stronger implementation, introducing containers
  - Opt-in for Apple’s own binaries and apps
  - Mandatory for Mac App Store apps (but not for DMG based)
- Far stronger still in iOS
  - Mandatory for all third party applications
  - Evolved beyond Mac OS implementation

© 2012, 2016 Technologieeks.com
Endpoints Are More Secure

Vulnerabilities and Average CVSS scores over time

Windows 8

Vulnerabilities and Average CVSS scores over time

Windows Vista
End Users Have More Power

- Now that the businesses are digitalized, end-users can do much more damage
- Users’ security awareness and role within the organization increasingly need to be taken into account when computing risk
- Endpoints devices tend to be less and less managed centrally since they’re more secure
- Cerebro will eventually need to take data from Workday and/or Salesforce into consideration
Hawaii Panics After Alert About Incoming Missile Is Sent in Error

By ADAM NAGOURNEY, DAVID E. SANGER and JOHANNA BARR   JAN. 13, 2018

Emergency Alert
BALLISTIC MISSILE THREAT INBOUND TO HAWAII. SEEK IMMEDIATE SHELTER. THIS IS NOT A DRILL.
A photo accidentally revealed a password for Hawaii’s emergency agency.
Hawaii governor didn’t correct false missile alert sooner because he didn’t know his Twitter password

By Travis M. Andrews  January 23  Email the author
TV5 Monde laisse traîner ses mots de passe devant les caméras

Alors que de nombreuses caméras de télévision filmaient la rédaction de TV5 Monde, certains mots de passe, affichés au mur, ont été diffusés à l'antenne.
CYBER EXPOSURE
The Digital Infrastructure is now a strategic component of every organization

- IOT, Application Security, Endpoints and End-users are changing the game

Cyber Exposure needs to be managed effectively

- Coverage and detection are key
- Application security will become more and more strategic
- Visualization of the infrastructure more important than fixing issues
- Collected data must be turned into valuable insight
“The challenge will not be our ability to generate data, but rather taking increasing data volume and complexity and translating it into clear, compelling insights that impact operational efficiencies, revenue generation and customer satisfaction.”

Jason Molfetas, CIO @ Amtrak
THANK YOU