AWS Life Science Day

Thomas Menthe
Enterprise Account Management
21 · Februar 2017
Agenda

14:00  Begrüßung, 10 Min.
14:10  **Aktuelle Referenzen im Life Sciences Umfeld**, 30 Min.
       Thomas Menthe, Enterprise Account Manager LS, AWS
14:40  **Trends im Life Science Bereich**, 45 Min.
       Dr. Stefan Hock, Director Business Consulting Life Sciences,
       Cognizant Technology Solutions
15:25  **Aufbau von agilen und effizienten IT Organisationen mit DevOps**, 45 Min.
       Steffen Grunwald, AWS Solution Architect
16:10  **High Performance Computing** - Case Study, 30 Min.
       Dr. Oliver Fortmeier, Technical Expert Scientific Computing, Bayer
16:40  **Security und Compliance im LS Umfeld** (u.a. GxP), 30 Min.
       Bertram Dorn, AWS Solution Architect

Ende
Cloud computing has become the new normal

Deploying new applications to the cloud by default

Migrating existing applications as quickly as possible to gain efficiencies
The AWS Cloud

Eliminate costly technical debt and reallocate resources so you can deliver high-value, revenue-generating projects faster.

Innovate faster and solidify your competitive advantage by merging startup agility with enterprise experience and scalable resources.

Reduce risk by focusing resources dedicated to security, compliance and availability to the most important areas of your business.

"AWS is our trusted partner that is going to run our company for the next 140 years.”
Jim Fowler – CIO, General Electric
Security: A shared responsibility

AWS secures the infrastructure:

- AWS data centers always “on”; robust connectivity and bandwidth
- Ongoing audit and assurance program
- Industry certifications

- You retain ownership of your IP and content – AWS does not have access
- You control region(s) where your data is stored
- You can build end-to-end compliance, including HIPAA compliance

....so you can secure your data
AWS implementation along the biopharma value chain

- **Discovery**
  - Computational chemistry
  - Collaboration
  - Genomics

- **Development**
  - Pharmacovigilance
  - Pharmacokinetics
  - Clinical Trials Management

- **Manufacturing and Distribution**
  - Supplier collaboration
  - Quality management
  - Processing analytics

- **Marketing and Sales**
  - Digital marketing
  - Online storefronts
  - Content distribution
AWS is the perfect place to experiment

Self-service access to infrastructure

Benefits
- Experiment more, with no CapEx
- Resource projects instantly
- Augment existing data centers for computationally demanding workloads

Use Cases
- Technology evaluation
- Prototyping
- Agile Development

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Launch
AWS use cases in Life Sciences
3 technical categories to improve clinical trials

**Cloud** – seamlessly integration and collaboration with external partners e.g. digital platforms

**Analytics** – to manage increasing amount of data from patient subgroups e.g. trials in rare diseases and recruit patients faster and globally

**Mobile-health** – smart devices e.g. wearables, wireless glucose meter to collect data like heart rate, movements or blood pressure within wearables trials

http://www.pharmatimes.com/magazine/2016/october/the_clinical_trial_of_the_future
Reference cases 1

- **BMS** used AWS(EC2) to build a **secure self-provisioning portal** for scientists to run clinical trial simulations on-demand.  
  > Running simulations **98% faster** (efficiency & cost savings)

- **Merck** uses Hadoop on AWS to crunch data (**big data analytics**) from 16 disparate sources, and to date has performed 15 billion calculations and more than 5.5 million batch-to-batch comparisons to improve vaccine production.  
  > **efficient manuf.**, improved vaccine **yield rates** and better conditions for patients

- **Novartis** saved a $40 M. datacenter investment by utilizing 67,000 cores to screen 10 million compounds from 39 years of scientific data  
  > **Cost was $4232 for 9 hours computing time (HPC)**

- **Pfizer** set up a secure instance with AWS VPC to provide a **secure R&D environment** and compute beyond own capacities  
  > Plan is to migrate to a commercial API
We completed the equivalent of thirty-nine years of computational chemistry in just under 9 hours for a cost of around $4200.

Steve Litster
Global Head of Scientific Computing, Novartis

- Existing infrastructure to screen 10 million compounds in a computational model not available
- New infrastructure would have cost approximately $40 million to build

Novartis used AWS for HPC computational chemistry
BMS: Reduction in clinical trial duration

[We could] reduce the number of subjects from 60 to 40 [in a Phase I clinical trial]....the length of the study is reduced by almost 1 year.

Russell Towell
Senior Solutions Specialist, Bristol-Myers Squibb

• It took the pharmacokinetics group 60 hours to run 2000 simulations using on-premises infrastructure

• Using AWS cloud-based infrastructure, the group can spin up 256 servers simultaneously

The same amount of work can be done in 1.2 hours for $336
We took all of our data on one vaccine, whether from the labs or the process historians or the environmental systems, and just dropped it into a data lake.

Jerry Megaro
Director of Manufacturing, Advanced Analytics and Innovation, Merck

- Merck was using a “spreadsheet approach” with on-premises infrastructure to solve vaccine batch yield problem
- Only able to perform 1-2 batch comparisons at a time

Using AWS for analytics, 5.5 billion batches were analyzed simultaneously
We combine data to make it actionable. We’re doing that together with Amazon, because there is only one company that we can do this with which gives us the reliability, scale, and performance we need.

Jeroen Tas
CEO, Healthcare Informatics Solutions and Services
Reference cases 2

• **Philips** Healthcare Informatics Solutions:
  Philips can stream vitals from 190 million patients globally and established a **digital platform HealthSuite**, which analyzes and stores **15 PB of patient data** from over 390 Millionen MRI research studies (**IOT, healthcare platform**):
  **Benefit:** The company achieves this by comparing millions of studies together and finding commonalities between them.

• **Johnson & Johnson** runs 120 applications in the AWS cloud with great efficiencies and plans to triple that in the next year. JJ deployed more than **25,000 Amazon Workspaces** cloud-based virtual desktops / tablets for its consultants and employees.

• **Siemens** has built a secure, **HIPAA-compliant, and scalable platform on AWS**.
Reference case Monsanto

• Monsanto built a **new architecture** based on AWS to increase automation through a SW-defined approach (SDDC).
  **Benefit**: App.-Development lifecycle cut by **50%** (Cloud foundation, Github)

• New Monsanto **IoT Platform** takes real-time data from tractors, planters and harvesters to automate harvesting and transport.
  > In parallel a **robotic automated greenhouse** has been established based on AWS IoT Rules Engines.
  > Scientists have transitioned from scientific developers to architects.
  **Benefits**: elastic, highly available, secure, automated and parallel testing

• Monsanto owns Climate Corp (FieldView™ platform), a onetime start up and all-in AWS customer.
Reference IoT Solution – BI/Propeller Health

• Tracks therapeutic utilization
• Patient gets feedback regarding their condition – Asthma and COPD
• Sensor attaches to existing inhaler
• Application allows environmental condition capture
The AWS Cloud enables swift collaboration even with hundreds of terabytes of data; the ability to have a central area for people to process that data cuts down on bandwidth and the need to buy and maintain vast computational resources.

Dr. Narayanan Veeraraghavan  
Lead Programmer Scientist  
Genome Sequencing Center, Baylor College of Medicine

- CHARGE Project required global collaboration of 200 scientists at 5 institutions – 14,000 participants
- 24 TB of sequencer content each month = 1 PB of raw data per month
- 21,000 AWS compute cores at peak
- Initial analysis completed in 10 days

When extended to the AWS Cloud, first analysis completed 5x faster vs. on premises.
AWS Life Sciences & Genomics Customers
Any questions?