

The background of the image is a vibrant, multi-colored gradient. It features broad diagonal bands of color, including shades of blue, purple, magenta, orange, and yellow. The colors blend into each other, creating a soft, ethereal effect. The AWS re:Invent logo is positioned on the left side of the image, with the text in white. The logo consists of the word "AWS" in a small, sans-serif font, followed by "re:" in a slightly larger font, and "Invent" in a large, elegant serif font.

AWS
re:Invent

HCL308

Healthcare data interoperability on AWS

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What is interoperability in healthcare?



“Interoperability is the ability of different information systems, devices or applications to connect, in a coordinated manner, within and across organizational boundaries to access, exchange and cooperatively use data amongst stakeholders, with the goal of optimizing the health of individuals and populations.”

— HIMSS

The state of healthcare IT



Data silos



Monolithic
solutions



Poor
communication

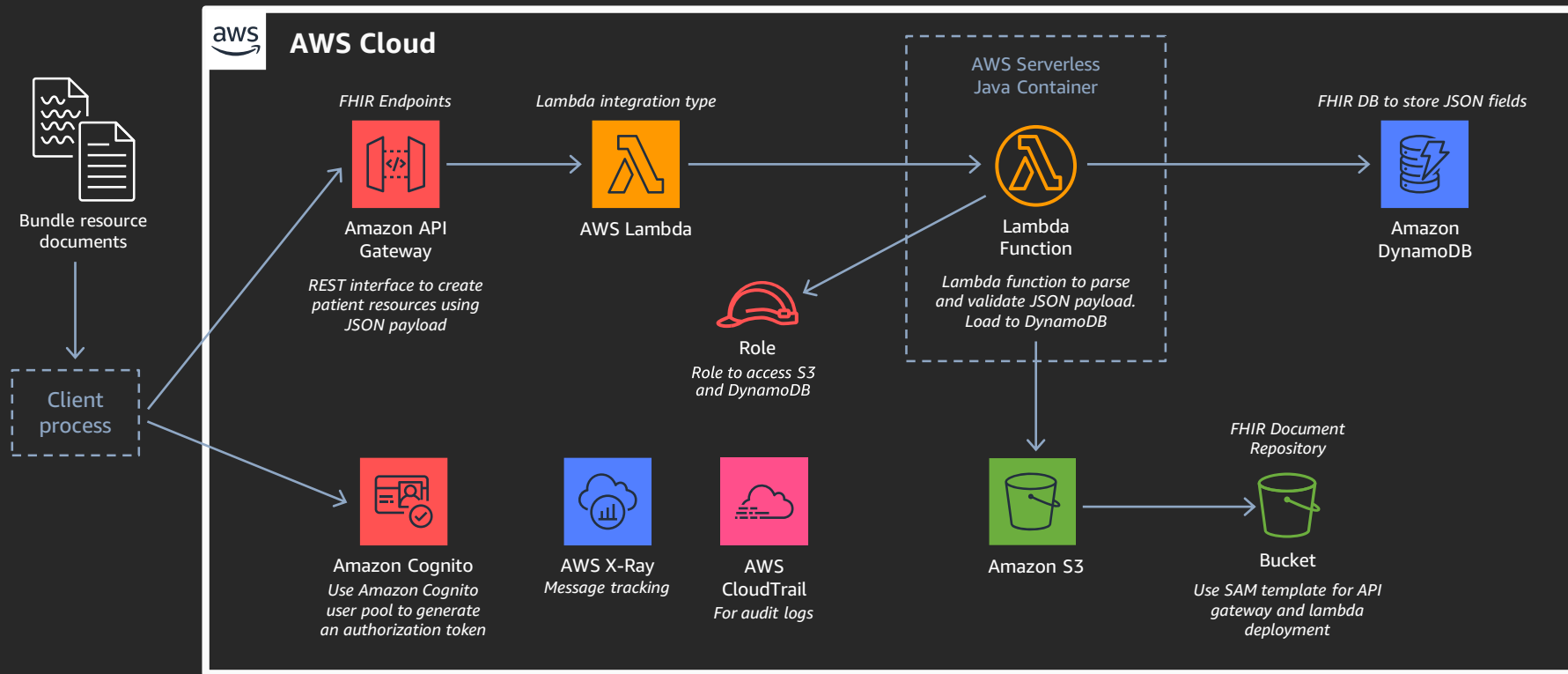
“Meaningful use will now be called ‘promoting interoperability’ as CMS focuses on increasing health information exchange and patient data access.”

<https://healthitanalytics.com/news/cms-renames-meaningful-use-to-highlight-interoperability-goals> April 24, 2018

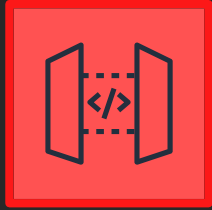
Creating an ecosystem for healthcare



FHIR server — architecture



Endpoint services



Amazon API Gateway

- Service to host the REST based FHIR endpoints
- Performs caching of responses
- Throttles requests as needed
- Metering of API calls



AWS Lambda

- Use AWS serverless Java wrapper to run Jersey framework
- Serverless compute service to read and process FHIR payload
- Perform validation and generate response
- Load data to database or perform search

Database and storage services



Amazon DynamoDB

- NoSQL and serverless database used to store FHIR resource attributes
- Horizontally scalable
- Pay based on usage



Amazon S3

- Highly available and durable object store
- Used to store raw JSON payload
- Unlimited storage capacity

Authorization and tracking service



Amazon Cognito

- Service providing a user pool for clients who need to send FHIR requests
- Acts as an identity provider
- Enables AWS role mapping for the FHIR request user
- Maintains a session for each authenticated user



AWS X-Ray

- Provides end-to-end tracking of the FHIR request message
- Enables debugging of the message

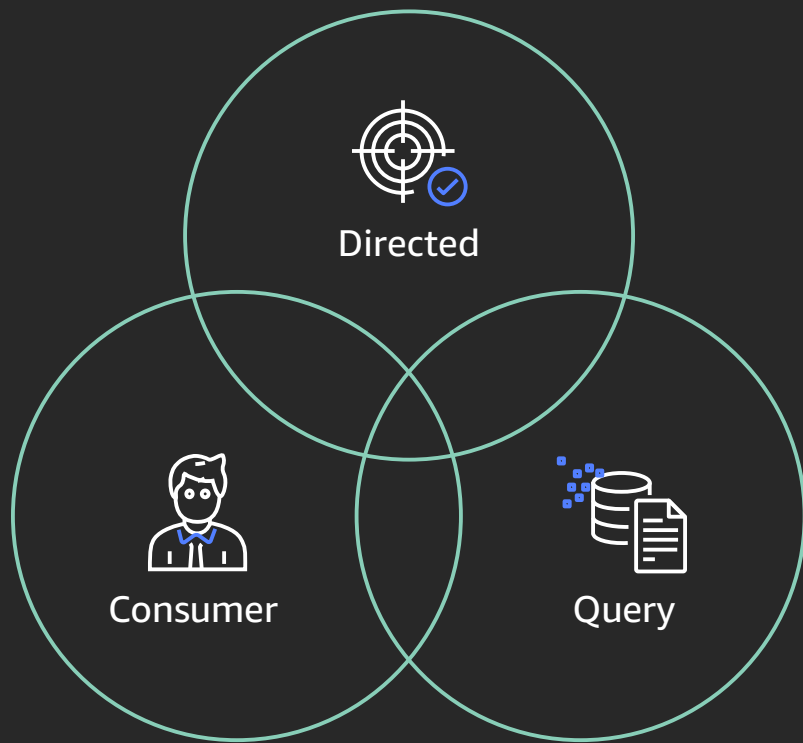
The AWS commitment to healthcare interoperability



Interoperability requires the ability to share clinical information across systems, networks, and care providers. Barriers to data interoperability sit at the core of many process problems. We believe that better interoperability will unlock improvements in individual and population-level care coordination, delivery, and management. As such, we support efforts from ONC and CMS to champion greater interoperability and patient access.

This year's proposed rules focus on the use of HL7 FHIR (Fast Healthcare Interoperability Resources) as an open standard for electronically exchanging healthcare information. FHIR builds on concepts and best practices from other standards to define a comprehensive, secure, and semantically extensible specification for interoperability. The FHIR community features multidisciplinary collaboration and public channels where developers interact and contribute.

Exchanges



“The foundation of standards, policies and technology required to initiate all three forms of health information exchange are complete, tested, and available today.”

— healthit.gov

CommonWell



Our vision

- CommonWell Health Alliance is not-for-profit trade association devoted to the simple vision that health data should be available to individuals and caregivers regardless of where care occurs.
- Access to this data must be built into health IT at a reasonable cost for use by a broad range of healthcare providers and the people they serve.



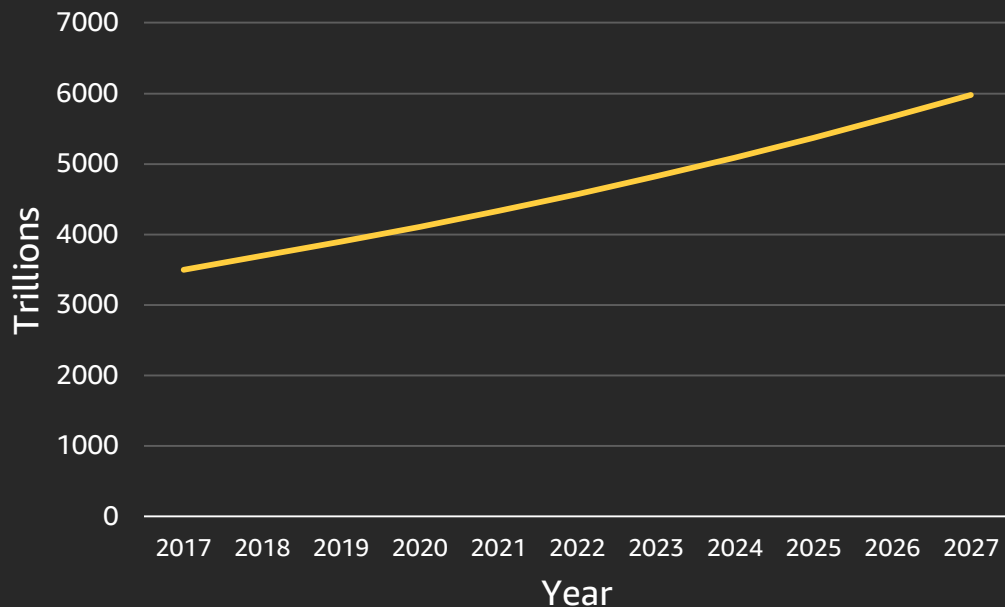
Bringing data liquidity to healthcare

Arien Malec

Senior Vice President of Product Development
Change Healthcare

We have a cost problem in the U.S. healthcare system

National Health Spending Trend



Healthcare system will grow from **\$3.5 trillion** to **\$6.0 trillion** by 2027

Healthcare sector will be **19.4%** of GDP in 2027

Out-of-pocket healthcare spend will increase from **3.6%** to **5%** by 2027

Waste in U.S. healthcare

EXHIBIT 1

Estimates of Waste in US Health Care Spending in 2011, by Category

	Cost to Medicare and Medicaid ^a			Total cost to US health care ^b		
	Low	Midpoint	High	Low	Midpoint	High
Failures of care delivery	\$26	\$36	\$45	\$102	\$128	\$154
Failures of care coordination	21	30	39	25	35	45
Overtreatment	67	77	87	158	192	226
Administrative complexity	16	36	56	107	248	389
Pricing failures	36	56	77	84	131	178
Subtotal (excluding fraud and abuse)	166	235	304	476	734	992
Percentage of total health care spending	6%	9%	11%	18%	27%	37%
Fraud and abuse	30	64	98	82	177	272
Total (Including fraud and abuse)	197	300	402	558	910	1,263
Percentage of total health care spending				21%	34%	47%

SOURCE Donald M. Berwick and Andrew D. Hackbarth, "Eliminating Waste in US Health Care," JAMA 307, no. 14 (April 11, 2012):1513-6. Copyright © 2012 American Medical Association. All rights reserved.

NOTES Dollars in billions. Totals may not match the sum of components due to rounding. ^aIncludes state portion of Medicaid. ^bTotal US health care spending estimated at \$2.687 trillion.

Waste due to poor care coordination, administrative complexity, and pricing failure leads to **waste and inefficiency**

Improvements in these areas could return **\$225-\$612 billion** to Americans

Transforming U.S. healthcare system



Vision

Redefine the healthcare consumer experience with a digital, mobile-first environment

Where consumers can manage their financial responsibilities, clinical information and explanation of benefits in real-time

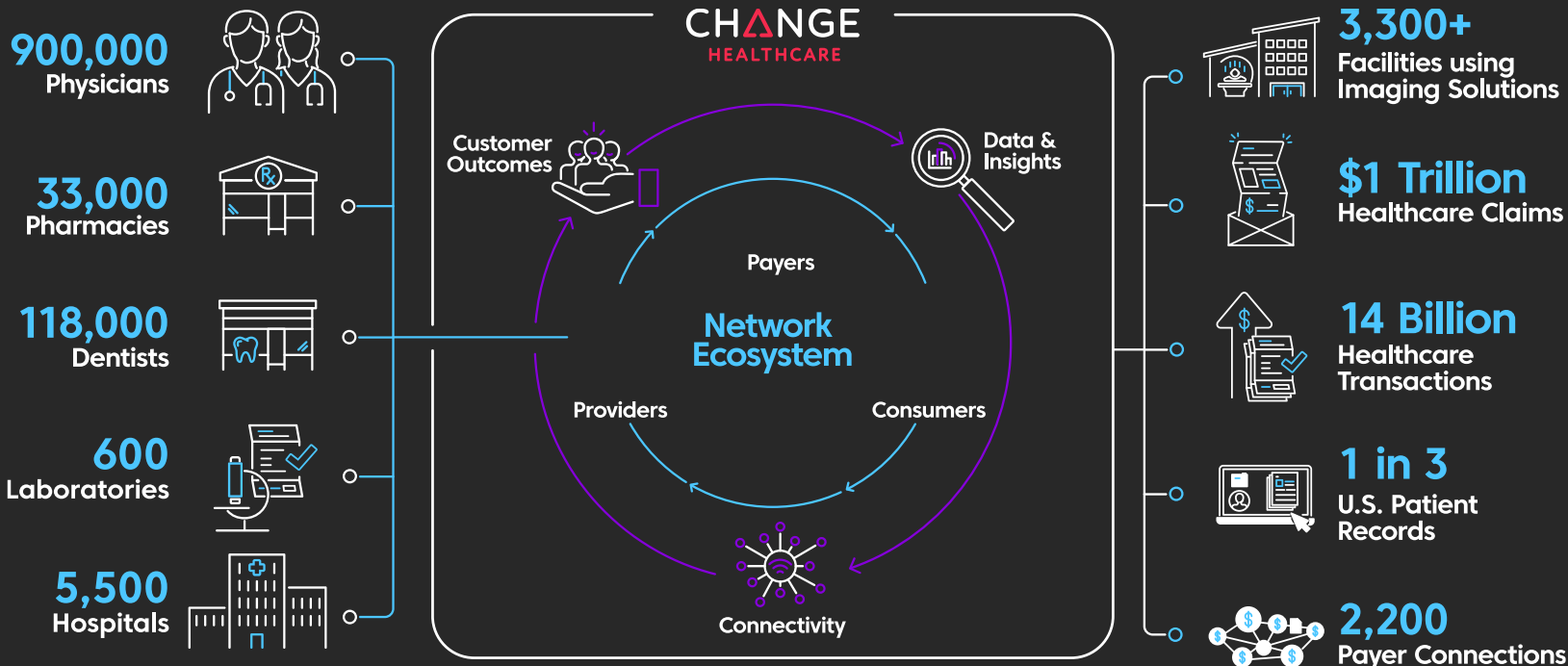


How ?

Expand access to clinical and financial information across care centers and participants

Need low-cost, highly reliable interoperability networks to drive radical improvement in the U.S. healthcare system

About Change Healthcare



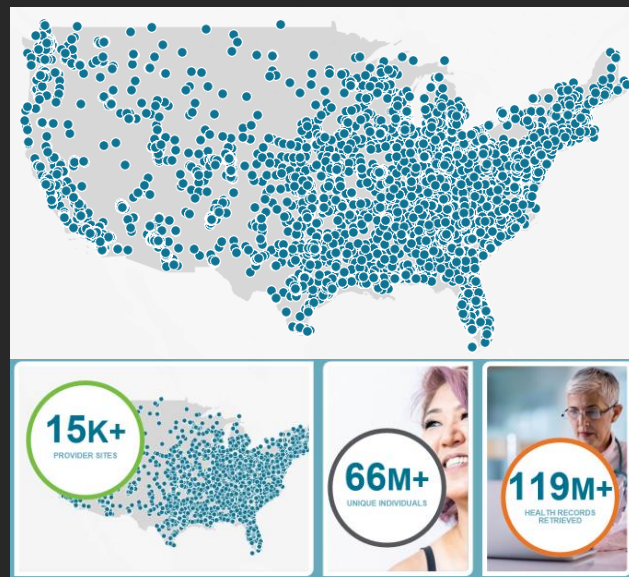
Case study: CommonWell Health Alliance nationwide health information exchange



CommonWell is an independent, not-for-profit trade association of 80+ member organizations devoted to the simple notion that:

Health data should be available **to individuals and providers** regardless of where care occurs, and

Provider access to this data must be built-in **to HIT** at a reasonable cost for use by a broad range of health care providers and the people they serve



Case study: CommonWell Health Alliance nationwide health information exchange



Migration



Database

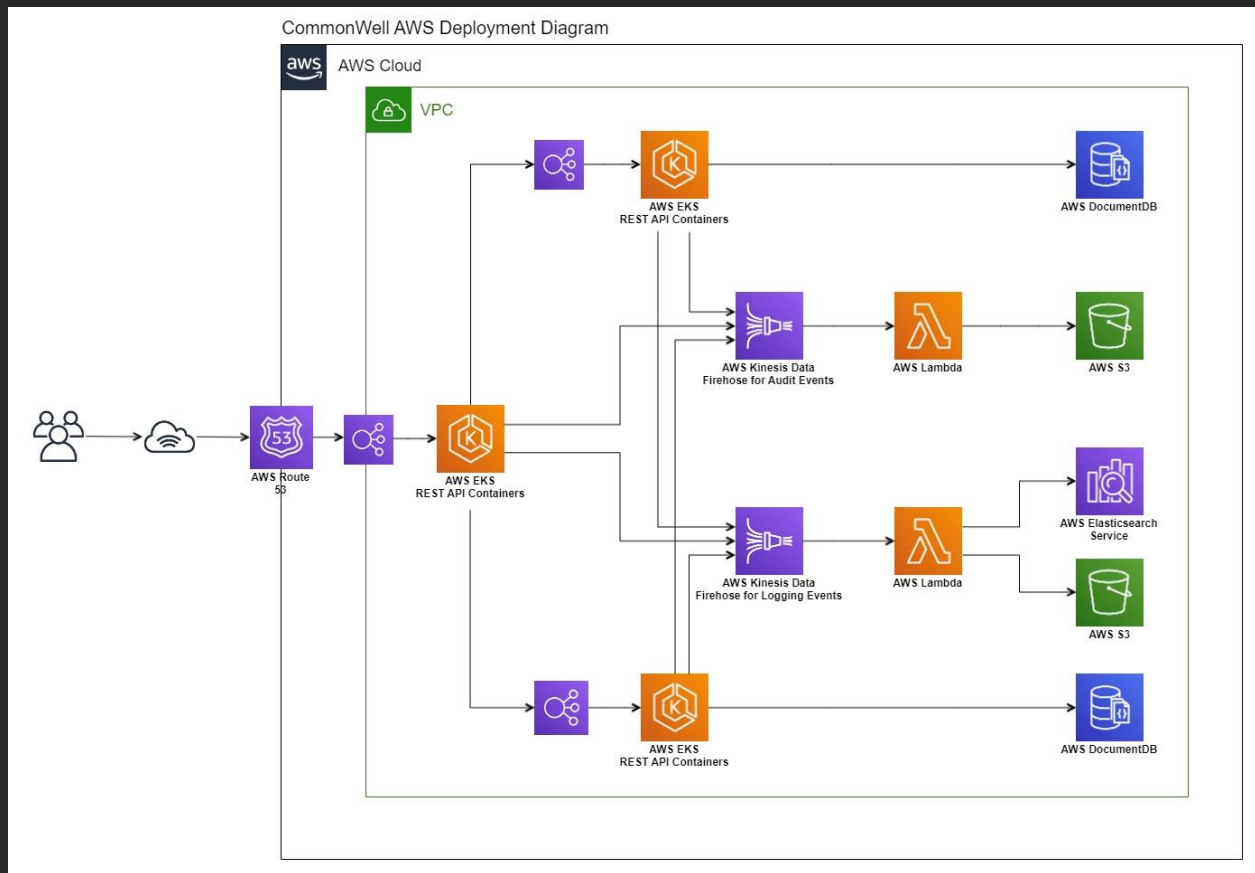


Re-architecture

Results:

- Increase our ability to scale to nationwide interoperability for FREE
- Reduce the infrastructure cost of data sharing
- Allow CommonWell to expand access to and scale interoperability solutions, especially in support of current and pending regulations preventing healthcare information blocking

Case study: CommonWell Health Alliance architecture



Case study: Intelligent Medical Network (IMN)

\$2 trillion
healthcare claims

14 billion
transactions



About IMN



Clearinghouse
combinations



Serverless



Results:
foundation + AI

Case study: API Marketplace



Results:

- **5.5 million** API eligibility and claims-related transactions
- **< 350 microseconds** in processing real-time transactions
 - **95%** of the time at **99.999%** availability and high observability
- Allowing startups and digital innovators to use capabilities through **API access**
- Driving interoperability
 - APIs are built to established and transparent standards

Thank you!

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Enabling digitally enhanced, data-driven healthcare

Designing services with healthcare in mind

Cloud becoming the new norm in healthcare

Personalization in medicine will be transformative

Other healthcare sessions

ID	TITLE	DAY/TIME	LOCATION
HLC401	Workshop: Healthcare data interoperability: HL7 and FHIR	Wednesday, 8:30 am	Venetian, Level 3, Murano 3306
HLC304	Chalk Talk: Predicting patient outcomes with Life Sciences and Healthcare data	Wednesday, 12:15 pm	Venetian, Level 2, Veronese 2405
HLC309	ChalkTalk: How to adopt HITRUST CSF on AWS	Wednesday, 1:45 pm	Venetian, Level 3, Murano 3201A
HLC302	Builder: VMware Cloud on AWS for Healthcare	Wednesday, 5:30 pm	Mirage, Events Center C1
HLC301	Builder: Healthcare call center automation with Amazon Connect	Thursday, 11:30 am	Aria, Level 1 West, Bristlecone 2
HLC306	Chalk Talk: Alexa healthcare skills	Thursday, 1:45 pm	Venetian, Level 4, Lando 4202
HLC305	Chalk Talk: How to run clinical applications on AWS	Friday, 9:15 am	Venetian, Level 3, Murano 3201A

Healthcare & Life Sciences Networking Lounge

Join us all week at our HCLS
networking lounge for post-session
speaker meet-and-greets, lightning
talks, and informal discussions



Venetian, Level 3



Healthcare & Life Sciences Cocktail Reception

Join us tonight at the **OTORO Grill** from 6:30 to 8:00pm to network with industry peers and AWS leadership in Healthcare, Life Sciences, and Genomics.



OTORO Grill @ The Mirage



Please complete the session
survey in the mobile app.

Thank you!

Pat Combes
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aws.amazon.com/health