



# CONSOLIDATED AUDIT TRAIL INDUSTRY WEBINAR: CAT COSTS

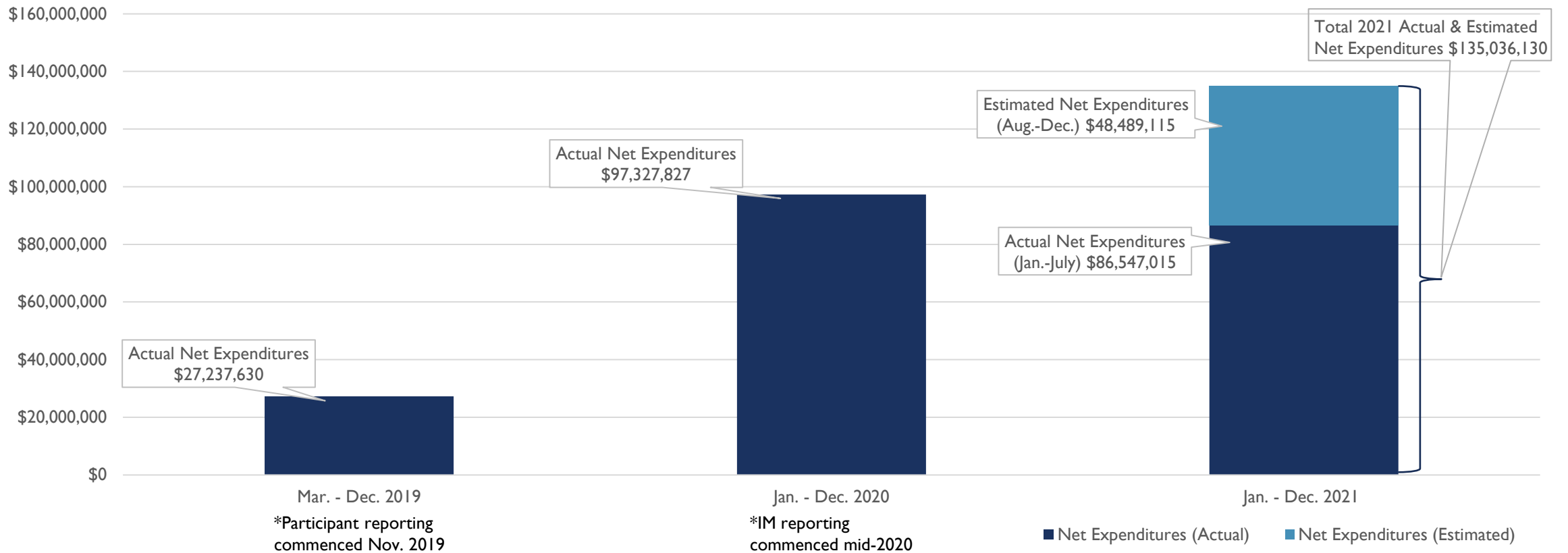
SEPTEMBER 21, 2021



# ROADMAP

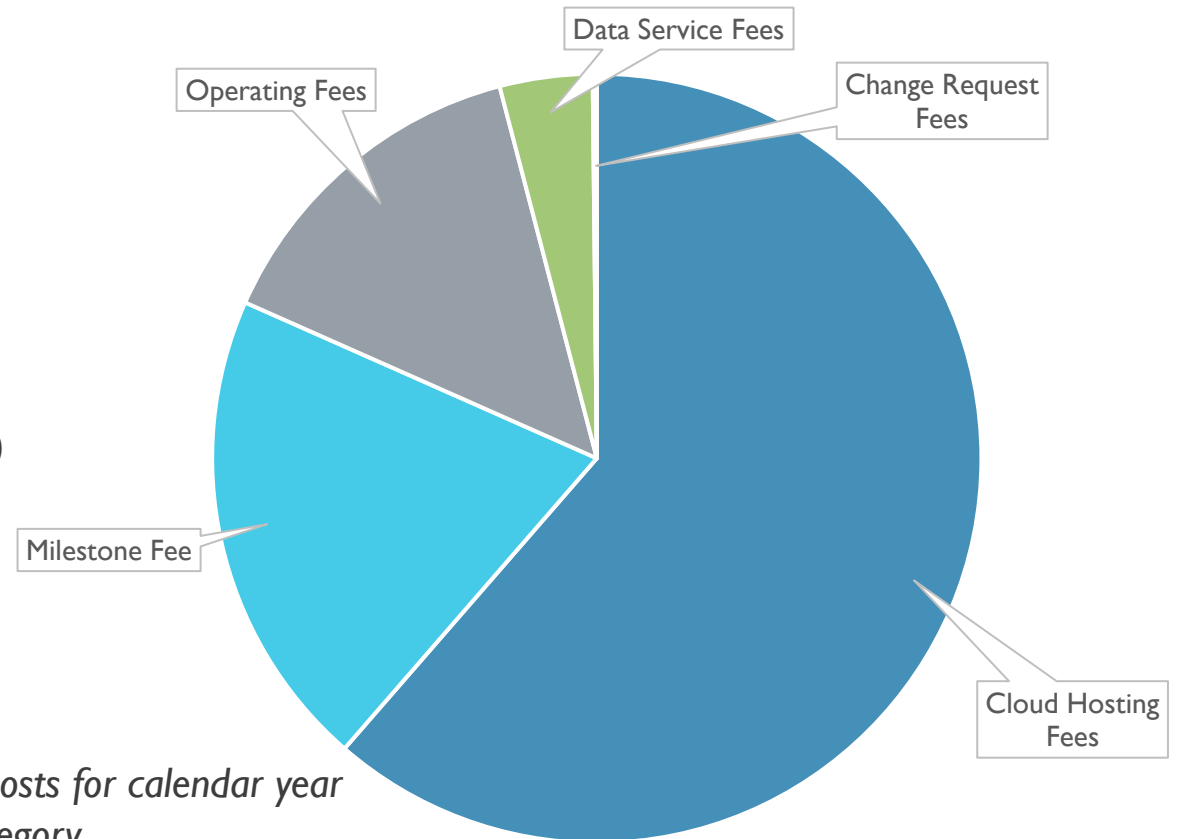
- CAT Costs – Historical
- CAT Costs – 2020
- CAT Costs – Q1 & Q2 2021
- CAT Costs – Cloud Hosting Fees
- Cost Drivers
- Cost Management

# CAT COSTS – HISTORICAL 2019-2020 AND ACTUAL/ESTIMATED 2021



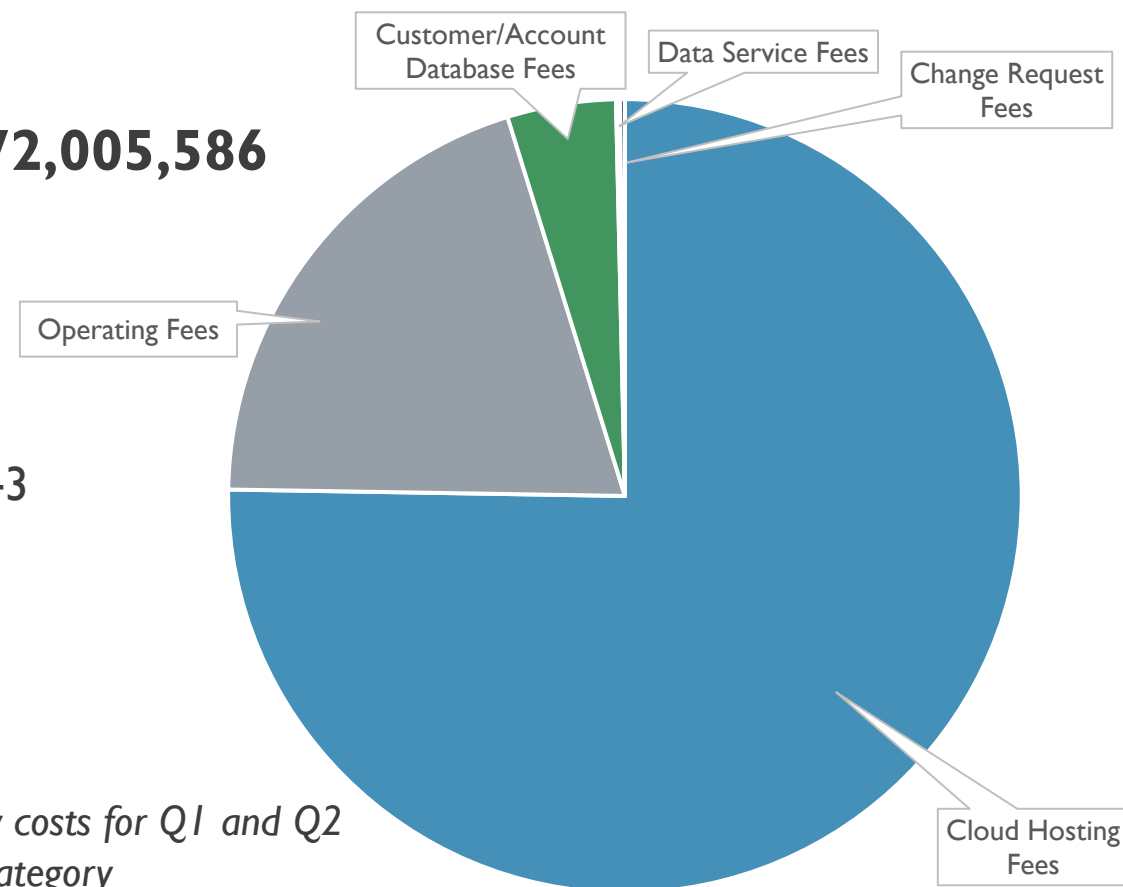
# CAT COSTS – 2020

- Net Expenditures for 2020: **\$97,327,827**
  - Technology costs of **\$71,106,488**, which are illustrated in the chart, were comprised of:
    - Variable cloud hosting fees: \$43,650,775
    - Fixed development costs - milestone: \$14,400,000
    - Fixed development costs - operating: \$10,162,628
    - Data service fees: \$2,770,003
    - Change request fees: \$123,082



# CAT COSTS – Q1 & Q2 2021 ACTUAL OPERATING EXPENSES

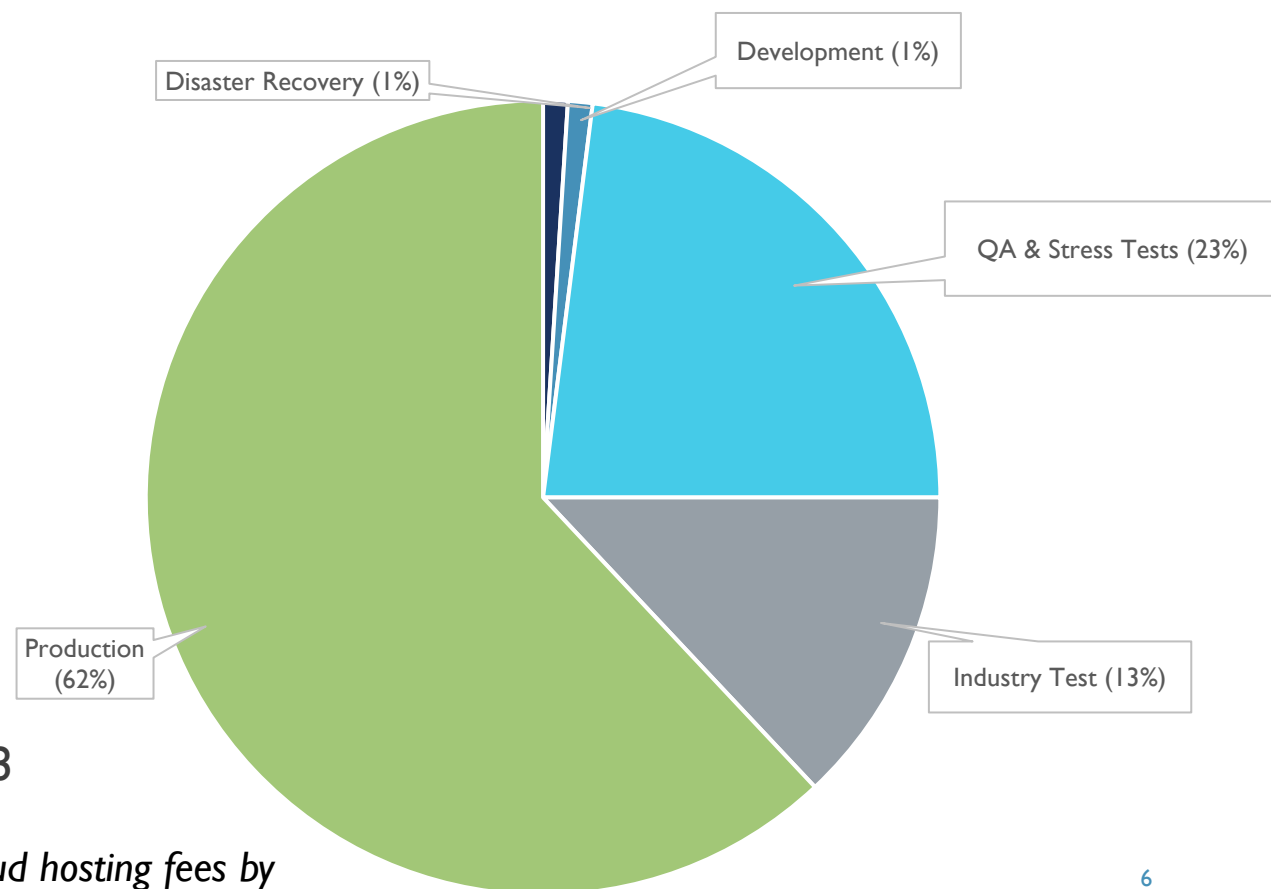
- Operating expenses for Q1 and Q2 2021: **\$72,005,586**
  - Technology costs of **\$64,123,898**, which are illustrated in the chart, were comprised of:
    - Variable cloud hosting fees: \$48,258,885
    - Fixed development costs - operating: \$12,798,943
    - Customer/account database: \$2,834,412
    - Data service fees: \$100,800
    - Change request fees: \$130,858



*Technology costs for Q1 and Q2 2021 by category*

# CAT COSTS – CLOUD HOSTING FEES

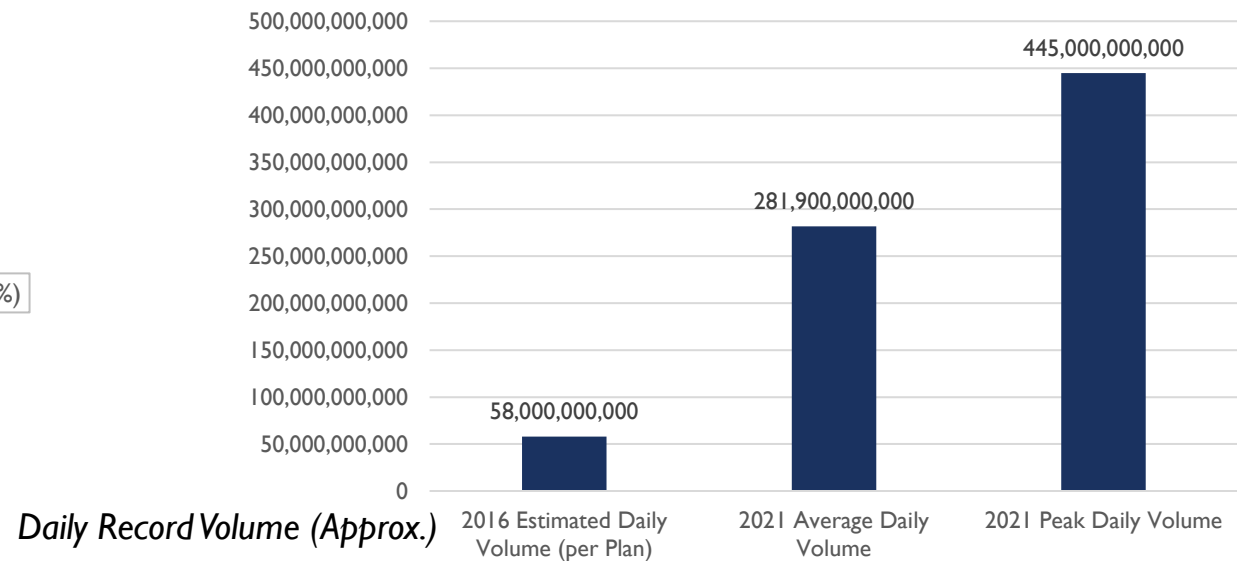
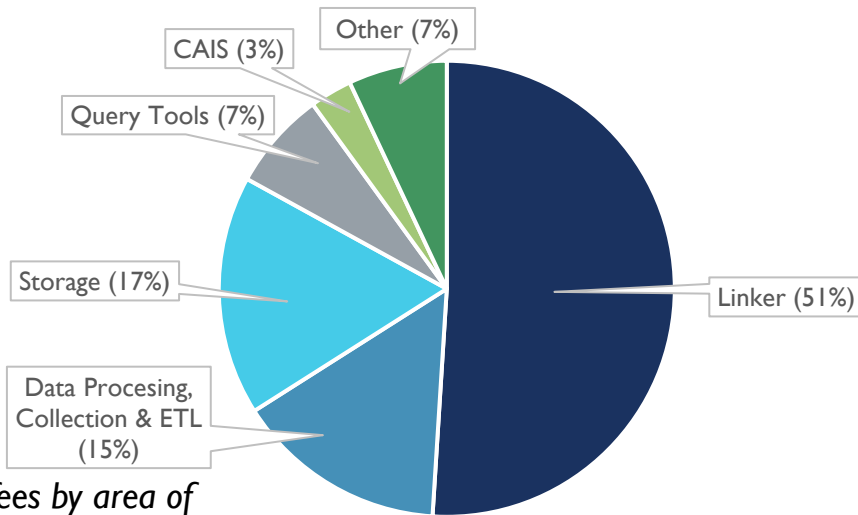
- Cloud hosting fees for Q1 and Q2 2021: **\$48,258,885**
- Production is the largest cost component given significant compute and storage requirements.
- Industry test environment reflects testing of significant releases and Industry Member use of the test environment daily.
- Stress tests are required to be performed during significant releases and annually and contributed to increased cloud hosting fees. QA tests have been significant for major releases (e.g., 2c, 2d, Participant Release 7).
- We estimate that cloud hosting fees will increase in Q3 and Q4 2021 as data volumes and retention increase.



*Cloud hosting fees by environment (Jan. - July 2021)*

# COST DRIVERS

- The primary cost drivers for the CAT are compute costs (e.g., linker) and storage costs. These costs are volume-based and have increased significantly each year beyond the volume estimate included in the Plan.
- The Plan estimates 29 PB of data after six years. However, CAT has 234 PB of data as of Sep. 14, 2021, and we project that storage will be approximately 1100 PB by end of 2024.



Cloud hosting fees by area of environment (Jan. - July 2021)

## COST DRIVERS, CONT.

- CAT reporting has been introduced via a phased approach with certain new reporting and functionality being added incrementally over time. With the introduction of each new phase, there has been a substantial increase in message traffic volume, computing complexity and storage requirements.
  - We have seen unprecedented volume in 2021, with a peak daily volume of 445,000,000,000 events.
- Computing and storage costs also are driven by the stringent capacity, performance and operational requirements for processing CAT Data set forth in the CAT NMS Plan.
  - The Plan requires that order events be reported, processed, corrected and made available to regulatory users within established timeframes. The Plan also requires that the system must be able to handle 2x the historical peak daily volume.
  - Linkage processing involves data from the current trade date and three previous trade dates, for a total of four days of rolling volume.
    - Participant four day rolling volume averages 550,000,000,000 to 600,000,000,000 events.
    - Industry Member four day rolling volume averages 65,000,000,000 to 115,000,000,000 events, reflecting high volatility.



# COST MANAGEMENT

- Participants regularly evaluate costs and investigate potential cost management measures.
- Operating Committee, working closely with the Plan Processor, has actively pursued and continues to actively pursue cost savings measures related to compute and storage costs as well as to system architecture and process improvements, among other cost savings measures.
  - Operating Committee actively discusses and approves the Capacity Plan, which includes information on cloud usage and costs and potential cost savings measures.
  - The Plan Processor also makes use of its close working relationship with the CAT technology providers and their experts to seek to provide services in a cost-effective and efficient manner. This includes engaging directly with senior leadership of the cloud hosting services provider.

## COST MANAGEMENT, *CONT.*

- CAT has implemented various cost savings measures, including those related to cloud hosting costs. For instance, such cost savings measures include, among others:
  - Storage: leverage multiple storage tiers; and introduced measures to reduce options quote storage.
  - Compute: purchased reserved compute for cost optimization; implemented performance improvements to reduce overall compute needs; and heavily utilize elastic compute and only spin up compute when needed.
  - Process and Architecture: leveraged new services to reduce required capacity; and implemented performance and stability improvements to reduce compute times.

# CLOSING REMARKS