

CHEAC - Public Health Generative AI Use Cases

AWS Public Health Team



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Agenda – Public Health Use Cases for GenAI

- Electronic Case Reports
- Intelligent Document Processing
- Chatbots
- Generative Business Intelligence and Data Analytics

Data Privacy & Security

Securely build generative AI applications with your data



Build with comprehensive data protection & privacy;
leverage AWS security services and best practices

Electronic Case Reports

- Problem: Public Health receives thousands of large clinical documents (CDA and HL7) with actionable public health data buried in non-standard data elements, non-standard vocabularies and critical information in free text fields
- Solution: Use Generative AI to ask the questions that public health needs from electronic case reports and extract actionable public health data in a standard format
 - Pregnancy Status (Syphilis in a woman of child bearing age)
 - Occupation (Is the person with Hepatitis A food handler?)

Electronic Case Reports

```
<<ClinicalDocument xmlns="urn:hl7-org:v3" xmlns:cda="urn:hl7-org:v3" xmlns:sdctc="urn:hl7-org:sdctc"
xmlns:voc="http://www.lantanagroup.com/voc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:hl7-org:v3 ../schema/infrastructure/cda/CDA_SDTCC.xsd">
  <realmCode code="US"/>
  <typeId extension="POCD_HD000040" root="2.16.840.1.113883.1.3">
    <!-- [C-CDA R1.1] US Realm Header -->
  </typeId>
  <templateId root="2.16.840.1.113883.10.20.22.1.1">
    <!-- [C-CDA R2.1] US Realm Header (V3) -->
  </templateId>
  <templateId extension="2015-08-01" root="2.16.840.1.113883.10.20.22.1.1">
    <!-- [eICR R2 STU1.1] Initial Public Health Case Report Document (eICR) (V2) -->
  </templateId>
  <templateId extension="2016-12-01" root="2.16.840.1.113883.10.20.15.2"/>
  <id root="38e6a983-38ad-484f-a7d2-b294cde5435">
    <!-- Globally unique document ID (extension) is scoped by vendor/software -->
  </id>
  <code code="55751-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Public
  Report">
    <!-- Document Code -->
  </code>
  <title>Initial Public Health Case Report</title>
  <effectiveTime value="20200505110515-0400"/>
  <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25" displayName="Normal"/>
  <languageCode code="en-US"/>
  <setId extension="8d86218e-0fea-11eb-8216-a80388425cfb" root="1.2.840.114350.1.13.380.3.7.1.1"/>
  <versionNumber value="1"/>
  <recordTarget>
    <!-- ***** recordTarget: The patient ***** -->
  </recordTarget>
  <patientRole>
    <id extension="PT-470127" root="2.16.840.1.113883.19.5">
      <!-- Patient ID -->
    </id>
    <!-- SSN -->
    <id extension="222-22-2222" root="2.16.840.1.113883.4.1"/>
    <addr use="H">
      <streetAddressLine>2222 Home Street</streetAddressLine>
      <city>Sacramento</city>
      <state>CA</state>
      <postalCode>94203</postalCode>
      <county>Sacramento County</county>
      <country>US</country>
    </addr>
    <telecom use="HP" value="tel:555-555-2003"/>
    <telecom use="HP" value="mailto:jose@email.com"/>
  </patientRole>
  <patient>
    <name use="L">
      <given>Joseph</given>
      <family>Patient</family>
    </name>
    <administrativeGenderCode code="M" codeSystem="2.16.840.1.113883.5.1" displayName="Male"/>
    <birthTime value="19890730"/>
    <sdctc:deceasedInd value="false"/>
    <religiousAffiliationCode code="1013" displayName="Christian (non-Catholic, non-specific)"
    codeSystem="2.16.840.1.113883.5.1076" codeSystemName="HL7 Religious Affiliation"/>
    <raceCode code="1002-5" codeSystem="2.16.840.1.113883.6.238" codeSystemName="Race & Ethnicity"
    displayName="American Indian or Alaska Native"/>
    <ethnicGroupCode code="2135-2" codeSystem="2.16.840.1.113883.6.238" codeSystemName="Race & Ethnicity - CDC"
    displayName="Hispanic or Latino"/>
  </patient>
  </patientRole>
</ClinicalDocument>
```



```
{
  "patient_identifier": "PT-470127",
  "patient_gender": "Male",
  "travel_details": "Recent travel for vacation to Wuhan China from April 22, 2020 to May 5, 2020",
  "medications_received": "Remdesivir 100 mg Injection, 100 mg every day for 4 days",
  "pregnancy_status": "Not specified",
  "symptoms": "Difficulty Breathing (finding)",
  "symptoms_onset_date": "05/13/2020",
  "occupation": "Sales",
  "does_job_involve_food_respond_yes_no_or_unknown": "Unknown",
  "has_chronic_conditions": "Unknown",
  "has_asthma": "Unknown",
  "diagnoses": "Coronavirus as the cause of diseases classified elsewhere (B97.2)",
  "was_hospitalized": "Yes",
  "date_hospitalized": "05/13/2020",
  "date_discharged": "05/13/2020",
  "is_patient_expired": "No",
  "all_medications": "Remdesivir 100 mg Injection",
  "medications_per_condition": "Remdesivir for Coronavirus",
  "eicr_trigger_data": "Coronavirus as the cause of diseases classified elsewhere (B97.2), SARS coronavirus 2 N gene detected",
  "is_this_person_homeless_or_prisoned": "Unknown"
}
```

eCR Demo – in console



Intelligent Document Processing

- Problem: Public Health receives paper forms across multiple domains including Vital Records, Electronic Laboratory Reports, Communicable Disease Reports, and WIC applications
- Solution: Use Generative AI to automatically extract the data from paper forms and transform it into formats easily consumable by the systems of record.

Intelligent Document Processing

CDPH
California Department of Public Health

Mail to: California Department of Public Health
Immunization Branch
885 Marine Bay Parkway
Building P, P.O. Box, MS 7319
Richmond, CA 94684-8400
Or Fax to: (510) 600-9348

MEASLES (RUBEOLA) CASE REPORT

PATIENT DEMOGRAPHICS

Patient name—last first middle initial: SPONGEBOB SPONGEBOB S Date of birth: 2/1/200 Age (enter age and check one): Days Weeks Months Years Gender: Male Female

Address—number, street: 125 CONCH ST City: BIKINI BOTTOM State: CA ZIP code: 93405 County: _____

Telephone number: Home (916) 555 1212 Work: _____ Email: spongebob@squarepants.com

ETHNICITY (check one) RACE (check all that apply)

Black/African American Asian: Please specify: Asian Indian Hmong Thai Native Hawaiian Pacific Islander: Please specify: Native American/Alaskan Native Japanese Vietnamese Other Asian: Samoan Other Pacific Islander: Hispanic/Latino Non-Hispanic/Latino White Other: _____ Unknown

Country of birth: USA Country of residence: USA

COMMON LHD TRACKING DATA

CMRID Number: _____ I29 Case ID Number: 6312692 WebCMR ID Number: _____

Date reported to county: 6/12/2025 Date investigation started: 6/13/2025 Person/clinician reporting case: Patrick Star Reporter telephone: _____

Case investigator completing form: _____ Investigator telephone: (816) 555 1212 Investigator's jurisdiction: _____

SIGNS AND SYMPTOMS

Rash: Rash onset date: 6/11/2025 Rash duration: 5 days Generalized rash: Yes No Unknown Origin on body: Chest Direction of spread: out

Fever: Fever onset date: 6/11/2025 Was temperature taken: Yes No Unknown Was temperature >101°F (38.3°C): Yes No Unknown If temperature not taken, skin was: Hot Warm Normal Unknown

Cough: Yes No Unknown Runny nose (otorrhea): Yes No Unknown Conjunctivitis: Yes No Unknown Koplik's spots: Yes No Unknown

Other symptoms: Describe other symptoms: _____

Does case meet clinical criteria for further investigation? Yes No Unknown CASE MEETS CDC/CSTE CLINICAL CRITERIA? (FOR STATE USE ONLY) Yes No Unknown

DIAGNOSIS

Diagnosis date: 6/11/2025

COMPLICATIONS AND OTHER SYMPTOMS

Hospitalized: Yes No Unknown Days hospitalized: _____ Pneumonia: Yes No Unknown Encephalitis: Yes No Unknown Death: Yes No Unknown If yes, date of death: _____

Other complications: If yes, describe other complications: _____

LABORATORY TESTS

Lab tests done for measles: Yes No Unknown CASE LAB CONFIRMED (FOR LHD USE) Yes No Unknown CASE LAB CONFIRMED (FOR STATE USE ONLY) Yes No Unknown

Serology performed: Yes No Unknown

Specimen date: _____ Result interpretation: P N I E X U

Specimen obtained for virus isolation: Yes No Unknown Specimen source: Nasopharyngeal Urine Other Unknown Specimen date: 6/12/2025 Virus isolated: Yes No Unknown Name of lab: _____

Specimen sent to CDC for genotyping: Yes No Unknown Date sent: _____ Virus genotype: _____

Other lab tests performed: Yes No Unknown Other lab test specimen date: _____ Specify other lab tests: _____ Other lab test results: _____

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Measles (Rubeola) Case Report—CDPH 8258

VACCINATION/MEDICAL HISTORY

Received one or more doses of measles containing vaccine (MCV) Yes No Unknown Number of doses: _____

Dates of vaccination—Dose 1: _____/_____/_____ Dose 2: _____/_____/_____ Dose 3: _____/_____/_____

Person not vaccinated (check all that apply)

1 Personal Beliefs Exemption (PBE) 4 Lab confirmation of previous disease 7 Delay in starting series or between doses
2 Permanent Medical Exemption (PME) 5 MD diagnosis of previous disease 8 Other
3 Temporary Medical Exemption 6 Under age for vaccination 9 Unknown

Prior MD diagnosed measles (see reason 5) Yes No Unknown Pregnant: Yes No Unknown Immunocompromised: Yes No Unknown

EPIDEMIOLOGICAL EXPOSURE HISTORY

Spread Setting (check all that apply)

1 Day care 4 Hospital Ward 7 Home 10 College 13 Church
2 School 5 Hospital ER 8 Work 11 Military 14 International travel
3 Doctor's office 6 Outpatient hospital clinic 9 Unknown 12 Correctional facility 15 Other

Recent travel or arrival from other country or state within 18 days of rash onset? Yes No Unknown

Countries or states visited: _____ Dates in countries or states visited: _____ Date of arrival in California: _____/_____/_____

Close contact with person(s) with rash 8-17 days before rash onset? Yes No Unknown

Name	Rash onset date	Relationship	Age (Years)	Same household
1 <u>Sandy Squivel</u>	<u>6/13/2025</u>	<u>friend</u>	<u>13</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown
2 _____	_____/_____/_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
3 _____	_____/_____/_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Please list other contacts on a separate sheet or use the contact tracing work sheet.

Epi-linked to a lab-confirmed case? Yes No Unknown Case name or case ID: _____ Outbreak related: Yes No Unknown Outbreak location: Bikini Bottom

Import status: Indigenous Out-of-state import Import-linked (linked to imported case) Endemic Unknown Source International import Imported virus (viral genetic evidence indicates an imported genotype) If case is imported, describe source: _____

CONTACT INVESTIGATION

Spread Setting (check all that apply)

1 Day care 4 Hospital Ward 7 Home 10 College 13 Church
2 School 5 Hospital ER 8 Work 11 Military 14 International travel
3 Doctor's office 6 Outpatient hospital clinic 9 Unknown 12 Correctional facility 15 Other

Number of susceptible contacts: _____ Close contacts who have rash 8-17 days after exposure to case (list below)

Name	Rash onset date	Relationship	Age (Years)	Same household
1 <u>Eugene Krabs</u>	<u>6/14/2025</u>	<u>co-worker</u>	<u>25</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown
2 _____	_____/_____/_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
3 _____	_____/_____/_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Please list other contacts on a separate sheet or use the contact tracing work sheet.

CASE CLASSIFICATION (FOR LHD USE) Confirmed Probable Suspect Not a case Unknown CASE CLASSIFICATION (FOR STATE USE ONLY) Confirmed Probable Suspect Not a case Unknown

MEASLES CASE DEFINITION

Clinical case definition: An illness characterized by all the following: (1) a generalized rash lasting greater than or equal to 3 days, (2) a temperature greater than or equal to 101.0°F (greater than or equal to 38.3°C), and (3) cough, coryza, or conjunctivitis.

Laboratory criteria for diagnosis: Positive serologic test for measles immunoglobulin M antibody; significant rise in measles antibody level by any standard serologic assay; or isolation of measles virus from a clinical specimen.

Case classification

Suspected: any febrile illness accompanied by rash.
Probable: a case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed case.
Confirmed: a case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed case (a laboratory-confirmed case does not need to meet the clinical case definition).

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IDP Demo – in console



Generative AI Chatbots

- **Problem:** Public Health departments receive multiple inquiries. Providers using Vital Records and Immunization Information Systems call asking basic questions about how to use these systems. The general public may also call Public Health with simple questions about how to obtain an immunization record or how to enroll in a program like WIC. Although this information is on the Public Health
- **Solution:** Using Generative AI, resources from public health like user manuals and public facing websites can be the knowledge bases to enable chatbots to automatically answer questions from end users and the general public.

AI Chatbots

Communicable Disease Epi on Call - Guide to Surveillance, Reporting and Control

Interactive Generative AI Assistant

Welcome to the GenAI Epi Assistant

This is a test chatbot to test GenAI to answer questions from content that can be found in the following

Reference Pages

- [Guide to Surveillance, Reporting and Control](#)
- [Clinical and Laboratory Testing Guidance for Monkeypox](#)

How to Use the Assistant

Our AI documentation assistant is available in the chat window. You can:

- Ask specific questions about the content in the reference pages
- Request information about specific topics
- Get help understanding complex information
- Find relevant sections in the documentation

Epi on Call

Customer has joined the chat

BOT 11:25 AM

Welcome to the Self Service Chatbot. How may I assist you with inquiry?

B *I* ☰ ☰ 🔗 😊

What do I do if I find a bat in my room? ➤

End chat

📞 Start a Call

Chatbot Demo – in console



Generative Business Intelligence

- Problem: Public Health staff do not always have the technical and analytic skills to interact with their data to generate the graphs and stories from their siloed systems to help improve population health.
- Solution: Generative BI enables business users to interact with their data using natural language prompts to build graphs, dashboards and stories that describe their data

AI-assisted storytelling

Interpret data for others

Help others derive meaning from data and reach conclusions to drive decisions

Generate stories using AI

Produce cohesive, powerful, and insightful narratives

Create refined content

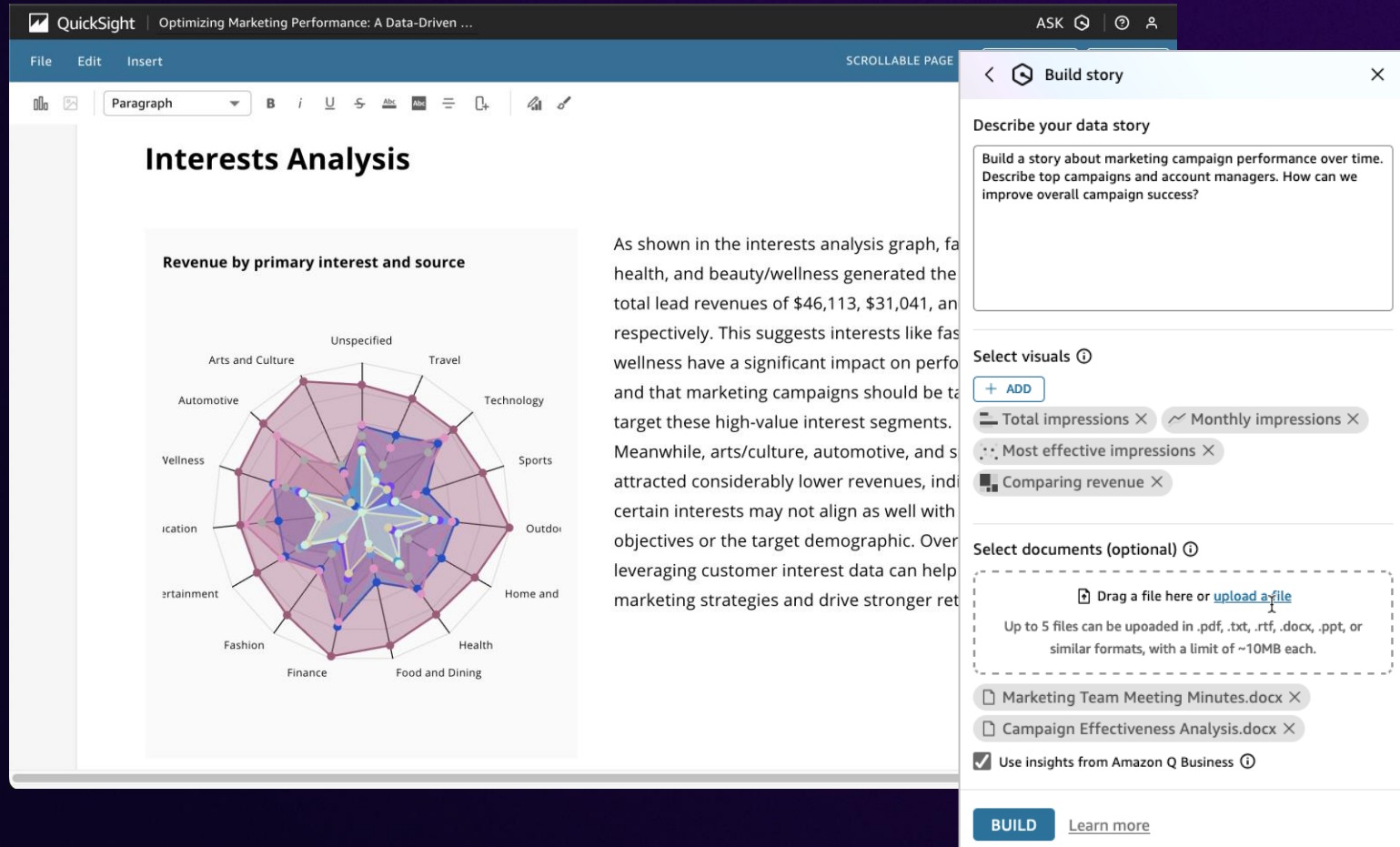
Control AI verbosity, customize narrative text, and apply stunning visual themes to bring content to life

Augment with unstructured data

Upload files with related content to enrich the story with additional insights

Share up-to-date governed data

Quickly update and disseminate data at any time



The screenshot displays the QuickSight 'Build story' interface. The main content area shows a report titled 'Interests Analysis' with a radar chart titled 'Revenue by primary interest and source'. The chart has 12 axes representing different interest categories: Unspecified, Travel, Technology, Sports, Outdoor, Home and Health, Food and Dining, Finance, Fashion, Entertainment, Recreation, and Wellness. The text to the right of the chart reads: 'As shown in the interests analysis graph, fashion, health, and beauty/wellness generated the total lead revenues of \$46,113, \$31,041, and \$21,041, respectively. This suggests interests like fashion, health, and beauty/wellness have a significant impact on performance and that marketing campaigns should be targeted to reach these high-value interest segments. Meanwhile, arts/culture, automotive, and sports attracted considerably lower revenues, indicating certain interests may not align as well with marketing objectives or the target demographic. Overall, leveraging customer interest data can help refine marketing strategies and drive stronger returns.' The 'Build story' sidebar on the right contains the following sections: 'Describe your data story' with a text input field containing the prompt 'Build a story about marketing campaign performance over time. Describe top campaigns and account managers. How can we improve overall campaign success?'; 'Select visuals' with a '+ ADD' button and three selected visual types: 'Total impressions', 'Monthly impressions', and 'Comparing revenue'; 'Select documents (optional)' with a dashed box containing the instruction 'Drag a file here or upload a file' and a list of two document thumbnails: 'Marketing Team Meeting Minutes.docx' and 'Campaign Effectiveness Analysis.docx'; and a checked checkbox for 'Use insights from Amazon Q Business'. At the bottom of the sidebar are 'BUILD' and 'Learn more' buttons.

Generative Business Intelligence

Build visuals

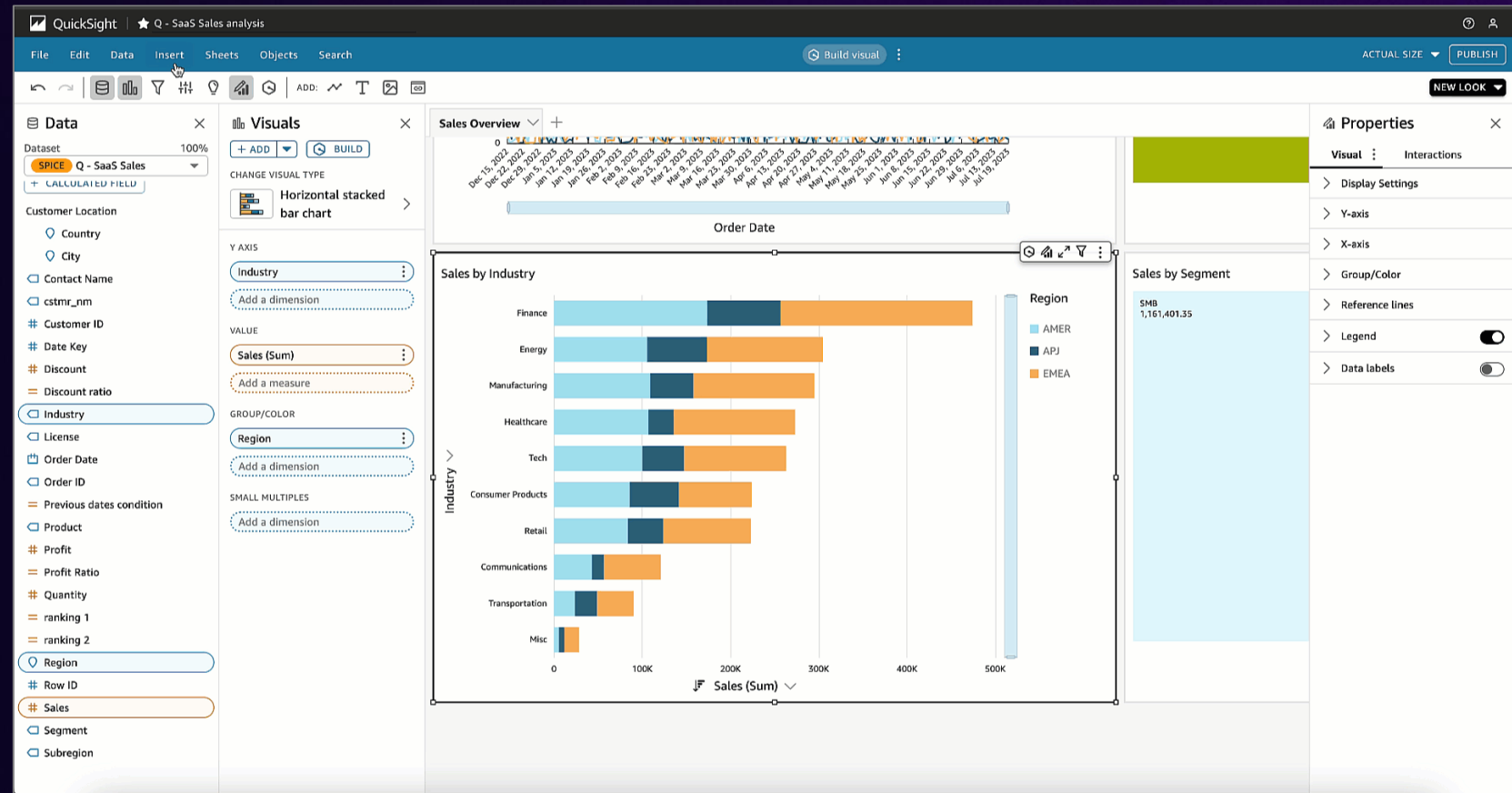
Use natural language to quickly build visuals for dashboards and reports

Build calculations

Easily create calculations using natural language without looking up or learning specific syntax

Refine visuals

Quickly update visuals by describing desired formats using natural language



GenBI Demo– in console



Thank you!

