



# Terminology Management With SNOMED CT At Kaiser Permanente

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# Presentation agenda

- What:  
Scope And Scale Of Terminology Management At Kaiser Permanente
- How:  
Staffing Cost Drivers For Terminology Management
- Why:  
Benefits Supported By Or Directly Attributable To Using Enterprise Terminology Based On SNOMED CT
- Discussion

The background features a blue gradient with binary code (0s and 1s) scattered across it. In the lower half, there is a white line graph with circular markers at various points, overlaid on a grid of vertical lines of varying heights, resembling a data visualization or signal waveform.

What:  
Scope And Scale Of Terminology Management

# Scale: Kaiser Permanente By The Numbers (2015-16)



433,413 2015 hospital admissions;  
6,291 2015 neurosurgeries;  
>1 million 2015 mammograms

10.6  
million members



38 hospitals  
co-located with  
medical offices



650+ outpatient surgery  
centers, medical office buildings,  
and other outpatient facilities



KAISER PERMANENTE®

70+ years of  
providing care

\$60B  
in revenue

\$62B  
in assets

225,000  
inpatient  
surgeries

98,000  
births

40.2mm  
doctor office  
visits



188mm  
visits to KP.org  
My Health Manager



22mm  
secure messages  
sent to providers



150mm  
lab orders  
per year



78mm  
prescription  
orders per year



4.8mm  
appointments  
booked online

23.2 million health information exchanges (HIE document exchanges)  
About 18,000 Physicians and 51,000 Nurses

# Scenarios for the use of terminology

- Use case for *classification* based on ICD:
  - *I have a record.* Everything in the record needs to be assigned *the right code* in a classification system.
  - Not everything is in the classification system, therefore “Not Otherwise Specified” (NOS) and “Not Elsewhere Classified” (NEC) codes are necessary and meaningful.
  - Supports consistent administrative reporting and financial transactions.
- Use case for *clinical terminology* based on SNOMED CT:
  - *I have a patient.* I can document everything that is relevant, and my EHR system will attach codes to much of it (*but not all*).
  - NOS and NEC are meaningless.
  - Supports semantic interoperability, decision support, care of individual patients, and population health management.

# Key U.S. legal/regulatory requirements

- **Meaningful Use** regulations require certified EHR technology to use **SNOMED CT** for clinical documentation of problems, and **LOINC** for laboratory procedures, for **care coordination, referrals, transitions of care, and patient access** to health summaries.
  - Use of SNOMED CT and LOINC for **interoperability** is required for certification of EHRs and hospital or physician compliance may be audited under Meaningful Use.
- **HIPAA** law requires the use of classification systems to document health care interventions for **administrative purposes** such as insurance **billing**, mortality records, or **reporting**.
  - Current Procedure Terminology (CPT) is used to classify outpatient procedures and inpatient services. **CPT-4** is owned by the American Medical Association
  - International Classification of Diseases (specific schemes published by the US government) is used to classify inpatient and outpatient diagnoses and inpatient procedures: **ICD-10-CM** (Clinical Modification) for diagnoses; **ICD-10-PCS** (Procedure Coding System)

# Terminology implementation

- Implementing an enterprise terminology management solution is an important part of the implementation of health information technology with electronic health records. It is not an independent activity.
- Kaiser Permanente uses Convergent Medical Terminology (CMT) in KP HealthConnect®
  - Based on SNOMED CT and Laboratory LOINC.
  - CMT includes concepts not yet in SNOMED CT therefore not in cross-maps to ICD.

# What is Convergent Medical Terminology (CMT)?

CMT is Kaiser Permanente's enterprise terminology system – how data is captured in KP HealthConnect® – which includes several components:

- End user terminology
- Standard terminology
- Administrative codes
- Patient/population query and decision support
- Terminology request process

# CMT end user terminology component (1)

- CMT contains the terminology used by clinicians in KP HealthConnect® and by patients in kp.org and mobile apps
- End user terms are mapped to the standard terminologies and have data attributes needed by the application software
- End users use and see the terms that are familiar to them, and the application uses the codes and attributes it needs
- Patient-preferred display terms usually are the same as medical terminology but may be synonyms — such as “miscarriage” instead of “spontaneous abortion”

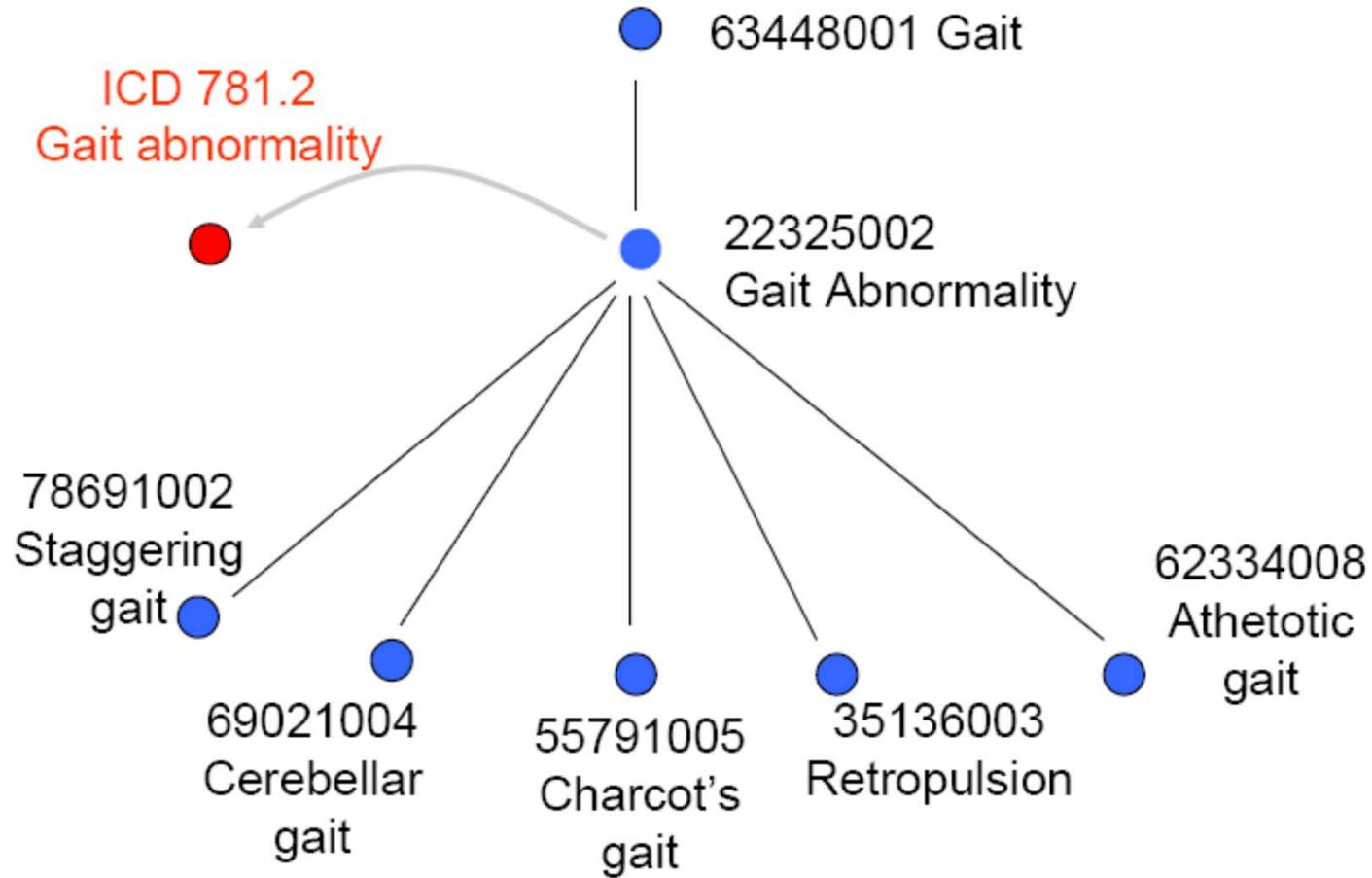
## CMT end user terminology component (2)

- Protects clinician end users from changes in standard terminology or coding schemes
- Example: Almost all diagnosis terms displayed to clinicians did not have to be changed or deleted for the transition from ICD9 to ICD10
- Neither ICD nor SNOMED has an inherent focus on end user usability
- CMT is a product of over two decades of actual user experience, and it continues to improve every month

# CMT standard terminology component

- CMT maps and integrates national and international terminology standards, such as SNOMED CT, ICD-10, and LOINC
- CMT can be mapped to other terminology as needed, such as local (non-standard) terminologies used in clinical technology, or terms developed and used for patient safety or quality measurement
- CMT supports requirements for standard terminology in Meaningful Use and Health Information Exchange programs

# SNOMED CT to ICD9 mapping example



# CMT administrative code component

- CMT supports Revenue Cycle, Charge Capture, and Risk Adjustment
- Administrative and financial coding is a by-product of the process for capturing patient care information — not a separate step
  - Diagnosis terms are mapped to ICD — clinicians pick a problem list and the same term is used for encounter diagnosis coding
  - Procedure terms are mapped to CPT4 or HCPCS codes
  - When a laboratory test order is resulted/completed, CPT4 administrative codes mapped to it are sent to the financial systems

# CMT query and decision support component (1)

- CMT is built on SNOMED CT, the global language of health care.
- CMT leverages the internal structure of SNOMED CT, including poly-hierarchy and description logic (formal definitional attributes).
- CMT provides the ability to query different ways to identify subsets in terminology:
  - SNOMED CT logic improves precision and efficiency of queries
  - Supports decision support modules in KP HealthConnect®
  - Identifies patient cohorts for Population Care
  - Identifies KP HealthConnect® terminology to fulfill reporting or analytical criteria and specifications

## CMT query and decision support component (2)

- Ability to easily identify patient cohorts for certain conditions for Population Care
- Ability to identify subsets for use as input criteria for KP HealthConnect® decision support modules, such as Best Practice Alerts, Reminders, etc.
- Ability easily to do precise queries, such as “find all conditions where causative organism is Aspergillus”
- Ability easily to do large aggregate queries, such as “find all patients with cardiovascular system disorders”

# CMT request tracking component

- What happens when a desired clinical concept is not already present in KP HealthConnect®, such as a new medical diagnosis or a new regulatory requirement?
- Terminology request submission and release process:
  - Kaiser Permanente regions and business partners submit CMT requests for inclusion of concepts in KP HealthConnect®
  - Integration into published standards including SNOMED CT and LOINC, release schedule, quality assurance, and operational processes ensure availability of the requested terminology in HealthConnect®

# Clinical terminology needs are dynamic

- According to the latest SIRS report from IHTSDO: since 2011 (last 5 years), Kaiser Permanente submitted 28,589 new concepts to NLM (US NRC) and IHTSDO
- New concept requests were in many recent KP submissions to IHTSDO and NLM:
  - Top 2500 Problem List;
  - Cardiology;
  - Mental Health;
  - Neurology;
  - Musculoskeletal;
  - Ophthalmology;
  - Hem/Onc;
  - Endocrine;
  - ENT/GI/ID;
  - Skin/Respiratory;
  - OB/Gyn;
  - Ortho Extremities;
  - Hx of and FHx of;
  - Ortho Non-Extremities;
  - Injuries;
  - Orthopedics;
  - Pediatrics;
  - Emergency Dept;
  - Common Lab Procedures;
  - Specimen Source;
  - Specimen Type;
  - Skin/Respiratory;
  - ENT/GI/ID;
  - Vaccinations;
  - Endo/Uro/Neph;
  - Radiology

# Why “enterprise terminology”?

## Internal:

- No one terminology meets all needs — standards meet specific needs
  - We must use many different terminologies, and we integrate or “converge” them in a central model in order to leverage the efficiencies of each terminology, and to provide interoperability
- None of the standard terminologies are ever “complete”; therefore, there is a need for new concepts or enterprise-specific concepts
  - Standard reference terminologies are updated slowly, e.g. 2x/year
- Having a central terminology management system eliminates duplication of effort and provides a common definition of data via common concepts/terms across the enterprise

## External

- SNOMED CT and LOINC as standard terminology is the key to semantic interoperability.
- Enables receivers of external data to understand the intended meaning precisely.

The background features a blue gradient with various data visualization elements. At the top, there are horizontal bars and binary code (0s and 1s) arranged in a grid-like pattern. Below this, a dark blue horizontal band contains the text. The bottom section shows a line graph with circular markers and a bar chart with vertical lines, all set against a background of binary code and a grid.

How:

Staffing And Technology Cost Drivers For Terminology Management

# Enterprise terminology - staffing (full-time equiv.)

Job / Role	SNOMED CT Support FTE	Total Support FTE
Certified Coder	0.0	3.0
Nurse Modeler	4, Partial	4.0
Physician Modeler/ Terminologist	3.5	4.0
Production Support	2, Partial	4.0
Technical Engineer	4, Partial	4.0
Total		19.0

# Enterprise terminology - technology components

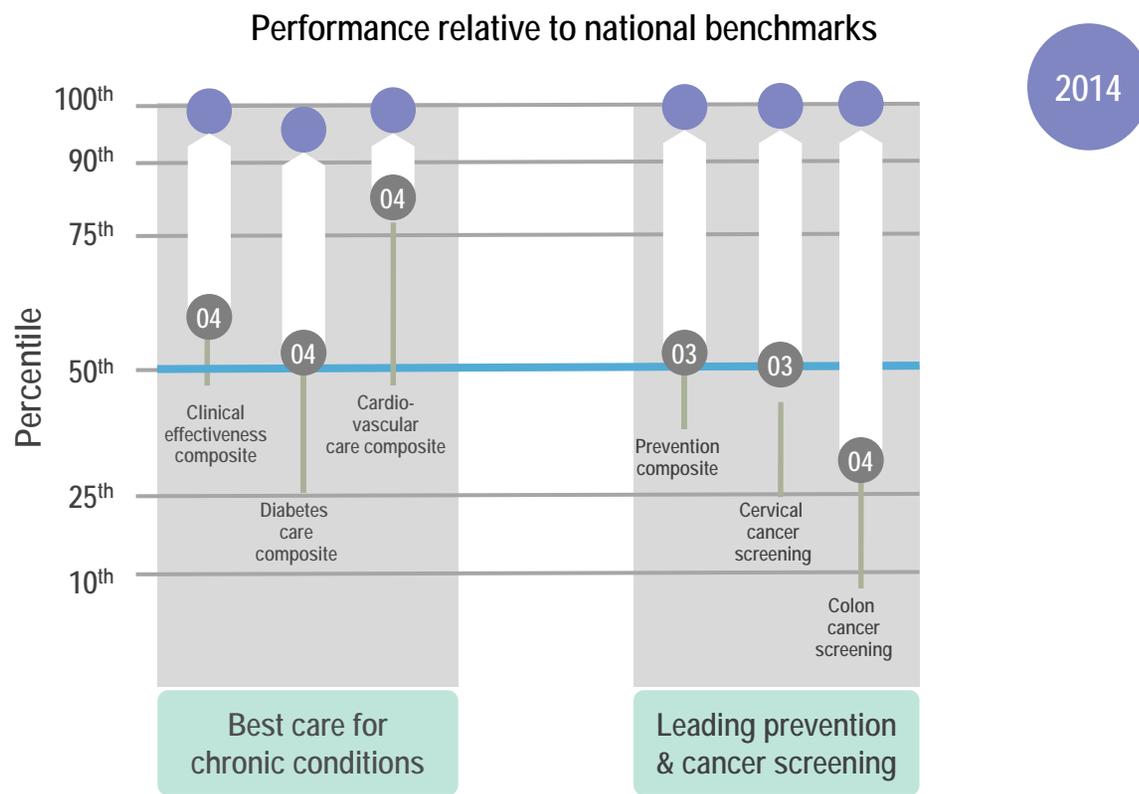
Technology Component	Specific Requirements
Term Authoring / Editing Software	Hosting, Subscription, Support
Classification Coding Resources	Electronic Tool Subscription and Publications (CPT, ICD10)
Request Tool	Hosting, Licensing, Support
Hardware	64 bit Laptops for Modelers Macbooks for Developers Primary Servers for Test and Production Backup Servers for Test and Production
Software	Microsoft Windows and Office Software Office Software for Macbooks

The background features a blue gradient with binary code (0s and 1s) scattered across it. In the lower half, there is a white line graph with circular markers and a vertical bar chart, suggesting data analysis or trends.

Why:

Benefits Attributable To Using KP HealthConnect®  
Including Enterprise Terminology Based On SNOMED CT

# Our quality of care is up



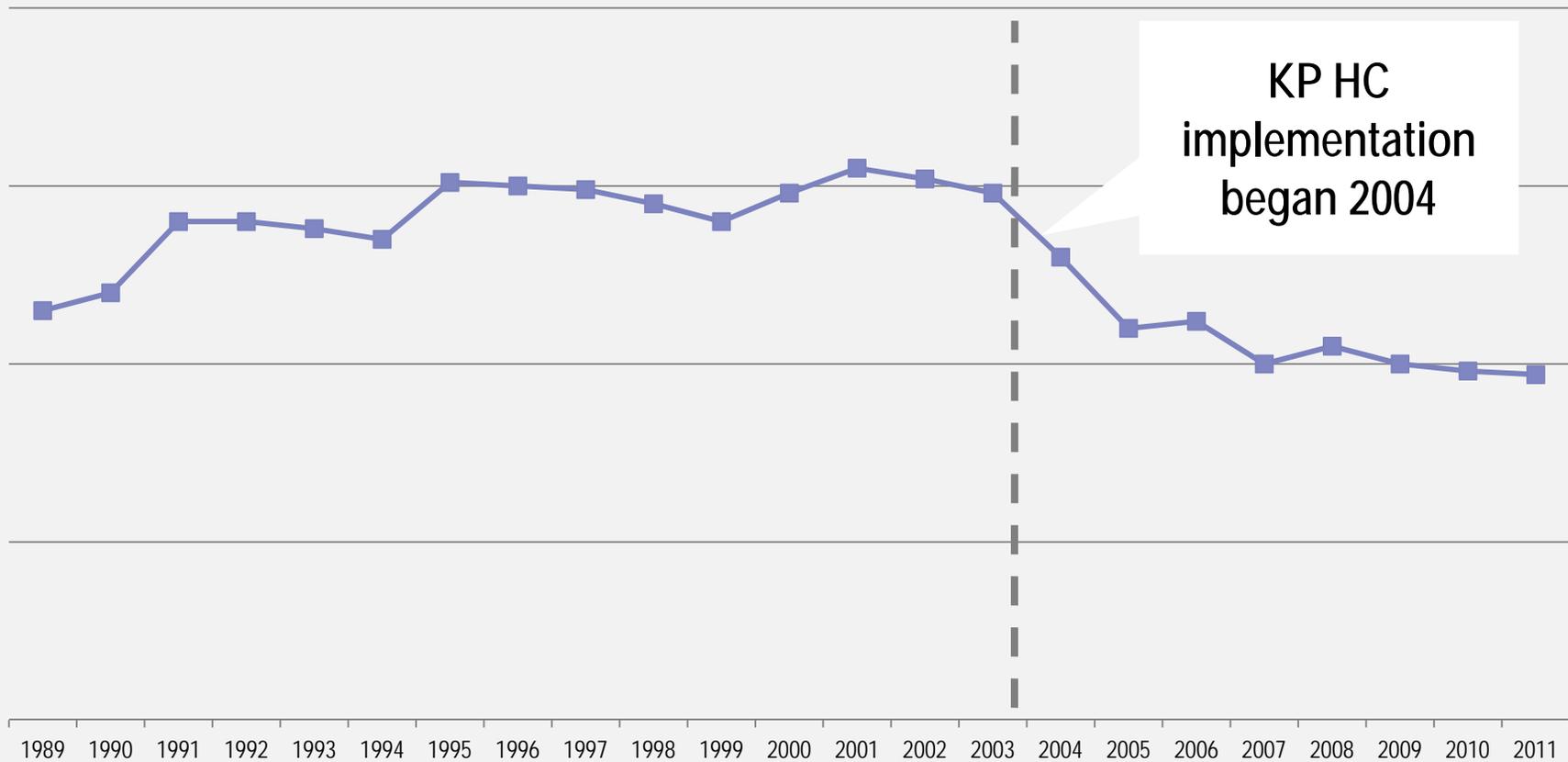
Note: Placement of current status and starting points approximate

HEDIS 2015 (Performance Year 2014)	HEDIS Composite	Diabetes Composite	Cardio Composite	Prevention Composite	Cervical Cancer Screening	Colorectal Cancer Screening
KP Programwide Rate	83.47%	84.96%	91.45%	87.28%	89.19%	83.43%
95th Percentile	82.25%	84.61%	88.58%	83.93%	84.23%	78.11%
90th Percentile	79.04%	81.87%	86.49%	80.43%	81.99%	73.73%
% above 95th Percentile	1.22%	0.35%	2.87%	3.34%	4.96%	5.33%

# ... and our malpractice cases are down.

As supported by KP HealthConnect.

## Professional Liability Claims Per 100,000 Members



# Taking accountability for patient populations

**KAISER PERMANENTE.**  
Demo Site

getting started | updates | FAQs | user guide | glossary | contact us

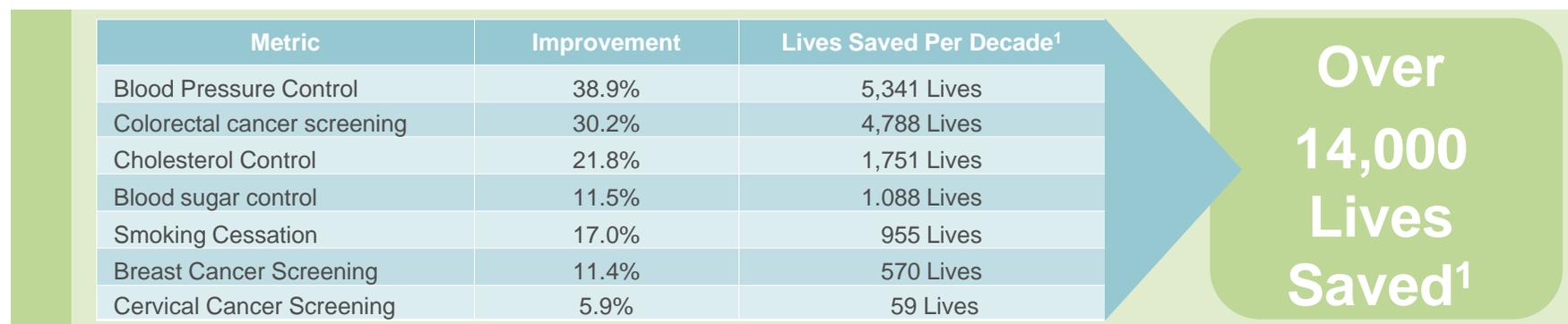
**The Panel Support Tool**

choose a provider | search / panel view | visit info | risk factors | logout

PCP: DEMO DOC Panel Size : 1158 Y Indicates in the registry

Report	MRN	NAME	Age	Sex	Prev	Gap	DM	CVD	CHF	HTN	CKD	Last Seen	Rev'd
<input type="checkbox"/>	000000027	DEMO27	76	F		20	Y				Y		3/23/2006

## Clinical Outcomes in Southern California



<sup>1/</sup> Based on NCOA Quality Dividend Calculator

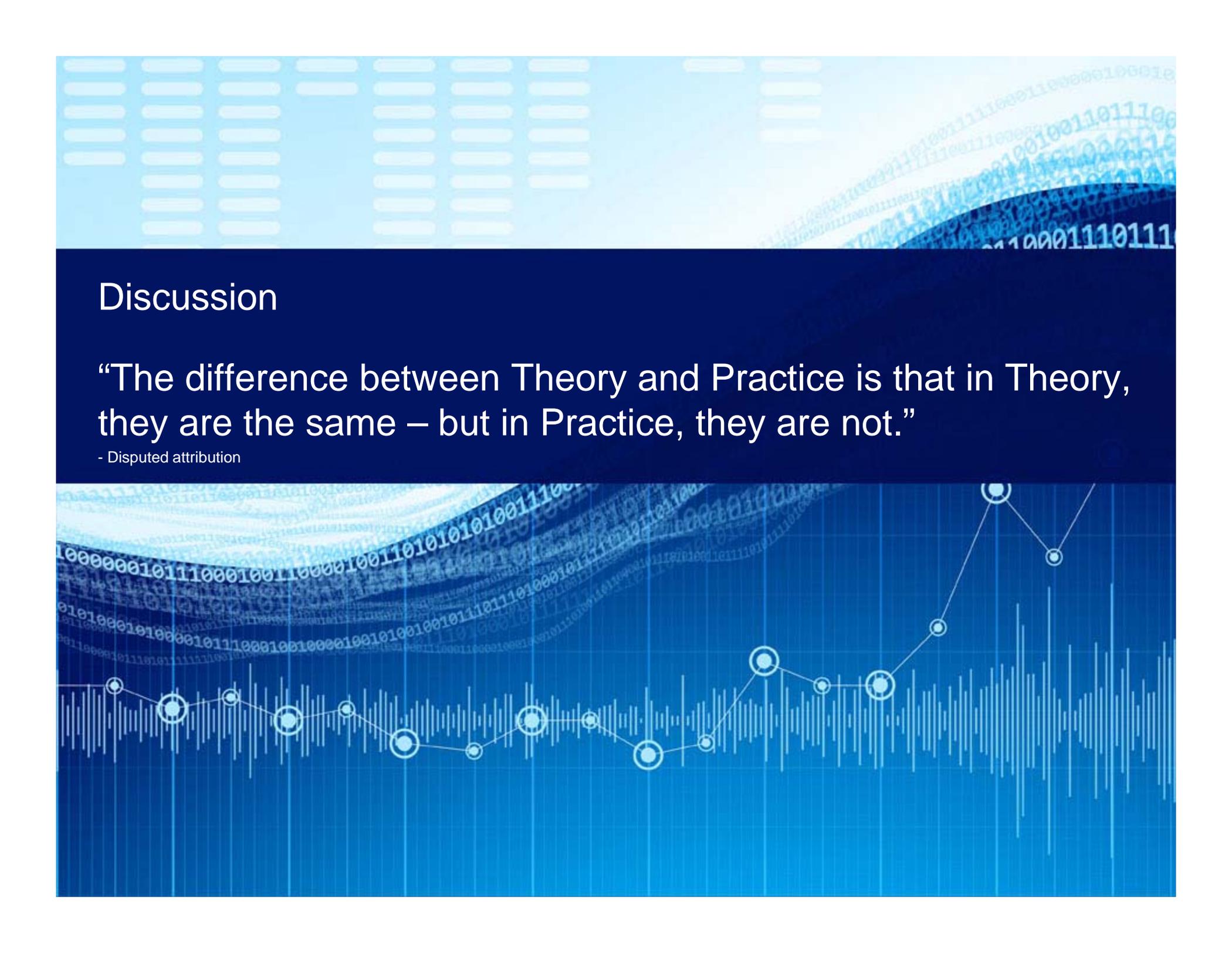
The background of the slide is a dark blue gradient. At the top, there are horizontal bands of binary code (0s and 1s) in a lighter blue color. Below this, there is a dark blue horizontal bar containing the text. At the bottom, there is a complex data visualization consisting of a line graph with circular markers and a bar chart with vertical lines of varying heights, all in a light blue color.

Why:

Benefits Directly Attributable To Using Enterprise Terminology Based On SNOMED CT

# Quality assessment and improvement proof point

- In 2015 Kaiser Permanente completed a production proof of concept using automated semantic technology (RDFox triple store using SPARQL with Datalog reasoning on SNOMED CT based logic model with simplified top level ontology) for the computation of diabetic control measures in a population of over 11,000 diabetic patients.
  - National Committee for Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) Comprehensive Diabetes Care (CDC) national standard measures include calculation of the diabetic population denominator, plus 10 different numerator measures of care management and control (e.g. HbA1c control, treatment for diabetic neuropathy, retinal eye exams, etc.).
- The semantic technology approach *cost a small fraction* of the traditional approach despite buying all new hardware and software. Significant *cost savings were proven*.
- The automated data extracts and semantic logic calculations captured different results, different patients, in the same population. Detailed reconciliation at the individual record level proved in *every case the new methods produced more accurate results*.
  - Calculations of each numerator captured differences ranging from <4% to >12% of the diabetic patients.
  - Significant improvement in quality measures can have an immediate effect on quality of care and health.
- *Publication* of this study is in the peer review and editorial review process.

The background of the slide is a dark blue gradient. At the top, there are horizontal bands of binary code (0s and 1s) in a lighter blue color. Below this, there are several curved, overlapping bands of binary code that create a sense of depth and movement. In the lower right quadrant, there is a white line graph with circular markers at each data point, set against a background of vertical white lines of varying heights, resembling a bar chart or a signal waveform.

## Discussion

“The difference between Theory and Practice is that in Theory, they are the same – but in Practice, they are not.”

- Disputed attribution