Dr. Kenneth W. Aschheim
Assistant Chief Forensic Odontologist
The Office of Chief Medical Examiner New York City
Chairman ADA JWG 10.12 On Forensic Odontology Informatics

Mr. Bradford Wing
Biometrics Standards Coordinator
NIST

ANSI NIST ITL:

Proposed Dental Forensic Data Supplement

January 30, 2013
NIST Headquarters
Gaithersburg, MD, USA

ANSI/NIST-ITL 1-2000

Data Interoperability

Before I Forget

ADA

Sharon Stanford

Gregory Zeller

NIST

Bradford Wing

THE CITY OF NEW YORK · OFFICE OF CHIEF MEDICAL EXAMINER ·

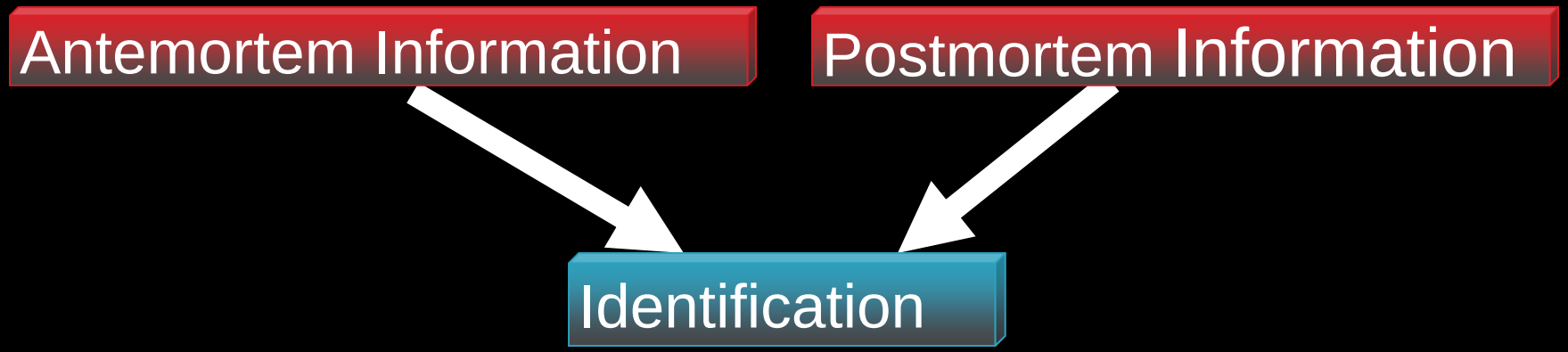
Frank DePaolo

Naeem Ullah

Balancing Act

Data Interoperability

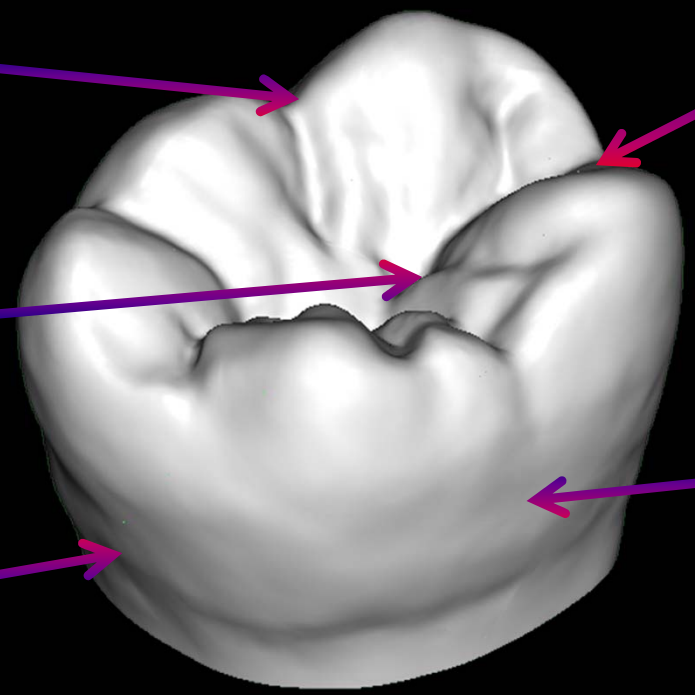
The Procedure



Odontology

- Ceramic Casing
- Highly Vascular
- Resistant to Crushing
- Resistant to Contamination
- Resistant to Heat
- Easy to find in Debris
- Good Source Of DNA

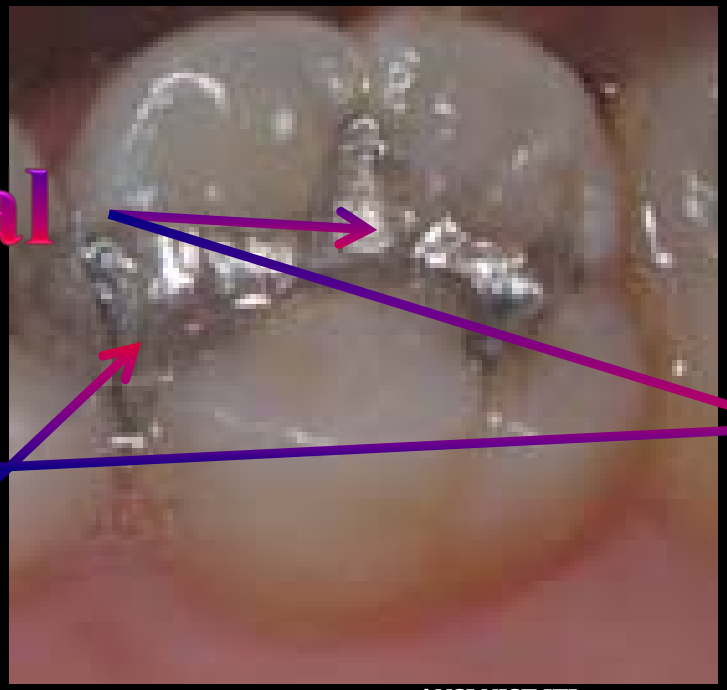
The Basics

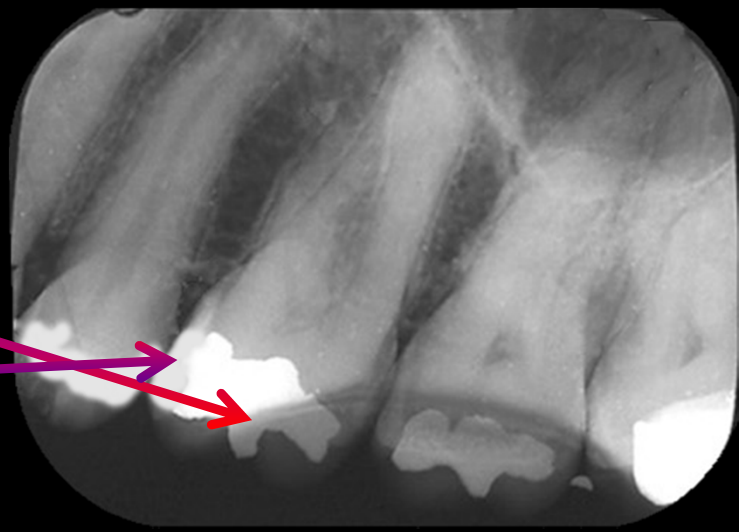


Why Is This Important

Occlusal

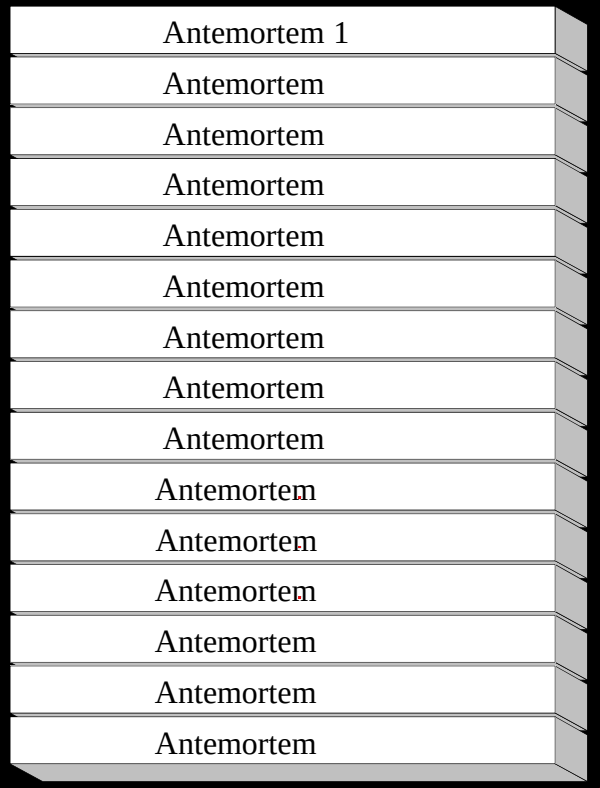
Mesial





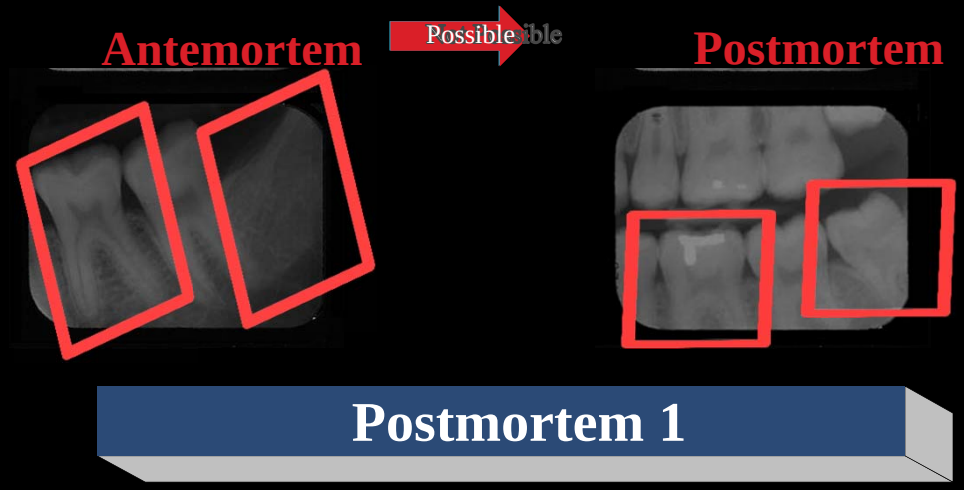
The Process (UDIM)

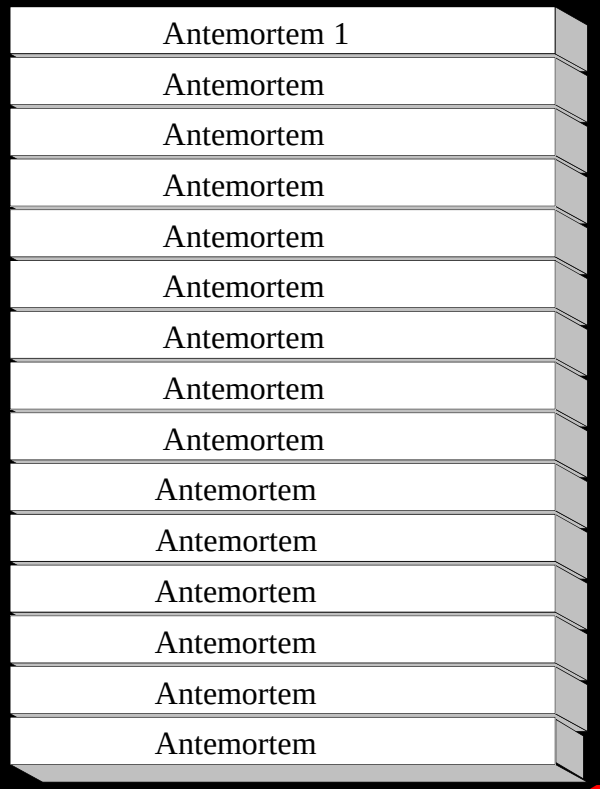
1. A Postmortem specimen is obtained and coded
2. Antemortem records are obtained and coded



The Process (UDIM)

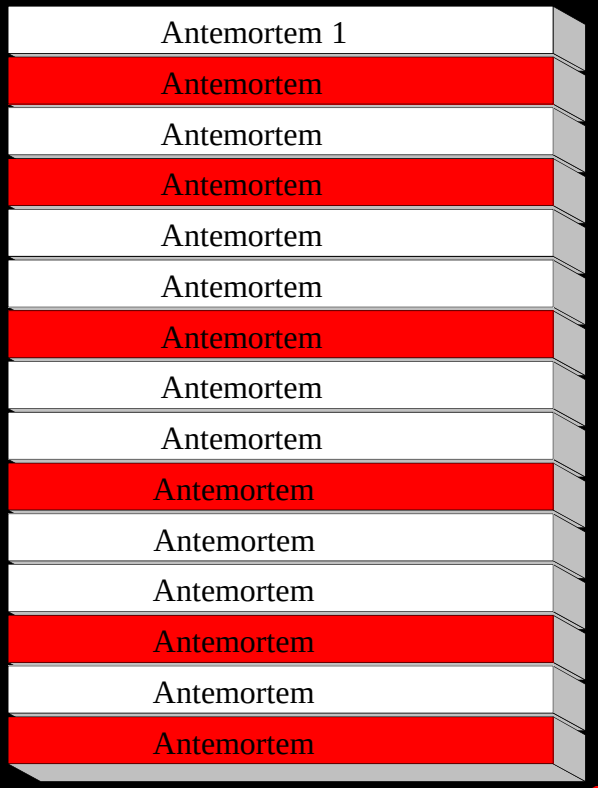
3. Check for Irreconcilable Discrepancies





The Process (UDIM)

4. Remove irreconcilable discrepancies



Postmortem 1

The Process (UDIM)

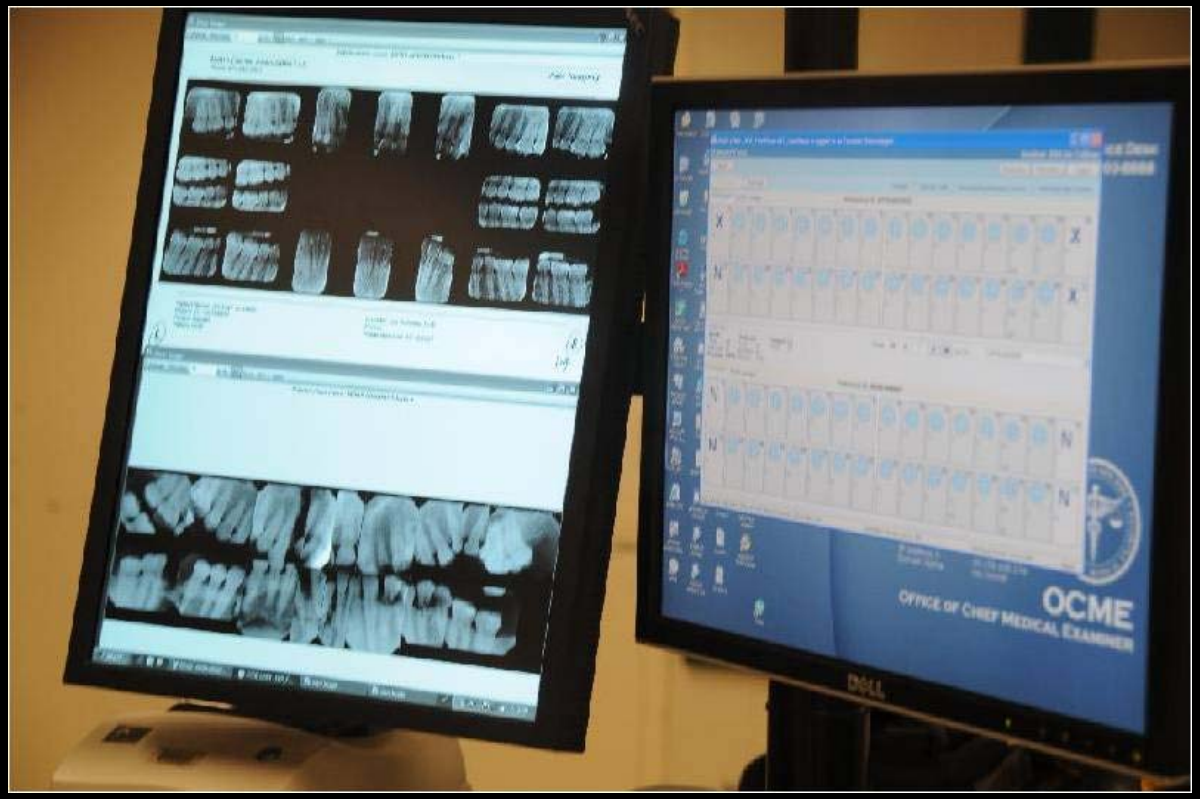
5. Rank data from most likely matches to least likely matches

Postmortem 1

L i k e l y

- Antemortem 1
- Antemortem 3
- Antemortem 5
- Antemortem 6
- Antemortem 5
- Antemortem 6
- Antemortem 3
- Antemortem 14
- Antemortem 12

Computer Data Review



Data Interoperability

HISTORY OF ADA COMMITTEE

History

- **Following 9/11 and Hurricane Katrina** the American Dental Association (ADA) realized the critical role play by Dentistry in the DVI Disaster process
- **Spring 2003** - ADA announces the formation of a Dental Forensic Committee
- **Fall 2006** ADA Meeting Las Vegas - Formal proposal placed before ADA Standards Committee for Dental Informatics (SCDI) which was approved
- **2006-2007** - Preliminary Seed documented created
- **September 2007** - First meeting of working group ADA -San Francisco
- **September 2007** - ADA round table on forensic odontology
- **February 2008** - Second meeting of working group

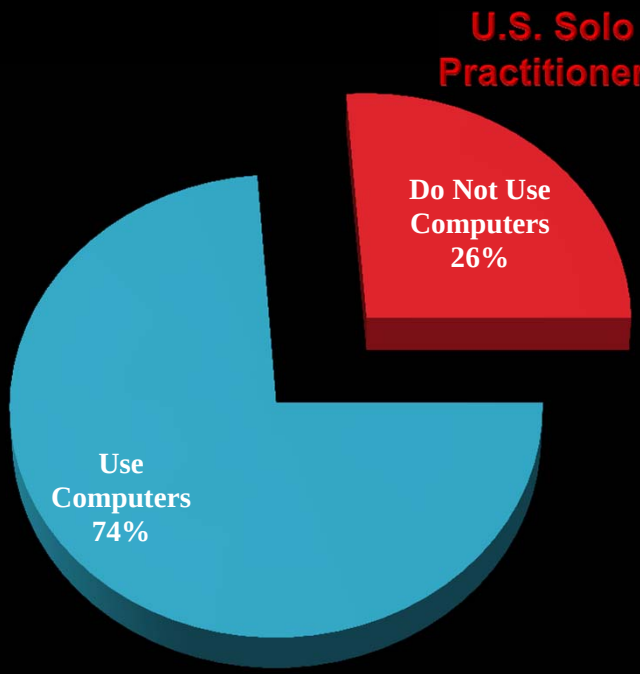
FAQ

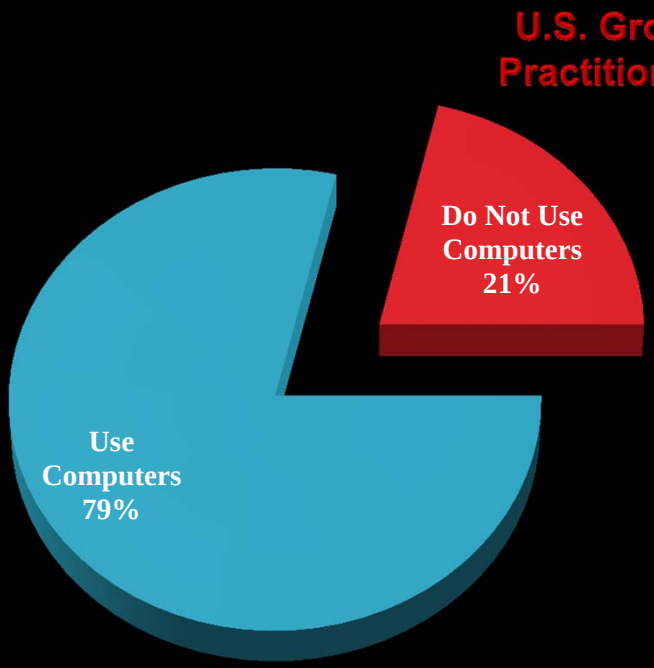
Question: Why are we doing this?

Answer: Electronic Health Records (EHR) have been mandated by The Department of Health and Human Services (HHS) by 2015. The creation of the National Health Information Infrastructure Initiative produce a three stage plan

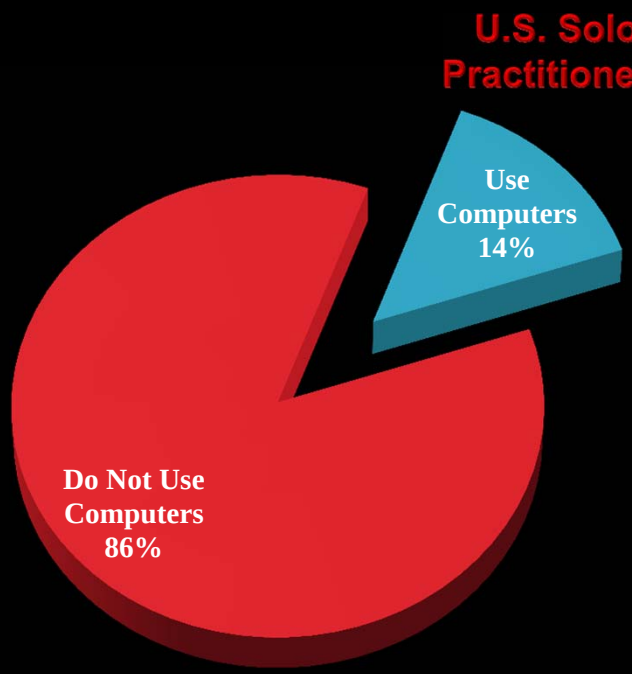
- Stage 1 - Development within (HHS) for blueprint for implementation and policy.
- Stage 2 - (5 years) focuses on building collaboration among stakeholders.
- Stage 3 - (10 years) involves carrying out the plan in all relevant public and private sectors.

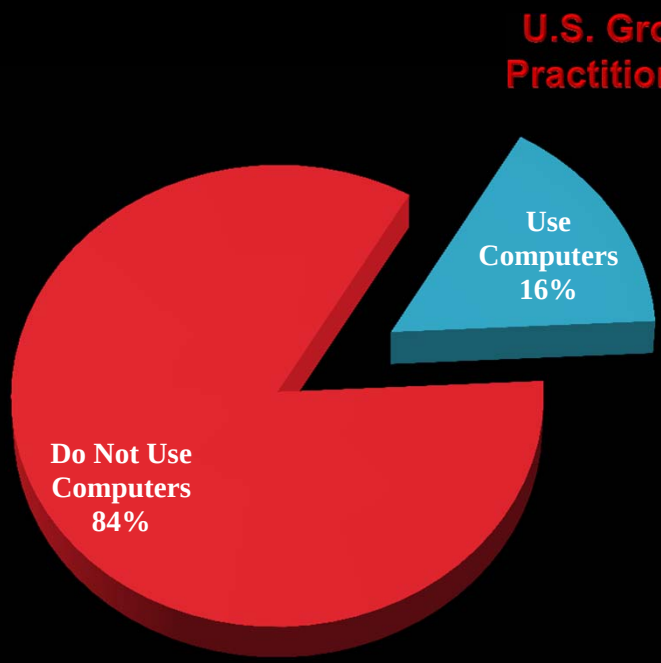
Computer Usage - Some Information





Computer Usage - All Information





How Can We Work Together?

The Goal

New Working Item Request - 2006

Specialty panel formed and Proposed a New ADA Specification No. 1058 - To formulate a new forensic dental data set of minimal and optional data that will aid in the determination of the identity of an unknown victim.


AMERICAN DENTAL ASSOCIATION WWW.ADA.ORG

ADANEWS

September 2007 VOLUME NO. 1

Forensics Panel Eyes Standard

BRIEFS

Sesquicentennial book: 150 Years of the American Dental Association: A Pictorial History, 1959-2009 is available for sale—with all proceeds going to the ADA Foundation.

The 200-page, 9-by-12-inch volume celebrates the ADA's sesquicentennial and tells the story of how dentistry and the Association have been intertwined during the past 15

The Situation When We Started

- The ADA non-forensic literate members wanted to know what information to collect
- The practice management software companies were interested in helping but did not know what to do
- The DICOM group were comfortable transferring images but wanted guidance on other metadata
- The forensic community wanted to be certain that they were part of the decision making process

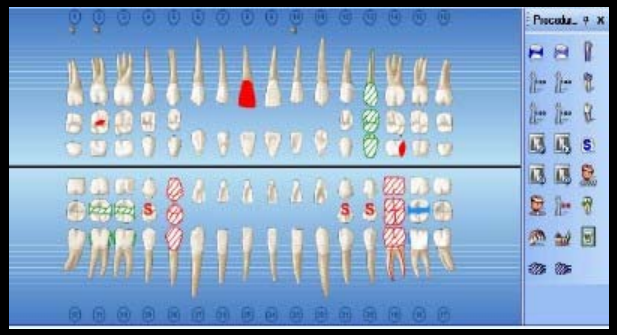
Committee Was Formed

BROAD CROSS-SECTION OF FORENSIC ODONTOLOGY

- Chairperson - Kenneth W. Aschheim, DDS
- ABFO - Bob Barsley, DDS ABFO
- AAFS - Thomas David, DDS ABFO
- ASFO - Ken Hermsen, DDS
- ACP and VA - Stephen Bergen, DDS
- A Ped D - Rhea M. Haugseth, DMD
- AGD - Jim Schneider DDS
- Ed - Mary Cimrmancic DDS
- AFIP - Duane R. Schafer, CAPT, DC, USN
- Pub Health - Robin Scheper, DMD
- Pub Health - Scott A. Trapp, DDS (ADA)
- Gov - NCIC (Gary L. Bell DDS)
- FBI-CJIS Cindy Johnston (observer)
- ME Odont - Lawrence Dobrin, DMD
- ME Radiology - Richard Weledniger, DDS
- ME Odont - Harry Zohn, DDS
- ME Anthropology - Donna Fontana, MS
- ADHA- Winnie Furnari, MS - Secretary
- Informatics - Mark Diehl, DDS
- Industry - Rad - Candy Ross, (Dexis)
- Industry - PMS - Zach Church, (Dentrix)
- Industry - Dianne Rose, (Insurance)
- ADA - Pamela Porembski, DDS
- ADA - Norman Schreiber, DDS
- ADA - Greg Zeller, DDS
- ADA - Sharon Sanford

Work Flow

Practice Management Software



Export

- Familial Data
- Dental History Data
- Tooth Data
- Mouth Information Data
- Radiographic Data
- Visual Image Data

Electronic Transfer

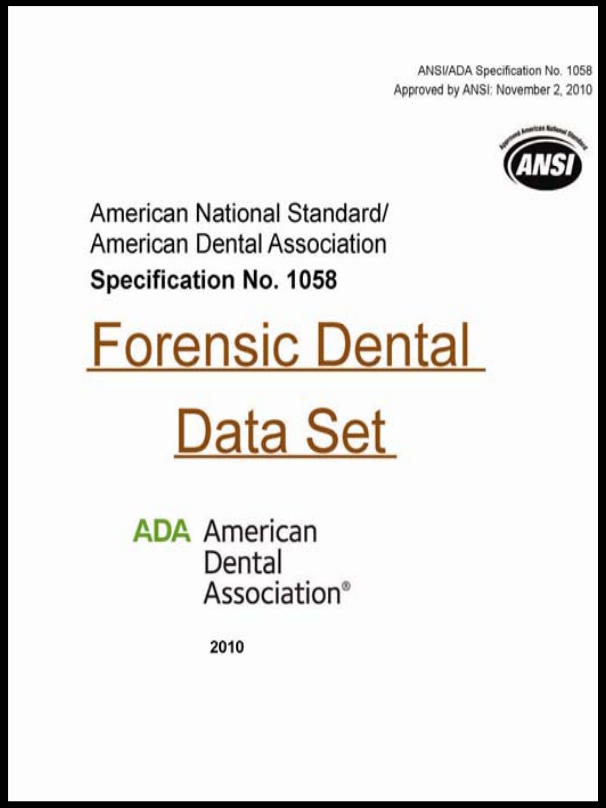
Forensic Management Software

plass data

James McGivney, DMD
WinID3
for Windows

Import

Current Status



Forensic Dental Data Dictionary

Data Set Final Draft

Of Harmonized Terms and Definitions

APPROVED By ANSI

Nov-Dec 2010

Officially Known as ANSI Standard 1058

November 16th 20[illegible]ft Spec. 1067

November 16, 2011

SCDI Working Group Ballot
PROPOSED SPECIFICATION 1067 FOR STANDARD FUNCTIONAL REQUIREMENTS OF AN ELECTRONIC RECORD SYSTEM FOR GENERAL DENTISTRY

Version 0.89
DRAFT for TASK GROUP REVIEW ONLY
NOT FOR DISTRIBUTION

This is a draft document for review only. This document has not been approved by the ADA or ANSI and is not an American National Standard.

Please use the comment template provided with this draft to enter your comments.

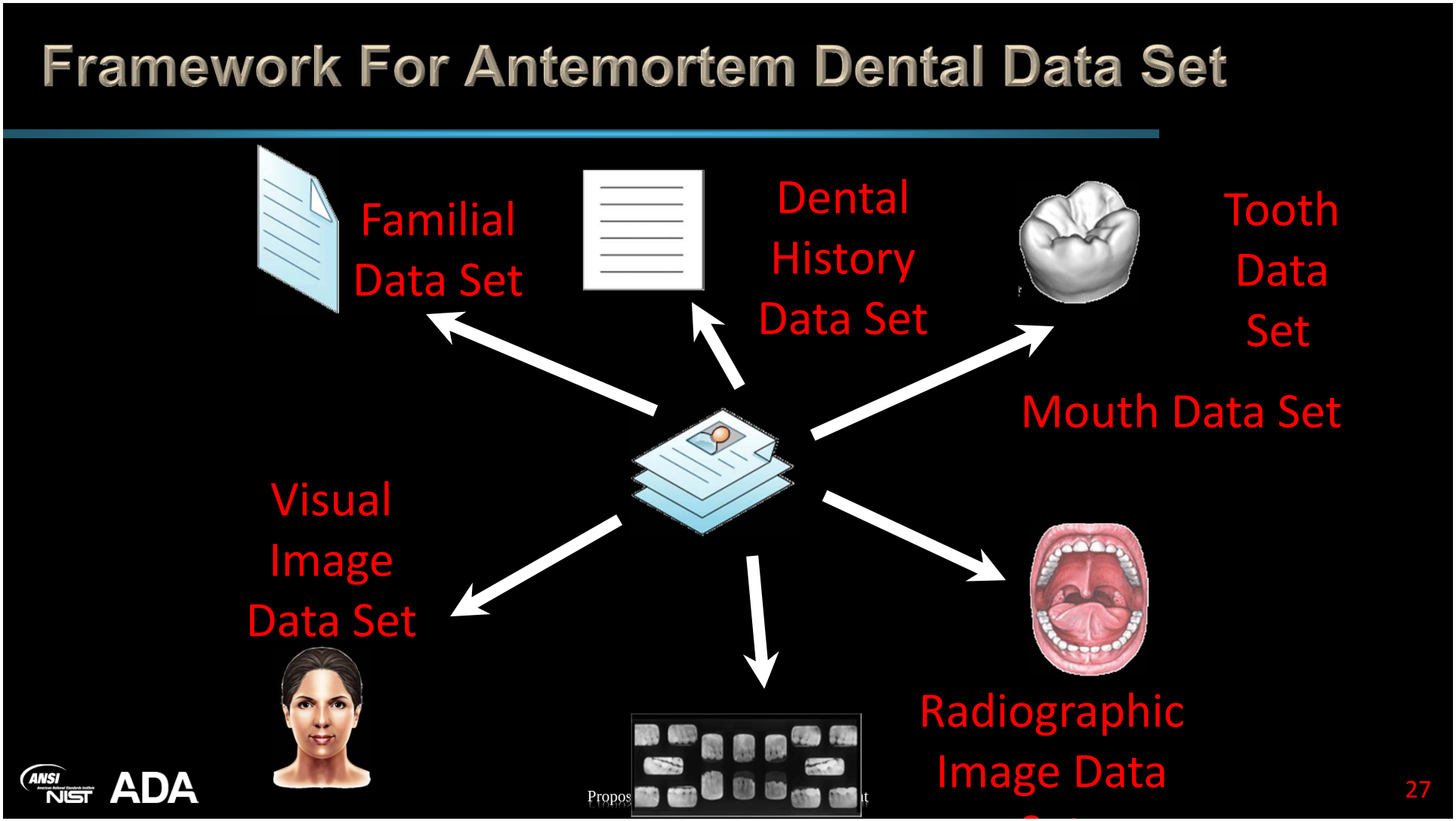
Send any questions to:
Paul Bralower - bralowerp@ada.org
or Mark Diehl – markfdata@aol.com

Requirement 2.32

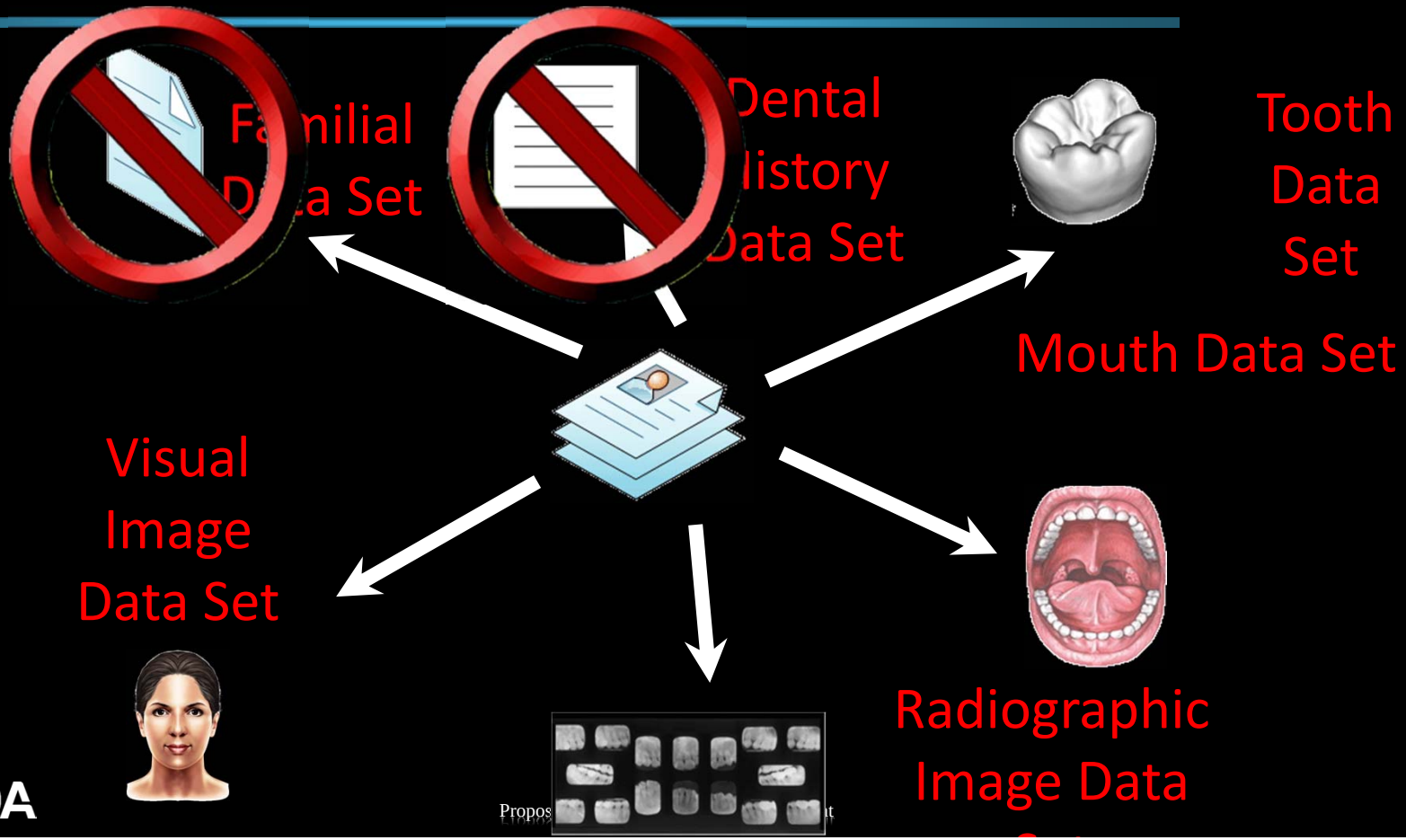
The electronic dental system SHALL have the ability to reference the forensic dental data set, e.g., ANSI-ADA [illegible]cification 1058

Data Interoperability

Framework For Antemortem Dental Data Set



Framework For Postmortem Dental Data Set



Review Of ADA Document

Familial Data Set - Dr. Dobrin

Familial Data Set

- 7.1 **Personal Data**
  - 7.1.7 **Sex**
    - 7.1.7.1 **Male** - This Descriptor should be used when the patient's legally recognized sex is known to be male.
    - 7.1.7.2 **Female**
    - 7.1.7.3 **Unknown**
  - 7.1.8.1 **Address Line 1**
  - 7.1.8.2 **Address Line 2**
  - 7.1.8.3 **Address Line 3**
  - 7.1.8.4 **Address Line 4**
  - 7.1.8.5 **City**
  - 7.1.8.6 **State** - This Descriptor should be used to describe the name of the state of the last current legal address used by the patient.
  - 7.1.8.7 **Zip (Postal code)**
  - 7.1.8.8 **Country**
- 7.2 **Occupation**
  - 7.2.1.1 **Name**
  - 7.2.1.2 **Address**
  - 7.2.1.3 **Office Telephone Number**
  - 7.2.1.4 **Office Fax Number**
  - 7.2.1.5 **Office Mobile Telephone Number**
  - 7.2.1.6 **Office Pager Number** - This Descriptor should be used to describe the last known area code and pager telephone number of the last known employer of the patient. If the number is a non-U.S. number, the Country code shall be included.
  - 7.2.1.7 **Office Email Address**
  - 7.2.1.8 **Employment Start Date**
  - 7.2.1.9 **Employment Completion Date**
- 7.3 **Dental Insurance Information (Multiple Iterations Allowed)**
  - 7.3.1.1 **Name**
  - 7.3.1.2 **Address**
  - 7.3.1.3 **Office Telephone Number**
  - 7.3.1.4 **Office Fax Number**
  - 7.3.1.5 **Office Email Address** - This Descriptor should be used to describe the last known email address of any Dental Insurance Carrier of the patient.
  - 7.3.1.6 **Patient Identification Number**
  - 7.3.1.7 **Group Information**

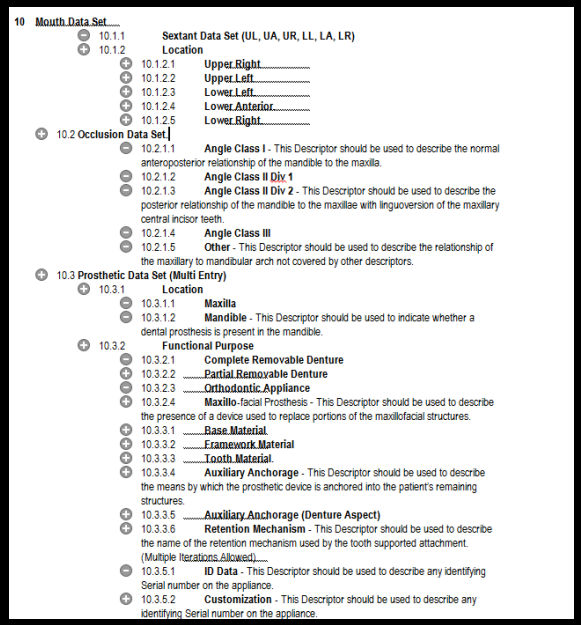
Tooth Data Set - Dr. Aschheim

- 9 Tooth Data Set
  - 9.2 **Date of Information**
  - 9.3 **Status**
    - 9.3.1 **Tooth Type**
      - 9.3.1.1 **Deciduous**
      - 9.3.1.2 **Succedaneous**
      - 9.3.2.1 **Missing - Replaced** - This Descriptor should be used if a part of the tooth has been replaced. This descriptor may not be used alone and requires a descriptor below. If no descriptor may describe may be found for the restoration seen then the "Other - (By Report)" descriptor should be used.
      - 9.3.2.2 **Missing Not Replaced**
      - 9.3.2.3 **Present - Unrestored Erupted (Virgin)**
      - 9.3.2.4 **Present - Unerupted**
      - 9.3.2.5 **Present - Restored**
      - 9.3.2.6 **Retained Root**
      - 9.3.2.7 **Other Tooth Condition- (By Report)** - This Descriptor should be used to describe a tooth that is not describe by other descriptors.
      - 9.4.1.1 **Cementoma**
      - 9.4.1.2 **Periapical Pathology** - This Descriptor should be used to describe a distinct dental radiolucency of any origin that is present on the apical segment of a dental tooth, implant residual root or edentulous area where any of those structures were previously present.
      - 9.4.1.3 **Fistulous Tract**
      - 9.4.2.1 **Mild** - This Descriptor should be used if a tooth shows radiographic loss of the supporting structure of the tooth as measured from the CEJ of 3 millimeters or more of attachment loss and 4 millimeters or more of pocket depth (adapted from NIH Definition).
      - 9.4.2.2 **Moderate**
      - 9.4.2.3 **Severe / Excess Bone Loss** - This Descriptor should be used if a tooth shows radiographic loss of the supporting structure of the tooth as measured from the CEJ of 5 millimeters or more of attachment loss and 6 millimeters or more of pocket depth (adapted from NIH Definition).
      - 9.4.2.4 **Bone Graft**
      - 9.4.2.5 **Calculus** - This Descriptor should be used if the final available radiographic of the tooth shows evidence of calculus.
      - 9.4.2.6 **Splinted to Adjacent teeth**

Review Of ADA Document

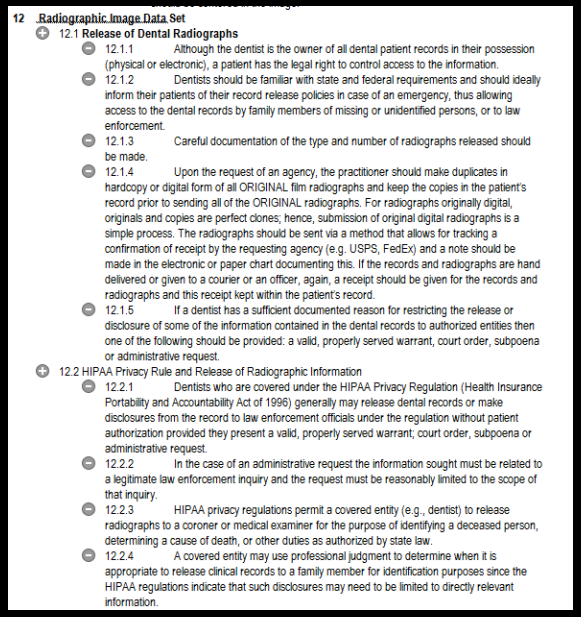
Winnie Furnari RDH
Secretary

Mouth Data Set - Dr. Zohn, Dr. Dashkow



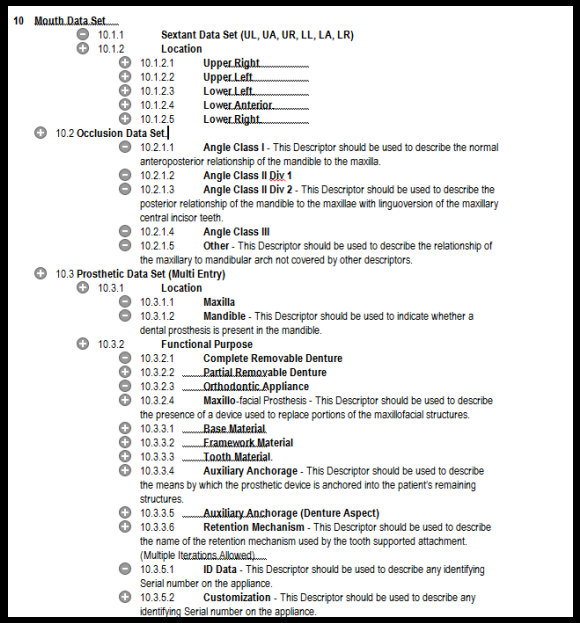
10 Mouth Data Set
- 10.1.1 **Sextant Data Set (UL, UA, UR, LL, LA, LR)**
- 10.1.2 **Location**
  - 10.1.2.1 **Upper Right**
  - 10.1.2.2 **Upper Left**
  - 10.1.2.3 **Lower Left**
  - 10.1.2.4 **Lower Anterior**
  - 10.1.2.5 **Lower Right**
- 10.2 **Occlusion Data Set**
  - 10.2.1.1 **Angle Class I** - This Descriptor should be used to describe the normal anteroposterior relationship of the mandible to the maxilla.
  - 10.2.1.2 **Angle Class II Div 1**
  - 10.2.1.3 **Angle Class II Div 2** - This Descriptor should be used to describe the posterior relationship of the mandible to the maxillae with linguoversion of the maxillary central incisor teeth.
  - 10.2.1.4 **Angle Class III**
  - 10.2.1.5 **Other** - This Descriptor should be used to describe the relationship of the maxillary to mandibular arch not covered by other descriptors.
- 10.3 **Prosthetic Data Set (Multi Entry)**
  - 10.3.1 **Location**
    - 10.3.1.1 **Maxilla**
    - 10.3.1.2 **Mandible** - This Descriptor should be used to indicate whether a dental prosthesis is present in the mandible.
  - 10.3.2 **Functional Purpose**
    - 10.3.2.1 **Complete Removable Denture**
    - 10.3.2.2 **Partial Removable Denture**
    - 10.3.2.3 **Orthodontic Appliance**
    - 10.3.2.4 **Maxillo**-facial Prosthesis - This Descriptor should be used to describe the presence of a device used to replace portions of the maxillofacial structures.
      - 10.3.3.1 **Base Material**
      - 10.3.3.2 **Framework Material**
      - 10.3.3.3 **Tooth Material**
      - 10.3.3.4 **Auxiliary Anchorage** - This Descriptor should be used to describe the means by which the prosthetic device is anchored into the patient's remaining structures.
      - 10.3.3.5 **Auxiliary Anchorage (Denture Aspect)**
      - 10.3.3.6 **Retention Mechanism** - This Descriptor should be used to describe the name of the retention mechanism used by the tooth supported attachment. (Multiple Iterations Allowed)
        - 10.3.5.1 **ID Data** - This Descriptor should be used to describe any identifying Serial number on the appliance.
        - 10.3.5.2 **Customization** - This Descriptor should be used to describe any identifying Serial number on the appliance.

Radiographic Data Set - Dr. Weledniger



12 Radiographic Image Data Set
- 12.1 **Release of Dental Radiographs**
  - 12.1.1 Although the dentist is the owner of all dental patient records in their possession (physical or electronic), a patient has the legal right to control access to the information.
  - 12.1.2 Dentists should be familiar with state and federal requirements and should ideally inform their patients of their record release policies in case of an emergency, thus allowing access to the dental records by family members of missing or unidentified persons, or to law enforcement.
  - 12.1.3 Careful documentation of the type and number of radiographs released should be made.
  - 12.1.4 Upon the request of an agency, the practitioner should make duplicates in hardcopy or digital form of all ORIGINAL film radiographs and keep the copies in the patient's record prior to sending all of the ORIGINAL radiographs. For radiographs originally digital, originals and copies are perfect clones; hence, submission of original digital radiographs is a simple process. The radiographs should be sent via a method that allows for tracking a confirmation of receipt by the requesting agency (e.g. USPS, FedEx) and a note should be made in the electronic or paper chart documenting this. If the records and radiographs are hand delivered or given to a courier or an officer, again, a receipt should be given for the records and radiographs and this receipt kept within the patient's record.
  - 12.1.5 If a dentist has a sufficient documented reason for restricting the release or disclosure of some of the information contained in the dental records to authorized entities then one of the following should be provided: a valid, properly served warrant, court order, subpoena or administrative request.
- 12.2 HIPAA Privacy Rule and Release of Radiographic Information
  - 12.2.1 Dentists who are covered under the HIPAA Privacy Regulation (Health Insurance Portability and Accountability Act of 1996) generally may release dental records or make disclosures from the record to law enforcement officials under the regulation without patient authorization provided they present a valid, properly served warrant; court order, subpoena or administrative request.
  - 12.2.2 In the case of an administrative request the information sought must be related to a legitimate law enforcement inquiry and the request must be reasonably limited to the scope of that inquiry.
  - 12.2.3 HIPAA privacy regulations permit a covered entity (e.g., dentist) to release radiographs to a coroner or medical examiner for the purpose of identifying a deceased person, determining a cause of death, or other duties as authorized by state law.
  - 12.2.4 A covered entity may use professional judgment to determine when it is appropriate to release clinical records to a family member for identification purposes since the HIPAA regulations indicate that such disclosures may need to be limited to directly relevant information.

Image Data Set - Dr. Benjamin



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FAQ - ANSI-ADA 1058

Question: Why is the purpose of the Descriptors?

Answer: The purpose of the descriptors is to be certain that we are all talking the "same language"

FAQ - ANSI-ADA 1058

Question: How does it do this?

Answer: By proving a non-ambiguous description for most descriptors and giving an explanation to make sure it is applied in a consistent manner

FAQ - ANSI-ADA 1058

Question: Can you give an example?

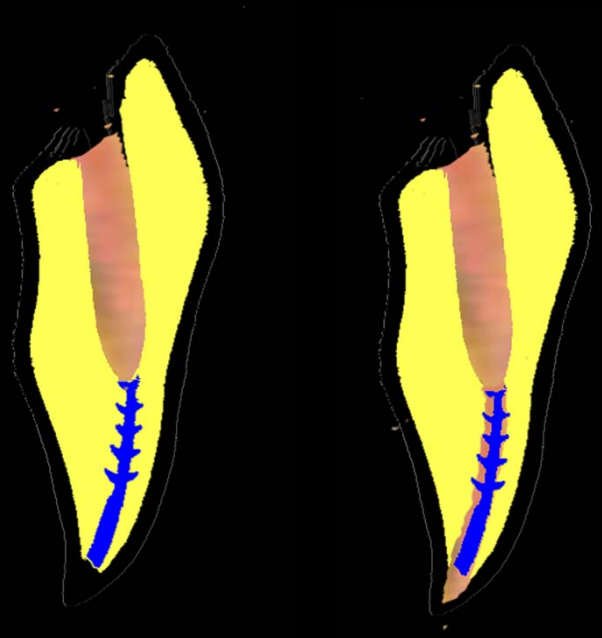
Answer: Something as simple as a name can be ambiguous. What about nicknames, maiden names etc.. so

> "Name - This Descriptor is used to describe the legal name of the patient as it would appear on official (government) documents."
>
> "Common Name Alias ("Nickname ") - This Descriptor should be used to describe a preferential name the patient uses."

FAQ - ANSI-ADA 1058

Question: How about a simple dental example?

Answer: "Broken Instrument - This descriptor is used to describe endodontic therapy in which one or more canals were obturated with any device that was accidentally separated during endodontic therapy. This descriptor can be used regardless of where any additional obturation materials coexist in the same or other canals of the tooth."



FAQ - ANSI-ADA 1058

Question: How about another example?

Answer:

"Prefabricated Abutment - This descriptor is used to describe a connection to an implant that is a manufactured component usually made of machined high noble metal, titanium, titanium alloy or ceramic. This abutment is usually produced by an implant manufacturer and is patient independent. This descriptor can be used even if the abutment has been modified for use. This abutment attaches to a single implant and supports a single crown."

"Custom Abutment - This descriptor is used to describe a connection to an implant that is a fabricated component, usually by a laboratory, specific for an individual application. A custom abutment is typically fabricated using either a casting process or milling process and includes computer milled abutments. This descriptor can be used regardless of the type of material utilized. This abutment attaches to a single implant and supports a single crown."

FAQ - ANSI-ADA 1058

Question: Is there a comparable document that the ADA has?

Answer: Yes the CDT codes

FAQ - ANSI-ADA 1058

Question: So why are there so many codes?

Answer: If a Descriptor is missing there will be no way to electronically transfer a certain characteristic from one piece of software to another

FAQ - ANSI-ADA 1058

Question: Does the ADA really expect us to use all these codes?

Answer:

- The ADA is not trying to reinvent the wheel
- The ADA is not creating a new coding system
- The ADA is not mandating anything to anyone
- The ADA is trying to give you the means to communicate but is not telling you how much to communicate

FAQ - ANSI-ADA 1058

Question: What About NCIC NamUs and Other Government Agencies?

Answer: They have agreed to work with us by reviewing the documents. As with any agency they are will be free to use the standard if they choose

FAQ - ANSI-ADA 1058

Question: So what is next?

Answer : Integration into ANSI- NIST ITL

Data Interoperability

ANSI-NIST ITL 2011

This standard defines the content, format, and units of measurement for the electronic exchange of …….. forensic information that may be used in the identification or verification process of a subject.

Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information

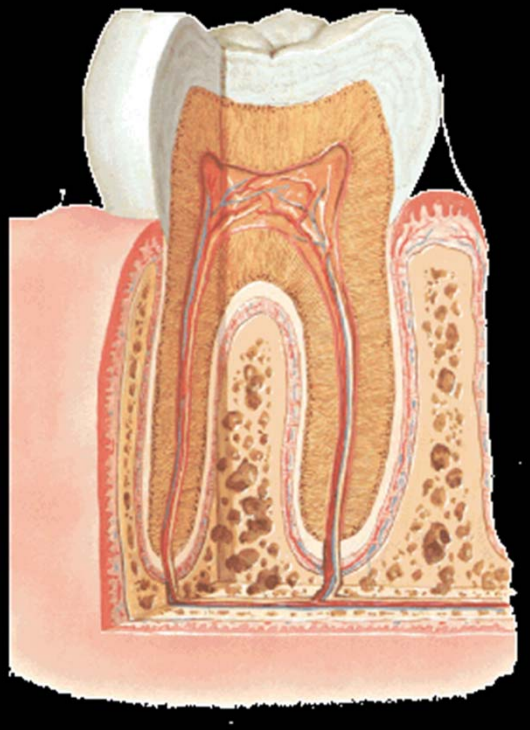
Purpose

- Standardizes data communication between law enforcement, criminal justice and other organizations
- Process biometric data
- Use the standard to exchange identity data
- Examples
  - Fingerprints, Palmprints and Plantars Prints
  - Faces, iris other body parts including scars, marks and tattoos (SMT).

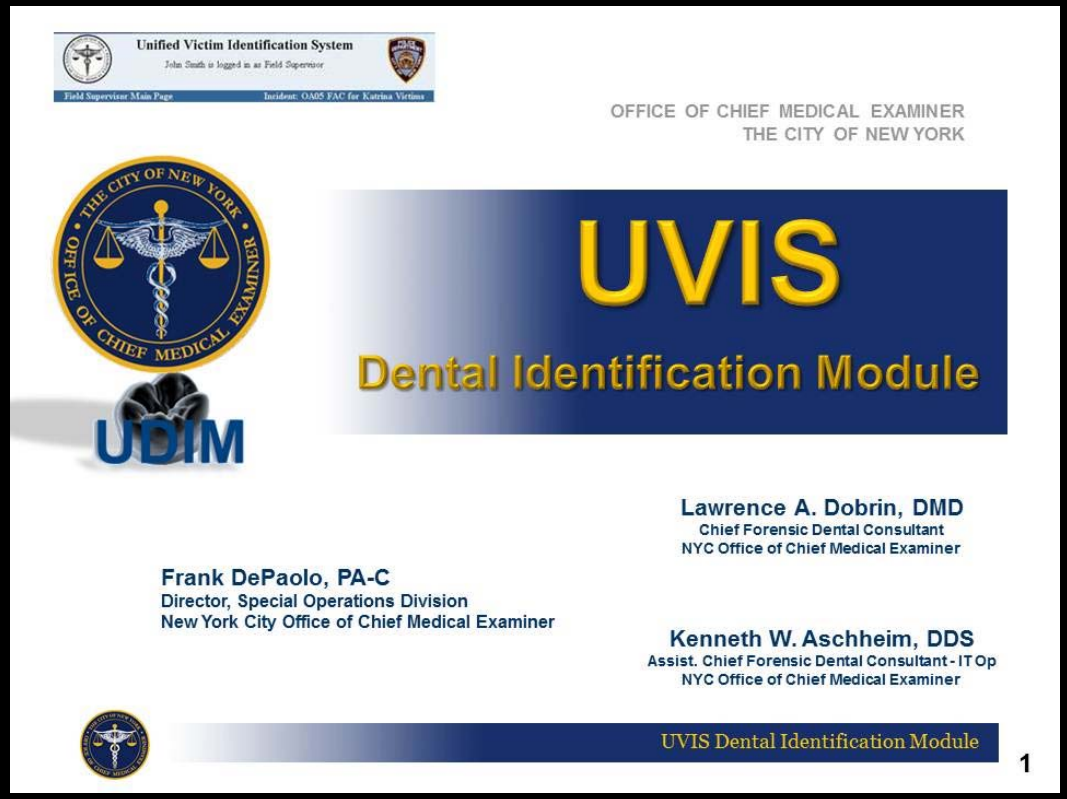
ANSI / NIST-ITL 1-2011

- Type 1 - Defines the transaction
- Type 2 - Identification And Descriptive
- Type 4,9,13,14,15 - Fingerprint
- Type 7 - Temporary field
- Type 8 - Signature data.
- Type 10 - Image data
- Type 12 - Dental Data
- Type 16 - Miscellaneous images
- Type 17 - Iris image data.
- Type 18 - DNA and related data
- Type 20 - Parts of records
- Type 21 - Audio / visual recording

New Data Type

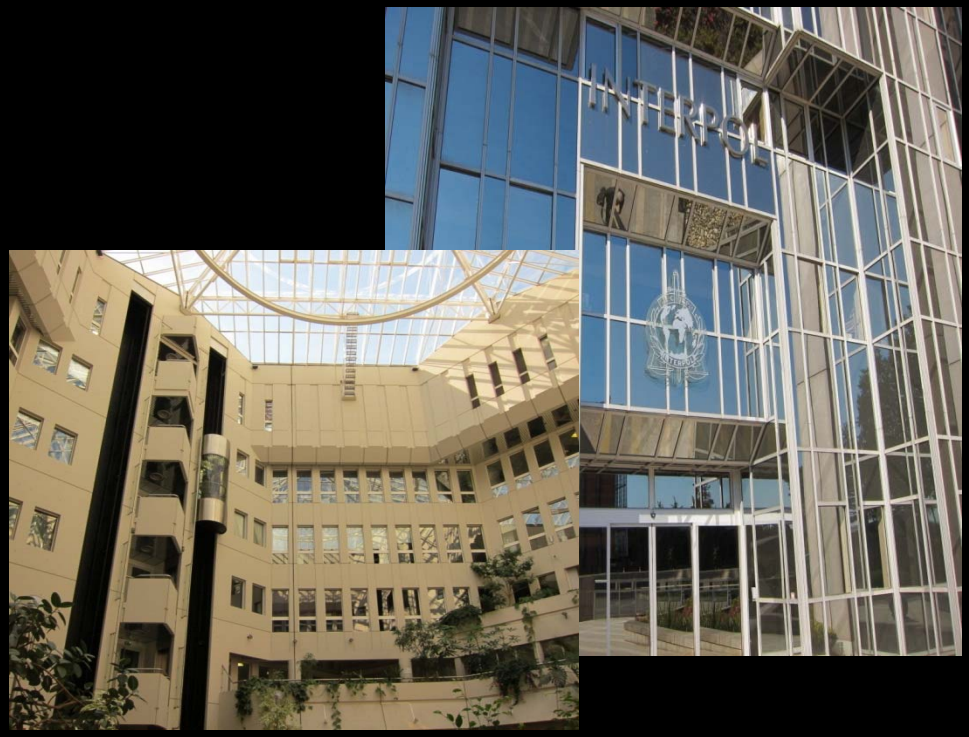


Winter 2011 Interoperability Discussion

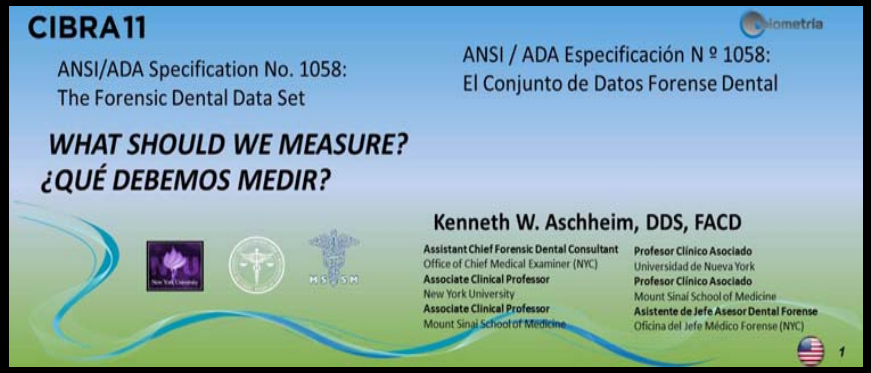


Lyon June 2011

- Met with Interpol DVI Odontology Section
- Discussion with Dr. Alain Middleton and René Pele of Plass Data
- Tentative agreement to review data compatibility
- Project critical to worldwide success of data transference



CIBRA 2011



- Discussion with Dr. Virginia Kannemann and Pedro Janices concerning the standard
- Possible expansion to other dental forensic data (i.e. bitemarks)

Data Interoperability

Forensic Odontology Standard

Face, Other Body Part, Or Scar, Mark, Tattoo (SMT) Image Record

Dental And Oral Data

Associated Context Data

ANSI / NIST-ITL 1-2011

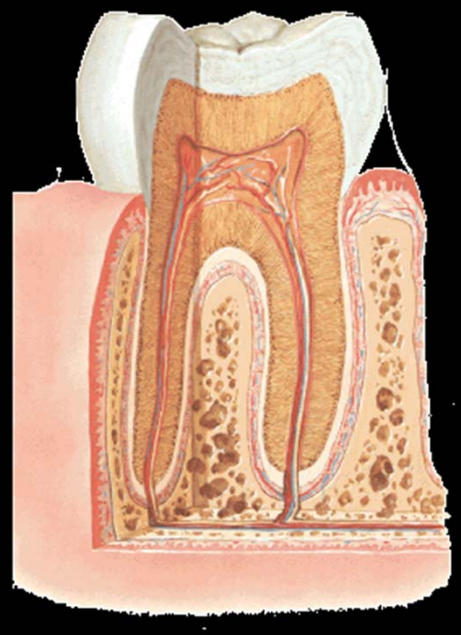
Type 10 - Image data

- Any IMAGE (and metric data) of a human body part
  - X-rays, MRI, Cat Scans, Cone Beam, DICOM
  - Images of the human teeth. Lips etc.
- Suspected pattern injuries of intraoral origin on humans
- Suspect latent images of perioral or intraoral origin on a human body

ANSI / NIST-ITL 1-2011

Type 12 - Dental data

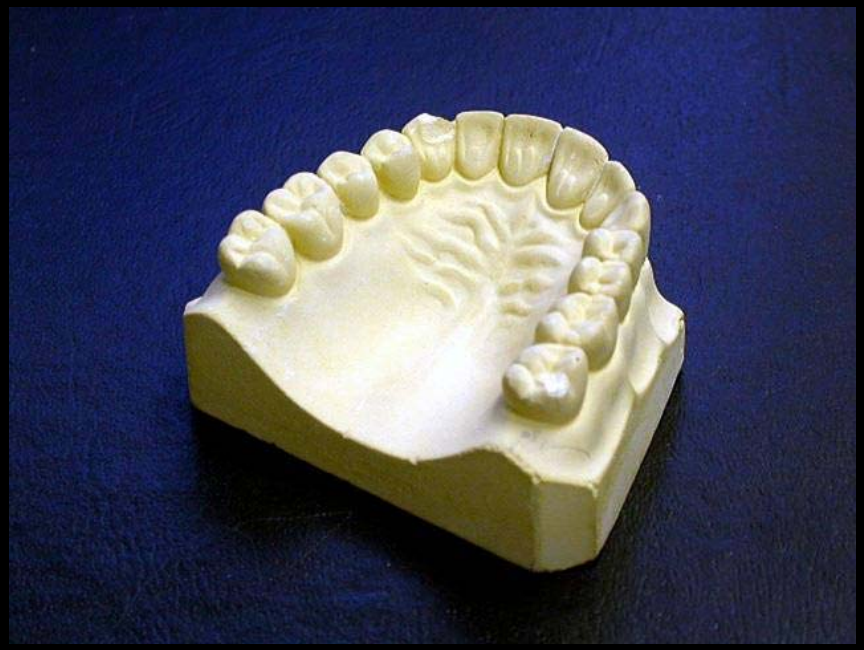
- Dental and Oral Comparison Data



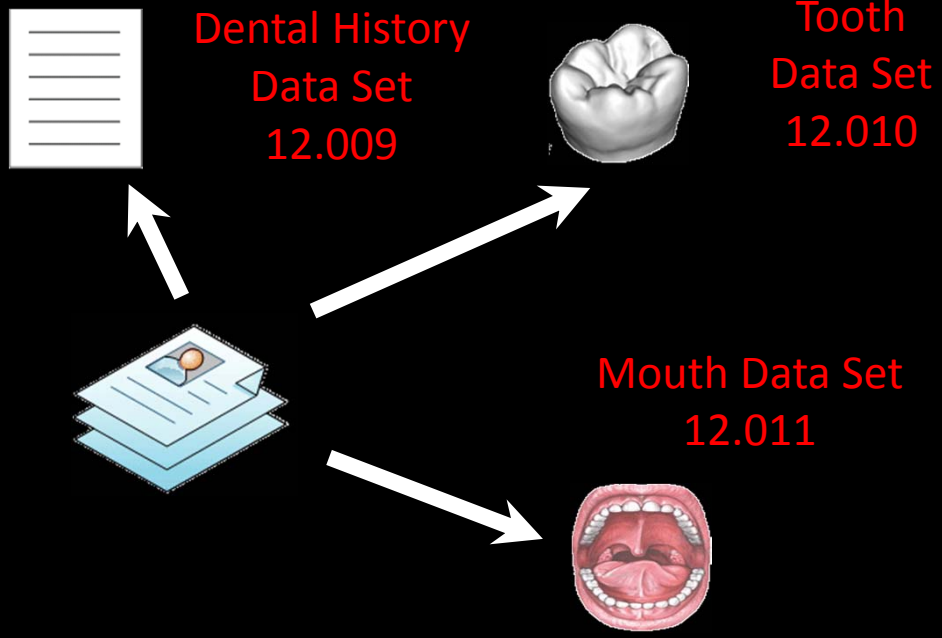
ANSI / NIST-ITL 1-2011

Type 21 - Associated Context

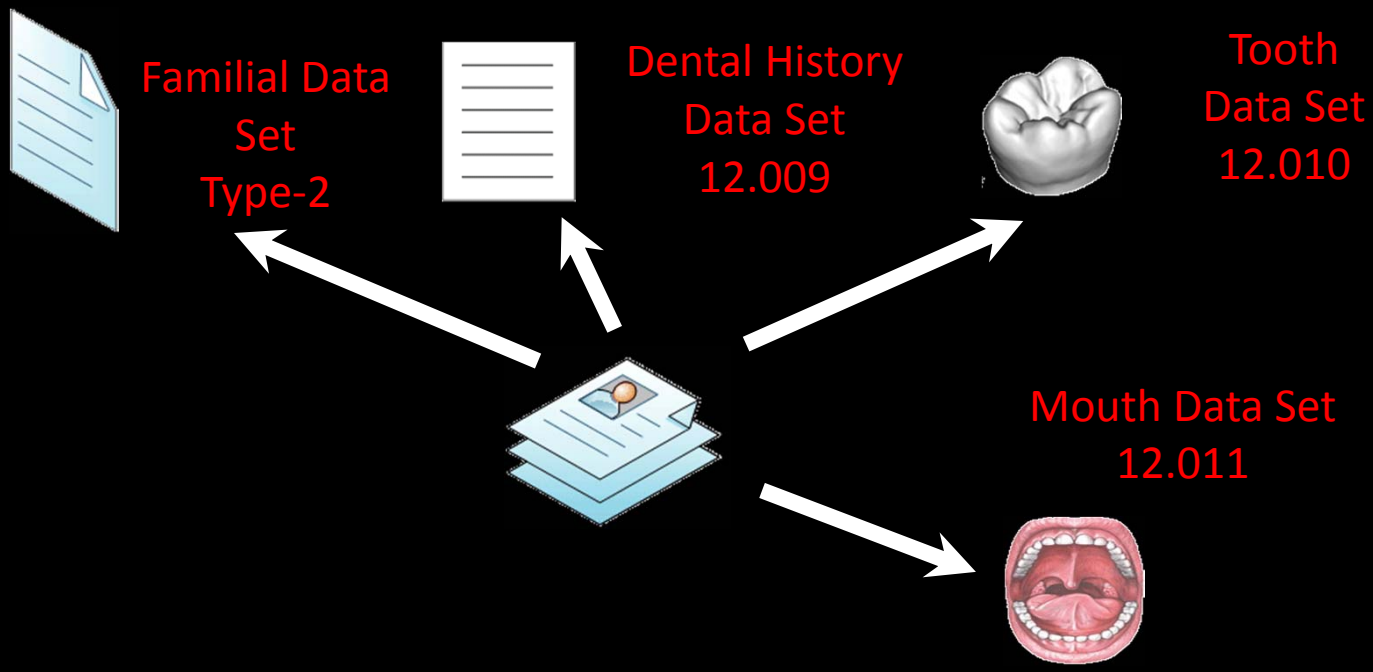
- Images (any type) and other examination data on non-human objects or animals.
- Data concerning
  - casts and molds of impressions in skin or objects,
  - locations of those casts and molds
  - identification markers (such as barcode information, etc..).
- There are no changes required to the Type-21 record



Type 12 Records



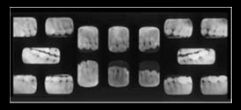
Type 2 Records



Type 2 Records

Familial Data Set Type-2

Visual Image Data Set Type 10



Radiographic Image Data Set Type 10

FAQ - ANSI-NIST ITL

Question: Why are there three data types?

Answer : The dental supplement needs to fit within the framework of the previous ANSI-NIST Standard

FAQ - ANSI-NIST ITL

Question: But wait you said images can go into both Type 10 and Type 21 records what is the difference?

Answer : Type 10 data deals with images that originated from humans or is on a human . All other images are Type 21 images.

FAQ - ANSI-NIST ITL

Question: Ok so all I need to worry about is Type 10 images and Type 21 images correct?

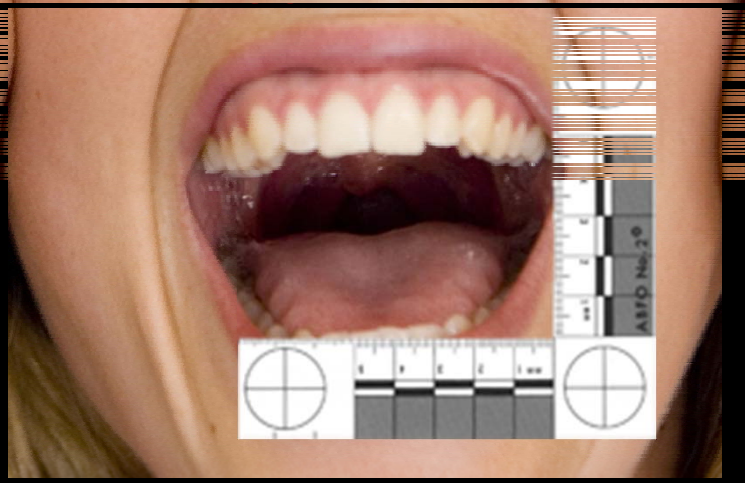
Answer : Almost there is one exception, something called a Type 20 image. Type 20 images come into play if the image is processed prior to sending. The processed image is a type 10 or type 21 image while the virgin unprocessed image is a Type 20 image.

FAQ - ANSI-NIST ITL

Question: Can you show me an example?

Answer : **Type 20**

Type 10

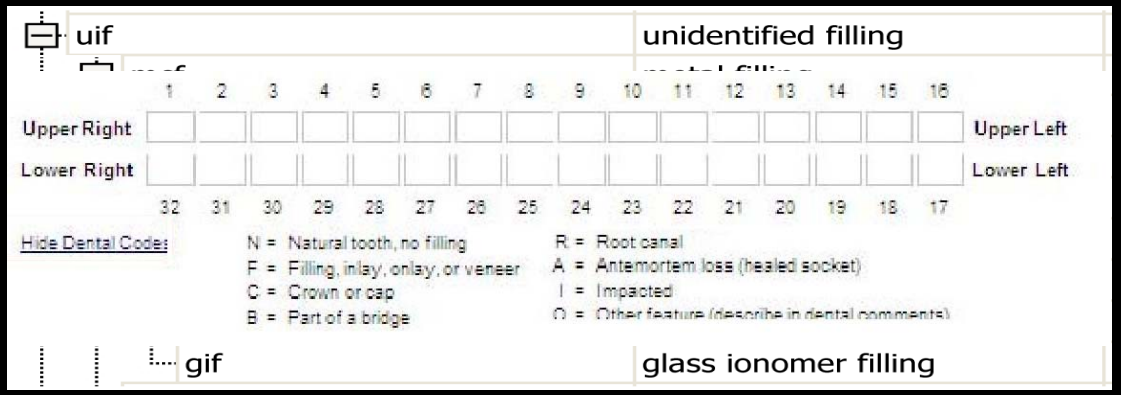


Data Interoperability

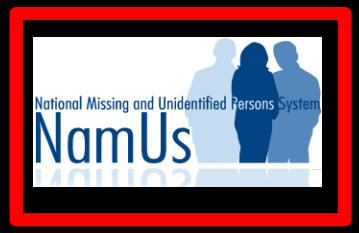
ANSI-NIST DATA ISSUES AND SOLUTIONS

Data Issue - Granularity

- Degree of detail varies
- ADA Standard needs to better accommodate hierarchical dental codes (Plass DVI's) as well as procedurally-based vs. conditional-based codes



Increasing Level Of Detail Coding



Data Issue - Ambiguity

What is the difference?

- car - caries
  - aca - acute caries
  - cca - chronic caries
- cav - cavity

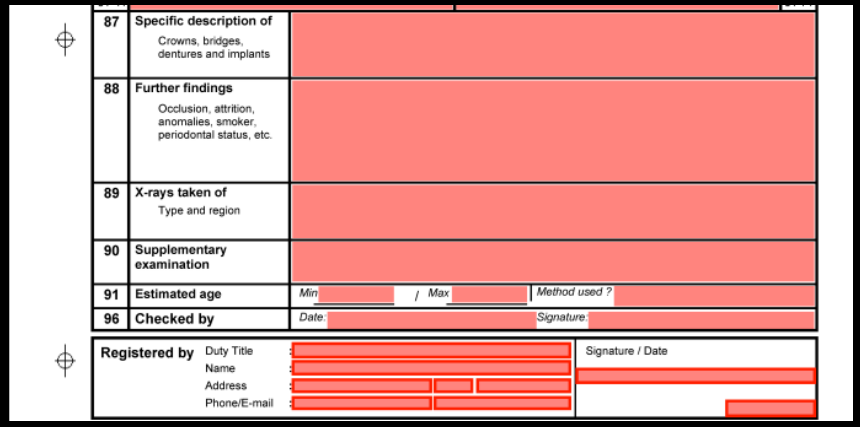
What is the significance in identification?

- cal - calculus

Data Issue - Specificity

87	**Specific data** Crowns, bridges, dentures and implants	
88	**Further data** Occlusion, attrition, anomalies, smoker, periodontal status, etc.	
89	**X-rays available** Type, region and year	
90	**Further material**	
91	**Age at time of disapp.**	
96	**Checked by**	*Date:* *Signature:*

Collected by	Duty Title Name Address Phone/E-mail	Signature / Date



87	**Specific description of** Crowns, bridges, dentures and implants	
88	**Further findings** Occlusion, attrition, anomalies, smoker, periodontal status, etc.	
89	**X-rays taken of** Type and region	
90	**Supplementary examination**	
91	**Estimated age**	*Min* / *Max* *Method used ?*
96	**Checked by**	*Date:* *Signature:*

Registered by	Duty Title Name Address Phone/E-mail	Signature / Date

Fill In → Multiple Choice

Problematic

Working Through the Issue's With Business Users

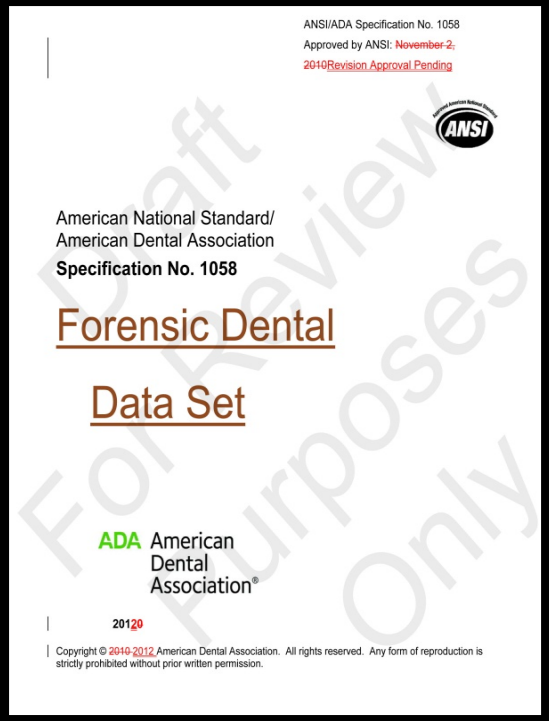
Submitted For Clarification To INTERPOL Odontology DVI on Plass Data

40 + Questions on ~150 Plass Data Dental Codes

	A	B	C	D	E	F	G	H	I
1	Plass	National text	2010	Descriptor 2010	Complete Description 2010	2012	Descriptor 2012	Complete Description 2012	Comments
71	uif	unidentified filling	10.3.3.3.3	Other	This Descriptor should be used when the tooth material is mainly composed of a material whose composition is unknown.	10.3.3.3.3	Other	This Descriptor should be used when the tooth material is mainly composed of a material whose composition is unknown.	No Change
73	mcf	metal coloured filling	9.3.2.5.4.7 9.3.2.5.2.2	No Code	No Code	9.3.2.5.4.7 9.3.2.5.2.2	No Code	No Code	Ambiguous ,By Metal Do You Mean Gold Or Gold And Silver? Is This Lab Fabricated Only, Such As An Inlay Or On lay? If The Later Does This Include Amalgam?
74	amf	amalgam filling	9.3.2.5.4.1	Amalgam	This Descriptor should be used to describe any direct restoration that either radiographically or by documentation consists of a silver/mercury based alloy.	9.3.2.5.4.1	Amalgam	This Descriptor should be used to describe any direct restoration that either radiographically or by documentation consists of a silver/mercury based alloy.	No Change
75	gof	gold filling	9.3.2.5.4.7 9.3.2.5.2.1	No Code	No Code	9.3.2.5.4.7 9.3.2.5.2.1	No Code	No Code	Ambiguous How Is This Different From "mcf"?
	tcf	tooth coloured filling	9.3.2.5.4.2	All Composite/Acrylic	This Descriptor should be used to describe any restoration that either radiographically or by documentation consists of any resin-based composite, including fiber	9.3.2.5.4.2	All Composite/Acrylic	This Descriptor should be used to describe any restoration that either radiographically or by documentation consists of any resin-based composite, including fiber	No Change Ambiguous,What is the Difference Between "tcf", "oaf", "cof", and "gif"?

Plass Data Code

February 2012



ANSI/ADA Specification No. 1058
Approved by ANSI: ~~November 2, 2010~~Revision Approval Pending

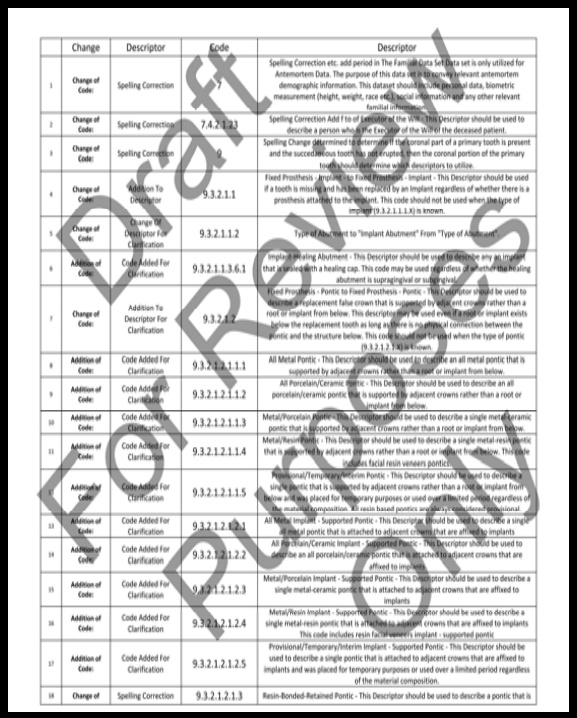
American National Standard/
American Dental Association
Specification No. 1058

Forensic Dental

Data Set

ADA American Dental Association®

20120



	Change	Descriptor	Code	Descriptor
1	Change of Code:	Spelling Correction	7	Spelling Correction etc. add period in The Family Data Set Data set is only utilized for Antemortem Data. The purpose of this data set is to convey relevant antemortem demographic information. This dataset should include personal data, biometric measurement (height, weight, race etc.), social information and any other relevant familial information.
2	Change of Code:	Spelling Correction	7.4.2.1.2.1	Spelling Correction Add f to of Executor of the Will. This Descriptor should be used to describe a person who is the Executor of the Will of the deceased patient.
3	Change of Code:	Spelling Correction	9	Spelling Change determined to determine if the coronal part of a primary tooth is present and the succedaneous tooth has not erupted, then the coronal portion of the primary tooth should determine which descriptors to utilize.
4	Change of Code:	Addition To Descriptor	9.3.2.1.1	Fixed Prosthesis - Implant - to Fixed Prosthesis - Implant - This Descriptor should be used if a tooth is missing and has been replaced by an implant regardless of whether there is a prosthesis attached to the implant. This code should not be used when the type of implant (9.3.2.1.1.1.6) is known.
5	Change of Code:	Change Of Descriptor For Clarification	9.3.2.1.1.2	Type of Abutment to "Implant Abutment" From "Type of Abutment"
6	Addition of Code:	Code Added For Clarification	9.3.2.1.1.3.6.1	Implant Healing Abutment - This Descriptor should be used to describe any an implant that is placed with a healing cap. This code may be used regardless of whether the healing abutment is supragingival or subgingival.
7	Change of Code:	Addition To Descriptor For Clarification	9.3.2.1.2	Fixed Prosthesis - Pontic to Fixed Prosthesis - Pontic - This Descriptor should be used to describe a replacement false crown that is supported by adjacent crowns rather than a root or implant from below. This descriptor may be used even if a root or implant exists below the replacement tooth as long as there is no physical connection between the pontic and the structure below. This code should not be used when the type of pontic (9.3.2.1.2.1.4) is known.
8	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.1.1	All Metal Pontic - This Descriptor should be used to describe an all metal pontic that is supported by adjacent crowns rather than a root or implant from below.
9	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.1.2	All Porcelain/Ceramic Pontic - This Descriptor should be used to describe an all porcelain/ceramic pontic that is supported by adjacent crowns rather than a root or implant from below.
10	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.1.3	Metal/Porcelain Pontic - This Descriptor should be used to describe a single metal-ceramic pontic that is supported by adjacent crowns rather than a root or implant from below.
11	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.1.4	Metal/Resin Pontic - This Descriptor should be used to describe a single metal-resin pontic that is supported by adjacent crowns rather than a root or implant from below. This code includes facial resin veneers pontic.
12	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.1.5	Provisional/Temporary/Interim Pontic - This Descriptor should be used to describe a single pontic that is supported by adjacent crowns rather than a root or implant from below and was placed for temporary purposes or used over a limited period regardless of the material composition. All resin based pontics are always considered provisional.
13	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.2.1	All Metal Implant - Supported Pontic - This Descriptor should be used to describe a single all metal pontic that is attached to adjacent crowns that are affixed to implants
14	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.2.2	All Porcelain/Ceramic Implant - Supported Pontic - This Descriptor should be used to describe an all porcelain/ceramic pontic that is attached to adjacent crowns that are affixed to implants
15	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.2.3	Metal/Porcelain Implant - Supported Pontic - This Descriptor should be used to describe a single metal-ceramic pontic that is attached to adjacent crowns that are affixed to implants
16	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.2.4	Metal/Resin Implant - Supported Pontic - This Descriptor should be used to describe a single metal-resin pontic that is attached to adjacent crowns that are affixed to implants This code includes resin facial veneers implant - supported pontic
17	Addition of Code:	Code Added For Clarification	9.3.2.1.2.1.2.5	Provisional/Temporary/Interim Implant - Supported Pontic - This Descriptor should be used to describe a single pontic that is attached to adjacent crowns that are affixed to implants and was placed for temporary purposes or used over a limited period regardless of the material composition.
18	Change of	Spelling Correction	9.3.2.1.2.1.3	Resin-Bonded-Retained Pontic - This Descriptor should be used to describe a pontic that is

- Standard updated to allow for better compatibility with NamUs, NCIC and Plass Data
- Request review of business users code due to ambiguity

FAQ - ANSI-NIST ITL

Question: Are you finally going to do something about all those codes and make everyone use one set?

Answer : Coding choices and especially the degree of granularity is up to the individual business owners. ANSI-NIST ITL does not have the authority nor the mandate to tell any business owner what codes to use.

Our goal is to ACCOMMODATE not DICTATE by allowing systems to "talk to each other"

TYPE 12 RECORDS

DENTAL AND ORAL COMPARISON CANDIDATES DATA STRUCTURE

Proposed Model

- This is a conceptual model
- We will discuss format (XML) later
- Attempts to handling the granularity issue cannot completely solve “simple” to “detail” coding issue
- NO ONE WILL ACTUALLY UTILIZE CODES (ASCII CODE 65 =“A”)
- Conversion is within software

Structure of ANSI-NIST ITL

Table 1 Excerpt from Table 24: Type-4 record layout

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
4.004	FGP	FRICTION RIDGE GENERALIZED POSITION	M	N	1	3	0 ≤ FGP ≤ 15 or FGP = 255 integer See Table 8	6	6

- Field Number
- Mnemonic
- Content Description
- Cond Code

- Assigned
- Assigned
- Assigned
- Condition code (Man / Opt)

Condition Codes

M = Mandatory field

O = Optional field

M⇑ = Mandatory subfield

O⇑ = Optional subfield

D = Dependent subfield presence dependent upon certain conditions

Structure of ANSI-NIST ITL

Table 1 Excerpt from Table 24: Type-4 record layout

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
4.004	FGP	FRICTION RIDGE GENERALIZED POSITION	M	N	1	3	$0 \leq$ FGP ≤ 15 or FGP = 255 integer See Table 8	6	6

- Character Type
- Character Min
- Character Max
- Value Constraints

- Character Type (N / A / U/ Hex Dec / Spec. Char./ Base 64)
- Min # of Char
- Max # of Char
- Constraints

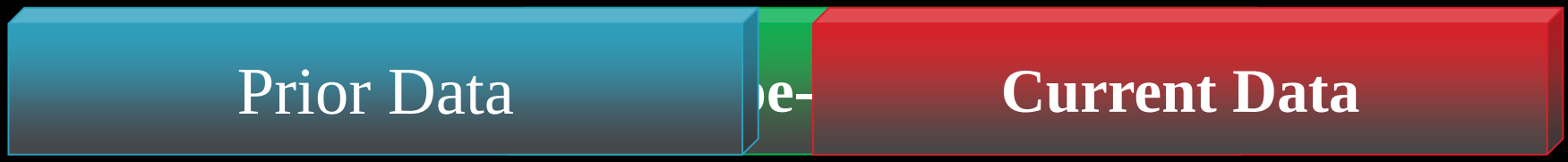
Structure of ANSI-NIST ITL

Table 1 Excerpt from Table 24: Type-4 record layout

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
4.004	FGP	FRICTION RIDGE GENERALIZED POSITION	M	N	1	3	0 ≤ FGP ≤ 15 or FGP = 255 integer See Table 8	6	6

- Occurrence - Min
- Occurrence - Max
- Minimum Times Used
- Maximum Times Used

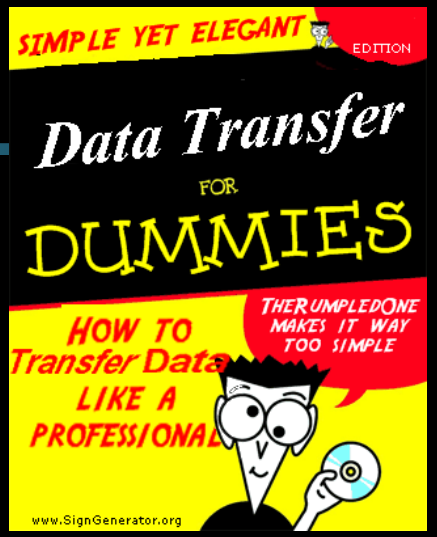
Forensic Odontology Standard



- Antemortem
- Historical Data

- Postmortem
- Living Amnesiac Identity Verification
- Suspect Data

Data Transfer For Dummies



What is XML

- XML (Extensible Markup Language) is a flexible way to share information in a consistent way.
- It is used in the World Wide Web, intranets etc..
- Consists of two parts Tags and Data

<NameOfData> DATA </NameOfData>

WinID In XML

<ToothNumber>18</ToothNumber>

<WinIDPrimaryCode>MOD</WinIDPrimaryCode>

<WinIDSecondaryCode>EA</WinIDSecondaryCode>

<WinIDCommentCode>Root Canal</WinIDCommentCode>

UDIM In XML

<ToothNumber>18</ToothNumber>

<UDIMStatusCode>MOD</UDIMStatusCode>

<UDIMConditionCode>cR</UDIMConditionCode>

<UDIMMaterialCode>mC</UDIMMaterialCode>

<UDIMMaterialExplanationCode>A3</UDIMMaterialExplanationCode>

FAQ-ANSI-NIST ITL

Question: Do we now need to memorize all those abbreviations?

Answer: As a user **No**. Only the programmers need to know it. It is invisible to the user and they will never use them. Do you know the ASCII table?

FAQ-ANSI-NIST ITL

Question: Do we now need to memorize all those XML Tags?

Answer: As a user No. Only the programmers need to know it. It is invisible to the user and they will never use them. Do you know HTML?

FAQ-ANSI-NIST ITL

Question: Do we now need to learn XML?

Answer: As a user No. Only the programmers need to know it. It is invisible to the user. Do you know C++ programming language?

Questions So Far???

Type 12 Records

Field 12.001: Record Header

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Encoding Specific	NA	NA	Encoding Specific	1	1

- It contains information particular to the encoding format chosen, in order to enable proper reading of the record.
  - In traditional encoding, this field contains the record length in bytes (including all information separators).
  - In NIEM-conformant XML encoding, this field contains the *RecordCategoryCode*, which is the numeric representation of the Record Type.

Field 12.002: Information Designation Character

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	2	0 < IDC < 99 integer	**1**	**1**

- The IDC shall be a sequentially assigned positive integer starting from zero and incremented by one up to a maximum of 99.
- IDC references are used to relate information items
- Two or more records may share an IDC to identify and link together records that pertain to different representations of the same biometric trait.

Abbr: IDC

XML: biom:ImageReferenceIdentification

Field 12.003: Forensic Dental Setting

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Describes the forensic setting that carried out the analysis of the dental and oral data.

Abbr: FDS

XML: biom:ForensicDentalSetting

Field 12.003: Forensic Dental Setting

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	1	1	FACC= M,D,F,A,T, or O	1	1

1. Forensic Analyst Category Code
2. Forensic Organization Primary Contact Information
3. Forensic Source Country Code

Field 12.004: Source Agency Identification ID

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1		None	1	1

- Agency that originally prepared this record
- Not necessarily agency transmitting transaction
- Not necessarily agency that gathered the biometric samples and/or metadata.

Abbr: SRC

XML: Pending

Field 12.005: Capture Organization Name

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1		None	0	1

- Agency responsible for collected the data
- This can be different from the agency entered in Field 12.004: Source agency / SRC

Abbr: CON

XML: Pending

FAQ – ANSI-NIST ITL

Question: Why do we need this information. It has nothing to do with a dental comparison

Answer: This is a transfer of legal information and must follow the rules of concerning the evidence.

Quality Of Data

Quality Of Data

Field 12.006: Dental Subject Information

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Provides information about the donor subject at time of donation of sample

Abbr: DSI

XML: biom:DentalSubject

FAQ – ANSI-NIST ITL

Question: I thought a Type 2 records handles all information concerning a subject

Answer: It is suppose but some information is missing and it cannot be modified since it is controlled by the FBI

Field 12.006: Dental Subject Information

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	DSC = 0 or 1 or 2	**1**	**1**

1 Subject Status Code

- It is an integer with one of the following values:
  - 0 = status of individual unknown
  - 1 = data obtained from a living person (for unknown deceased = antemortem)
  - 2 = data obtained from a decedent (for unknown deceased = postmortem)

Abbr: DSC

XML: Pending

Field 12.006: Dental Subject Information

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

- 2 **Subject - Last Contact Date**
- 3 **Subject - Range Of Last Contact Date Estimate**
- 4 **Subject - Person Birth Date**
- 5 **Subject - Range Of Birth Date Estimate**
- 11 **Subject - Death Time Estimate Rationale Text**
- 12 **Subject - Death Age Estimate Text**

Field 12.006: Dental Subject Information

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	50	None	0	1

6 Subject - Person Ethnicity Text

- Describes the ethnic group to which the subject belongs
- Not a fixed list, since terminology that is useful in one area may not be relevant in another. Certain ethnicity (ex. 'Hispanic‘) may be meaningful in US but that meaningless or confusion) in Guatemala or Argentina
- Tribal membership (e.g. Zulu, Hopi) may be used

Abbr: DPET

XML: nc:PersonEthnicityText

Field 12.006: Dental Subject Information

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	DRAC = 0, 1 or 2	**0**	**1**

7 **Subject - DNA Records Availability Code**

8 **Subject Collection Location Description**

Field 12.007: Original Dental Encoding System Information

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	4	6	OSN= EDR, FastID, NCIC, NEMA, PLASS, UDIM, WinID, OTHER or None	1	1

1 Original System Name Code

- The code is selected from the following list:
  - EDR - Electronic Dental Record System, conformant to ANSI / ADA Specification No. 1067
  - FastID - Interface for completing the INTERPOL Disaster Victim Identification forms
  - NamUS - The National and Unidentified Persons System
  - NCIC - The National Dental Image Repository of the National Crime Information Center (NCIC) run by the FBI.
  - PLASS - The DVI System International marketed by Plass Data Software A / S
  - UDIM - The Unified Dental Identification Module (UDIM) of the Unified Victim Identification System (UVIS)
  - WinID - Dental Identification System
  - OTHER - The coding system is not listed but is formally documented
  - NONE The ADA codes are entered directly based solely upon available data, whether from dental records, interviews or other sources

Abbr: OSNC

XML: biom:SystemNameCode

Field 12.007: Original Dental Encoding System Information

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	None	1	1

2 Original System Version Text

- Describes the data system that was used in the original encoding
- This item is optional unless OTHER is specified for OSN in which case it is mandatory and described the encoding system used

Abbr: OSVT

XML: biom:SystemVersionText

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3 **Original Tooth Permanence Category Code**

Value **0 = Specified by tooth number** FastID, PLASS, WinID UDIM

- For Systems Like FastID, PLASS sent directly
- For systems which use a deciduous indicator y tooth (WinID and UDIM) the two pieces of information shall be used together to assign the correct tooth number according to ANSI / ADA Specification No. 3950 prior to inclusion in this record.

Abbr: OTPC **XML:** biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3

Original Tooth Permanence Category Code

Value

1 = Unable To Determine At Tooth Level NCIC

- Unable to determine if the teeth are permanent or deciduous at the tooth level
- System allow a marker to indicate that deciduous teeth are present in the dentition.
- Permanent tooth number shall be used

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3

Original Tooth Permanence Category Code

Value

2 = Incapable Of Distinguishing Deciduous Teeth NamUS

- Coding system incapable of distinguishing deciduous from permanent teeth.
- The permanent tooth number shall be used

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3 **Original Tooth Permanence Category Code**

Value **3 = Unknown**

- Unknown whether the coding is capable of indicating deciduous and permanent teeth and / or whether the coding was performed using that capability.
- The permanent tooth number shall be used

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	ORDI = 11,21,31,41,51 or 99	0	1

4

Value

Original Restoration Data Granularity Code

11 = Individual restorations including restored surfaces information and material composition are coded separately for each restoration in the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

Abbr: ORDG

XML: biom:RestorationDataGranularityCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	ORDI = 11,21,31,41,51 or 99	0	1

4

Value

Original Restoration Data Granularity Code

21 = Individual restorations including restored surfaces information are coded separately but all the individual material composition are combined into a single code for the tooth

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

None

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	ORDI = 11,21,31,41,51 or 99	0	1

4

Value

Original Restoration Data Granularity Code

31 = Individual restorations including restored surfaces are combined to a single code for the tooth. All the materials utilized in all the restorations are combined into a single code for the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	ORDI = 11,21,31,41,51 or 99	0	1

4

Value

Original Restoration Data Granularity Code

41 = The presence of restorations without surface information is combined to a single code for the tooth. All materials utilized in all the restorations to restore the tooth are combined to a single code for the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

NCIC National Crime Information Center

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.007: Original Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	ORDI = 11,21,31,41,51 or 99	0	1

4

Value

Original Restoration Data Granularity Code

99 = The level of detail contained in Field 12.011 concerning restorations, materials and / or surfaces is unknown.

Values 1-10, 12-20, 32-40, 42-50 and 52 through 98 are reserved for future use by ANSI / NIST-ITL

Abbr: OTPC

XML: biom:ToothPermanenceCategoryCode

FAQ – ANSI-NIST ITL

Question: Why do we need this information. It has nothing to do with a dental comparison

Answer: This is vital to understand the granularity of the data so that the receiving software can make adjustments for less granular detail.

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Describe the last in the chain of systems involved in creating the record
- This field is mandatory only if the record creation data reference / encoding system is different from the original system.
- If a chain of systems is involved, it is highly recommended that Field 12.902: Annotation information be used to log the chain.
- OSCI need not be a forensic data system or a system capable of formulating an ANSI / NIST-ITL conformant record or transaction. The purpose of this field is to specify the rules and definitions that were used to specify the data originally.

Abbr: TDES

XML: biom:SourceForensicDentalEncodingSysemInformation

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	4	6	OSN= DICOM, EDR, FastID, NCIC, NEMA, PLASS, UDIM, WinID, OTHER or None	1	1

1 Transmittal System Name Code

- The code is selected from the following list:

  EDR Electronic Dental Record System, conformant to ANSI / ADA Specification No. 1067

  FastID Interface for completing the INTERPOL Disaster Victim Identification forms

  NamUS The National and Unidentified Persons System

  NCIC The National Dental Image Repository of the National Crime Information Center (NCIC) run by the Federal Bureau of Investigation (FBI).

  PLASS The DVI System International marketed by Plass Data Software A / S

  UDIM The Unified Dental Identification Module (UDIM) of the Unified Victim Identification System (UVIS)

  WinID - Dental Identification System

  OTHER The coding system is not listed but is formally documented

  NONE The ADA codes are entered directly based solely upon available data, whether from dental records, interviews or other sources

Abbr: TSNC

XML: biom:SystemNameCode

Field 12.008: Transmittal Dental Encoding System Information

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	500	None	1	1

2 Transmittal System Version Text

- Describes the data system that was used in the record creation encoding
- This item is optional unless OTHER is specified for OSN in which case it is mandatory and described the encoding system used

Abbr: TSVT

XML: biom:SystemVersionText

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3 **Transmittal Tooth Permanence Category Code**

Value **0 = Specified by tooth number** FastID, PLASS, WinID UDIM

- For Systems Like FastID, PLASS sent directly
- For systems which use a deciduous indicator y tooth (WinID and UDIM) the two pieces of information shall be used together to assign the correct tooth number according to ANSI / ADA Specification No. 3950 prior to inclusion in this record.

Abbr: TTPC **XML:** biom:ToothPermanenceCategoryCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3 **Transmittal Tooth Permanence Category Code**

Value **1 = Unable To Determine At Tooth Level** NCIC

- Unable to determine if the teeth are permanent or deciduous at the tooth level
- System allow a marker to indicate that deciduous teeth are present in the dentition.
- Permanent tooth number shall be used

NCIC National Crime Information Center

Abbr: TTPC **XML:** biom:ToothPermanenceCategoryCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3

Transmittal Tooth Permanence Category Code

Value

2 = Incapable Of Distinguishing Deciduous Teeth NamUS

- Coding system incapable of distinguishing deciduous from permanent teeth.
- The permanent tooth number shall be used

Abbr: TTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	OTPC = 0, 1, 2 or 3	1	1

3 **Transmittal Tooth Permanence Category Code**

Value **3 = Unknown**

- Unknown whether the coding is capable of indicating deciduous and permanent teeth and / or whether the coding was performed using that capability.
- The permanent tooth number shall be used

Abbr: TTPC

XML: biom:ToothPermanenceCategoryCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	TRDI = 11,21,31,41,51 or 99	0	1

4 **Value**

Transmitted Original Restoration Data Granularity Code

11 = Individual restorations including restored surfaces information and material composition are coded separately for each restoration in the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

Abbr: TRDG

XML: biom:RestorationDataGranularityCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	TRDI = 11,21,31,41,51 or 99	0	1

4

Value

Transmitted Original Restoration Data Granularity Code

21 = Individual restorations including restored surfaces information are coded separately but all the individual material composition are combined into a single code for the tooth

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

None

Abbr: TRDG

XML: biom:RestorationDataGranularityCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	TRDI = 11,21,31,41,51 or 99	0	1

4

Value

Transmitted Original Restoration Data Granularity Code

31 = Individual restorations including restored surfaces are combined to a single code for the tooth. All the materials utilized in all the restorations are combined into a single code for the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

Abbr: TRDG

XML: biom:RestorationDataGranularityCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	TRDI = 11,21,31,41,51 or 99	0	1

4

Value

Transmitted Original Restoration Data Granularity Code

41 = The presence of restorations without surface information is combined to a single code for the tooth. All materials utilized in all the restorations to restore the tooth are combined to a single code for the tooth.

- Material inclusion may be optional
- Unknown material composition may be implicit or explicit.

NCIC National Crime Information Center

Abbr: TRDG

XML: biom:RestorationDataGranularityCode

Field 12.008: Transmittal Dental Encoding System Information

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	TRDI = 11,21,31,41,51 or 99	0	1

4

Value

Transmitted Original Restoration Data Granularity Code

99 = The level of detail contained in Field 12.011 concerning restorations, materials and / or surfaces is Unknown .

Values 1-10, 12-20, 32-40, 42-50 and 52 through 98 are reserved for future use by ANSI / NIST-ITL

Abbr: TRDG

XML: biom:RestorationDataGranularityCode

Field 12.009 Dental History Data Detail

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- This optional field includes a subfield with a repeating set of information items. Each subfield has two mandatory information items. There may be multiple subfields.

Abbr: HDD

XML: DentalHistoryDataDetail

Field 12.009 Dental History Data Detail

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS			Valid code from *ANSI/ADA Specification No. 1058*	0	1

1

Dental History ADA Reference Code Text

- Corresponding to the data set descriptors in Section 7 of the ANSI / ADA Specification No. 1058 may be entered
- All the information in the chart
- Can be repeated multiple times

Abbr: HARC

XML: biom:ADAReferenceCodeText

Field 12.009 Dental History Data Detail

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	None	1	1

2 Dental History Additional Descriptive Text

- Used for those codes that require text

Abbr: HADT

XML: biom:AdditionalDescriptiveText

Field 12.010 Tooth Data Detail

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- Condition of each individual tooth
- This optional field includes a subfield with a repeating set of information items.
- There may be multiple subfields with the same tooth number.
- For systems that combine tooth conditions into a single subfield at the tooth level, one subfield is used per tooth.
- For systems that separate tooth conditions each condition shall be a separate subfield with the same tooth number, designated in TNU

Abbr: TDD

XML: biom:ToothDataDetail

Field 12.010 Tooth Data Detail

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- All systems should be capable of receiving data relating to a single tooth in multiple subfields, even if tooth conditions in the destination system are expressed jointly at the tooth level.
- If a system is capable of expressing tooth conditions separately does receive information from a system that is not capable of expressing tooth conditions separately, the receiving system should take care concerning the assignment of ANSI / ADA Specification No. 1058 codes (listed in TTC) to individual conditions on the tooth. Any mappings should only be performed after examination of the OSTC, with the mapping decision clearly described in the appropriate reference data items of the destination system.

Abbr: TDD

XML: biom:ToothDataDetail

Field 12.010 Tooth Data Detail

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

1 Tooth Data Date Of Recording

- The Date the particular tooth number information was referenced

Abbr: TCD

XML: nc:Date

Field 12.010 Tooth Data Detail

Optional Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	3	15	Time Measure	0	1

2 Tooth Data Date Of Recording Estimated Accuracy Range

- Amount of time (plus and minus) of which TCD is the center point during which the death could have taken place.

Abbr: TCDR

XML: Pending

Field 12.010 Tooth Data Detail

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	2	2	11 < TNU < 88	1	1

3 Tooth ID

- Teeth shall be numbered utilizing the permanent and deciduous teeth codes in ANSI / ADA Specification No. 3950 (International Numbering System)
- If the Permanent Or Deciduous Indicator (OTPC) indicates no distinction between deciduous and permanent teeth in the original encoding, the tooth shall be listed as permanent, even if the transmitted (or receiving) system is capable of distinguishing between the two types of teeth

Abbr: TID

XML: biom:ToothID

Field 12.010 Tooth Data Detail

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	1	300	Valid code from *ANSI/ADA Specification No. 1058*	0	1

4 Tooth - Original System- Data Code

- The exact text utilized by the original system to code a tooth
- Shall have a value of NONE if the original coding was performed by using the codes of ANSI / ADA Specification No. 1058 directly.

Abbr: TOET

XML: biom:OriginalSystemToothEncodingText

Field 12.010 Tooth Data Detail

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS	1	*	Valid code from *ANSI/ADA Specification No. 1058 Section 9*	1	1

5 Tooth Data - ADA Reference Code Text

- Any code value in Section 9 of the ANSI / ADA Specification No. 1058 may be entered.
- The ANSI / ADA Specification No. 1058 coding system has a hierarchical arrangement so that codes with more nodes (represented by periods) provide greater specificity of the information concerning a characteristic.

Abbr: TARC

XML: biom:ADAReferenceCodeText

Field 12.010 Tooth Data Detail

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	300	None	0	1

6 Transmitted Tooth Encoding Text

- Utilized if the transmitting system is different than the originating system and tells of the translation that occurred when data was received.
- For OSN = NONE, there shall not be an entry in this information item.
- Record creation (transmitting) systems may have a different degree of coding then the original system which could dilute coding.

Abbr: TTET

XML: biom:TransmittedSystemToothEncodingText

Field 12.010 Tooth Data Detail

Optional Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	1	TNCI = 0, 1 or 2	0	1

7 Tooth ID Certainty Code

- Some system allow for an indication that tooth certainty may be in doubt
  - **0** = Unspecified (the system does not have the capability of stating that there is uncertainty in the tooth number
  - **1** = Certain
  - **2** = Uncertain
- If it is not entered, a TNCI of 0 is assumed

Abbr: TICC

XML: biom:ToothIDCertaintyCode

Field 12.010 Tooth Data Detail

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	None	0	1

8 Tooth Additional Descriptive Text

- Used for codes that require text (by report)

Abbr: TADT

XML: biom:AdditionalDescriptiveText

Questions So Far???

EXAMPLE 1 - SINGLE SIMPLE RESTORATION

Plass Tooth Coding

cef MOD

10A. 1
10B. 9.3.2.5.1.1 (Mesial)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

WinID Tooth Coding

MOD E

10A. 1
10B. 9.3.2.5.1.1 (Mesial)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

UDIM Tooth Coding

MOD mC

10A. 1
10B. 9.3.2.5.1.1 (Mesial)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

NCIC Tooth Coding

MOD

10A. 1
10B. 9.3.2.5.1.1 (Mesial)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

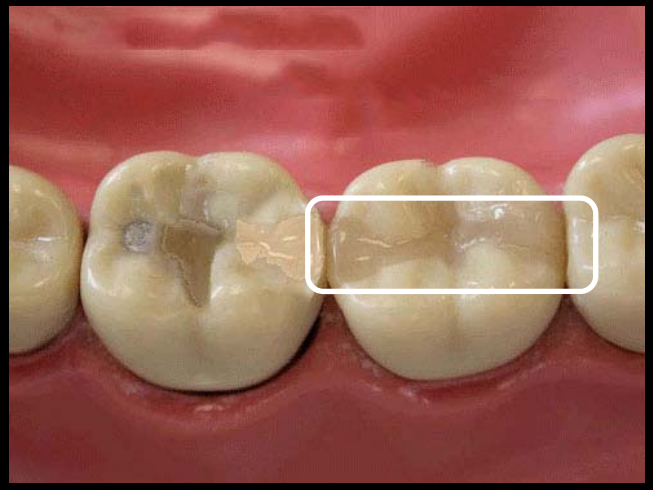
10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.4.9(Other Rest.)

NAMUS Tooth Coding

F

10A. 1
10B. 9.3.2.5 (Restored)



Electronic Health Records

Two types of Data

- Transactional Data -based on the procedures done
  - This is the way dentist bill
- Conditional Data - base on evaluating the current status of a tooth
  - Identical to Forensics Data
  - HL 7
  - ICD-10-CM Medical Coding
  - SNOMED/SNODENT
  - EZ Code

Electronic Health Record

D2393 MOD

Resin-Based Composite
Three Surfaces, Posterior

Date 10/12/2007

10A. 1
10B. 9.3.2.5.1.1 (Mesial)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

EXAMPLE 2 - MULTIPLE COMPLEX RESTORATIONS

ITEM 12.010

Plass Tooth Coding

amf O cef MO uif O

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

10A. 2
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 2
10B. 9.3.2.5.4.9(Other Restorative)

10A. 3
10B. 9.3.2.5.1.3 (Distal)

10A. 3
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A.3
10B. 9.3.2.5.4.2 (Composite)

Plass Tooth Coding

amf O cef MO uif O

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

10A. 2
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 2
10B. 9.3.2.5.4.9(Other Restorative)

10A. 3
10B. 9.3.2.5.1.3 (Distal)

10A. 3
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A.3
10B. 9.3.2.5.4.2 (Composite)

WinID Tooth Coding

MO ES

10A. 1
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

UDIM Tooth Coding

DO mAC

10A. 1
10B. 9.3.2.5.1.3(Distal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

NCIC Tooth Coding

DO

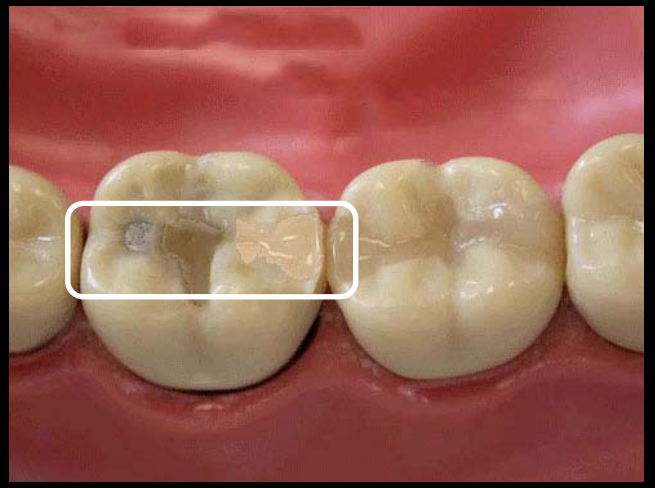
10A. 1
10B. 9.3.2.5.1.1 (Distal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

NAMUS Tooth Coding

F

10A. 1
10B. 9.3.2.5 (Restored)



Electronic Health Record

D2140 O

Amalgam One Surface, Primary Or Permanent

Date 10/12/2007

The Problem With Transactionally Based Data

An Occlusal Amalgam Is Placed First

D2140 O

Amalgam One Surface, Primary Or Permanent

Date 10/12/2007

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

Next A DO Composite Is Placed

D2392 OD

Resin-Based Composite Two Surfaces, Posterior

Date 10/12/2008

10A. 1
10B. 9.3.2.5.1.3(Distal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.2 (Composite)

Next A DO Composite Is Placed

D2392 OD

Resin-Based Composite Two Surfaces, Posterior

Date 10/12/2008

However it could also be…..

- 10A. 1
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 1
  10B. 9.3.2.5.4.1 (Amalgam)
- 10A. 2
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 2
  10B. 9.3.2.5.1.3 (Distal)
- 10A. 2
  10B. 9.3.2.5.4.9(Composite)

Previous:

- 10A. 1
  10B. 9.3.2.5.1.3(Distal)
- 10A. 1
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 1
  10B. 9.3.2.5.4.2 (Composite)

Procedural Based Codes

- Sequence is important
- The creation of a second filling does not negate the possibility that the first filling is still in placed
- Certain assumptions can be made
  - The material of a filling placed on virgin surface can be determined
  - The material of a filling placed on non-virgin surface is always present but the removal of the previous material can never be determined

Finally An Occlussal Composite Is Placed

D2391 O

Resin-Based Composite
One Surfaces, Posterior

Date 10/12/2007

If the second filing starts like this …..

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.9(Other Rest. Material)

10A. 2
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 2
10B. 9.3.2.5.1.3 (Distal)

10A. 2
10B. 9.3.2.5.4.9(Composite)

Finally An O Composite Is Placed

D2391 O

Resin-Based Composite
One Surfaces, Posterior

Date 10/12/2007

But it could also be like this …..

- 10A. 1
  10B. 9.3.2.5.4.2 (Composite)
- 10A. 2
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 2
  10B. 9.3.2.5.4.9(Other Restorative)
- 10A. 3
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A.3
  10B. 9.3.2.5.4.2 (Composite)
- 10A. 3
  10B. 9.3.2.5.1.3 (Distal)
- 10A. 1
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)

- 10A. 1
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 1
  10B. 9.3.2.5.4.9(Other Rest. Material)
- 10A. 2
  10B. 9.3.2.5.1.2 (Occlusal / Incisal)
- 10A. 2
  10B. 9.3.2.5.1.3 (Distal)
- 10A. 2
  10B. 9.3.2.5.4.9(Composite)

Finally An O Composite Is Placed

D2391 O

Resin-Based Composite
One Surfaces, Posterior

Date 10/12/2007

And can we start with this……

10A. 1
10B. 9.3.2.5.4.1 (Amalgam)

10A. 2
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 2
10B. 9.3.2.5.4.9(Other Restorative)

10A. 3
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A.3
10B. 9.3.2.5.4.2 (Composite)

10A. 3
10B. 9.3.2.5.1.3 (Distal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 1
10B. 9.3.2.5.4.9(Other Rest. Material)

10A. 2
10B. 9.3.2.5.1.2 (Occlusal / Incisal)

10A. 2
10B. 9.3.2.5.1.3 (Distal)

10A. 2
10B. 9.3.2.5.4.9(Composite)

THE RULE:

Unless verified radiographically the only way to guarantee accuracy is to not transmit material data when a subsequent filling is placed on a previously restored surface of a previously restored tooth.

Questions So Far???

Field 12.011 Mouth Data Detail

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- Entry of information concerning the mouth

Abbr: MDD

XML: biom:MouthDataDetail

Field 12.011 Mouth Data Detail

Mandatory subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

1

Mouth Data Of Recording Date

- Any code value in Section 10 of the ANSI / ADA Specification No. 1058 may be entered.

Abbr: MCD

XML: nc:Date

Field 12.011 Mouth Data Detail

Mandatory subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	3	15	Time Measure	0	1

2 **Mouth Data Date Of Recording Date Estimated Accuracy Range**

- This is the amount of time (plus and minus) of which MCD is the center point during which the tooth data could have been originally collected.

Abbr: MCDR

XML: Pending

Field 12.011 Mouth Data Detail

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	3	Valid code from *ANSI/ADA Specification No. 1058 Section 10*	0	1

3 Mouth Data ADA Reference Code Text

- Any code value in Section 10 of the ANSI / ADA Specification No. 1058 may be entered.

Abbr: MARC

XML: biom:ADAReferenceCodeText

Field 12.011 Mouth Data Detail

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	None	0	1

4 Mouth Additional Descriptive Text

- Used for those codes that require text (by report)

Abbr: MADT

XML: biom:AdditionalDescriptiveText

Reserved For Future Use Only By ANSI/NIST-ITL

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Reserved For Future Use Only By ANSI/NIST-ITL					

- Reserved For Future Use Only By ANSI/NIST-ITL

Field 12.020: Comment / COM

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	1	125	None	**0**	**1**

- Optional text field

Fields 12.200 - 12.900: User-Defined Fields

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
User Defined					

- These fields are user-defined fields. Their size and content shall be defined by the user and be in accordance with the receiving agency.

Field 12.902: Annotation information

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- This is an optional field, listing the operations performed in order to prepare this biometric record type

Abbr: ANN

XML: biom:ProcessAnnotation

Field 12.902: Annotation information

Optional ??

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

1. Greenwich Mean Time / GMT
2. Processing Algorithm Name / Version
3. Algorithm Owner
4. Process Description

Field 12.993: Source Agency Name

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	125	None	0	1

- This is an optional field. It may contain up to 125 Unicode characters. It is the name of the agency referenced in Field 12.004: Source Agency / SRC.

Abbr: SAN

XML: Pending

Field 12.995: Associated Context

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Subfields					

- Refers to one or more Record(s) Type-21.
- An example of the use of this field would be to transmit an image of an unidentified body at the location where it was discovered.

Abbr: ASC

XML: biom:AssociatedContext

Field 12.995: Associated Context

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	255	Sequentially assigned	1	1

1 **Associated Context Number**

2 **Associated Segment Position**

Field 12.997: Source Representation

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #

- Used for biometric sample derived from a source representation in Record Type-20 (Type 20 - Parts of records derived from other record types)
- An example of the use of this field would be when data is extracted from a representation, such as a group photograph, which is stored in a Type-20 record. The facial image of the subject of the transaction may be segmented and placed in a Type-10 record.

Abbr: SOR

XML: biom:SourceRepresentation

Field 12.997: Source Representation

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
N	1	255	sequentially assigned	1	1

1 **Source Representation Number**

2 **Reference Segment Position**

Field 12.998: Geographic Sample Acquisition Location

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #

- Location where the image(s) / sample(s) were acquired - not where it is stored.
- If different locations are applicable for the images / samples / data then separate instances of Record Type-12 should be created and transmitted jointly in the same transaction.

Abbr: GEO

XML: biom:CaptureLocation

Making it Happen

Example XML For Type-12 Record

Header

WinID

#8
MOD
E

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- ****************************** -->
<!-- RECORD TYPE 12 Forensic Dental Record-->
<!-- ****************************** -->
<itl:PackageForensicDentalDataRecord>
```

Plass

Example XML For Type-12 Record

Record Category

WinID

```
<itl:PackageForensicDentalDataRecord>
  <!-- 12.001 -->
  <biom:RecordCategoryCode>
    12
  </biom:RecordCategoryCode>
```

Plass

Example XML For Type-12 Record

FBI - Information Designation Character

WinID

```
<!-- 12.002 IDC -->
<biom:ImageReferenceIdentification>
  <nc:IdentificationID>
    4
  </nc:IdentificationID>
</biom:RecordCategoryCode>
```

Plass

Example XML For Type-12 Record

Time Of Record

WinID

```
<!-- GMT -->
<biom:ProcessUTCDate>
  <nc:DateTime>
    2011-11-05T05:25:00Z
  </nc:DateTime>
</biom:ProcessUTCDate>
</biom:ProcessAnnotation>
```

Plass

Example XML For Type-12 Record

Location Of Record

WinID

```
<biom:DentalData>
  <biom:BiometricCaptureDetail>
    <!-- 12.998 GEO -->
    <biom:CaptureLocation>
    <!-- GRT -->
      <nc:LocationDescriptionText>
        Washington and Madison, Geneva, NY
      </nc:LocationDescriptionText>
    </biom:CaptureLocation>
```

Plass

Example XML For Type-12 Record

Organization Name

WinID

```
<!-- 12.005 CON -->
<biom:CaptureOrganization>
    <nc:OrganizationName>
      Hurricane Sandy DVI Team
    </nc:OrganizationName>
  </biom:CaptureOrganization>
</biom:BiometricCaptureDetail>
```

Plass

Example XML For Type-12 Record

Subject Status Code

WinID

```
<!-- 12.006 DSI -->
<biom:DentalSubject>
  <!-- DSC -->
    <biom:SubjectStatusCode>
      2
    </biom:SubjectStatusCode>
```

Data obtained from a living person

Plass

Example XML For Type-12 Record

Subject Last Contact Date

WinID

```
<!-- DLCD -->
<biom:SubjectLastContactDate>
  <nc:Date>
    2010-12-25
  </nc:Date>
</biom:SubjectLastContactDate>
```

Plass

Example XML For Type-12 Record

Person Birth Date

WinID

```
<!-- DPBD -->
<nc:PersonBirthDate>
  <nc:Date>
    1953-04-23
  </nc:Date>
</nc:PersonBirthDate>
</biom:DentalSubject>
```

Plass

Example XML For Type-12 Record

Dental Encoding System

WinID

```
<!-- 12.007 ODES-->
<biom:OriginalDentalEncodingSystemInformation>
<!-- OSNC -->
<biom:SystemNameCode>
  WinID
</biom:SystemNameCode>
<!-- OSVT -->
<biom:SystemVersionText>
  Version 3.63
</biom:SystemVersionText>
```

Plass

Example XML For Type-12 Record

Original System Info

WinID

```
<!-- OTPC -->
  <biom:ToothPermanenceCategoryCode>
    0
  </biom:ToothPermanenceCategoryCode>
  <!-- ORDG -->
  <biom:RestorationDataGranularityCode>
    31
  </biom:RestorationDataGranularityCode>
</biom:OriginalDentalEncodingSystemInforma
```

Restoration with individual restored surfaces merged

Permanent tooth specified by tooth number

Plass

Example XML For Type-12 Record

Tooth Data

WinID

```
<!-- 12.010 TDD -->
<biom:ToothData>
  <biom:ToothDataDetail>
    <biom:CaptureDate>
      <nc:Date>
        2012-01-01
      </nc:Date>
    </biom:CaptureDate>
```

Plass

Example XML For Type-12 Record

Tooth Info

WinID

#18

```
<!-- TID -->
  <biom:ToothID>
    37
  </biom:ToothID>
  <!-- TOET -->
  <biom:OriginalSystemToothEncodingText>
    MOD E
  </biom:OriginalSystemToothEncodingText>
```

Plass

#37

Example XML For Type-12 Record

Tooth Info

WinID

#8

MO

```
<!-- TARC -->
<biom:ADAReferenceCodeText>
  9.3.2.5.1.1
</biom:ADAReferenceCodeText>
<biom:ADAReferenceCodeText>
  9.3.2.5.1.2
</biom:ADAReferenceCodeText>
```

Plass

#37

mo

Example XML For Type-12 Record

Tooth Info

WinID

#8
MOD
E

```
<biom:ADAReferenceCodeText>
  9.3.2.5.1.3
</biom:ADAReferenceCodeText>
<biom:ADAReferenceCodeText>
  9.3.2.5.4.2
</biom:ADAReferenceCodeText>
<!-- TTET -->
<biom:TransmittedToothEncodingText>
  MOD E
</biom:TransmittedToothEncodingText>
```

Plass

#37
mod

Example XML For Type-12 Record

Tooth Info

WinID

#8 MOD E

```
  <!-- TICC -->
  <biom:ToothIDCertaintyCode>
    0
  </biom:ToothIDCertaintyCode>
  <!-- TADT -->
  </biom:ToothDataDetail>
</biom:ToothData>
```

Plass

#37 cef mod

Questions So Far???

Type 12 Records

Type 10 Records

DENTAL AND ORAL COMPARISON CANDIDATES DATA

Field 10.046: Subject

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- If the image is a pattern injury or latent image on a person, this field is used to describe the victim.

Abbr: SUB

XML: biom:SubjectData

Field 10.046: Subject

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	4	6	VSC= 0, 1, 2, 3 or 4	1	1

1 Subject Current Status Code

.Possible entries are:

- 0 = Status of individual unknown
- 1 = Data obtained from a living person – victim or person unable to identify themselves
- 2 = Data obtained from a living person – as a candidate for comparison to a latent print or a pattern injury
- 3 = Data obtained from a decedent – victim, or unknown deceased
- 4 = Data obtained from a decedent – as a candidate for comparison to a latent print or a pattern injury

Abbr: SSC

XML: biom:SubjectStatusCode

Field 10.046: Subject

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
A	4	6	OSN= DICOM, EDR, FastID, NCIC, NEMA, PLASS, UDIM, WinID, OTHER or NONE	1	1

2 Subject Body Status Code

- Information relates to an entire corpse or a separate body part
  - 1 = Whole
  - 2 = Fragment

Abbr: SBSC

XML: biom:SubjectBodyStatusCode

Field 10.046: Subject

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	none	0	1

3 **Subject Body Class Code**

- Condition of the body
  - 1 = Natural Tissue
  - 2 = Decomposed
  - 3 = Skeletal

Abbr: SBCC

XML: biom:SystemNameCode

Field 10.046: Subject

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	5000	none	0	1

4

Subject Identifier Descriptive Text

- A unique identifier for the subject of this record (who may not be the subject of the transaction)
- This is so that the victim or person unable to identify themself is distinguished from the record that carry information to be compared against pattern injuries or latent prints on the victim or person unable to identify themself
- It may be a name or a case number or other means of correlating the data to a particular person / file

Abbr: SIDT

XML: biom:SubjectBodyClassCode

Field 10.047: Capture Organization Name

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	4	1000	none	1	1

- Agency responsible for collected the data
- This can be different from the agency entered in Field 12.004: Source agency / SRC

Abbr: CON

XML: biom:CaptureOrganization

Field 10.048: Pattern Injury Image Description

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- This field describes the pattern injury

Abbr: PIL

XML:

Field 10.048: Pattern Injury Image Description

Mandatory Subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
ANS	3	5	Value from Dental Supplement Table 2	1	1

1 Pattern Injury Code

- It is the pattern injury code
- See Table Dental Supplement 2.

Abbr: PIL

XML: biom:PatternInjuryCode

Type Of Injury

Code	Description	Requires Text
1.1	Abrasion	No
1.2	Artifact	Yes
1.3	Avulsion	No
1.4	Contusion (ecchymosis)	No
1.5	Perforation (Incision)	No
1.6	Laceration	No
1,7	Petechial hemorrhage	No
1.8	Other	Yes

Color Of The Pattern Injury

Code	Description	Requires Text
2.1	Red	No
2.2	Violet	No
2.3	Red	No
2.4	Violet / Magenta	
2.5	Blue	No
2.6	Purple/ Black	No
2.7	Blue	No
2.8	Green	No
2.9	Dark Yellow	No
2.1	Pale Yellow	No
2.11	Brown	No
2.12	Other color	No

Surface Contour

Code	Description	Requires Text
3.1	Flat	No
3.2	Curved	No
3.3	Irregular (such as on loose skin)	Yes
3.4	Unknown	No

Shape Of Pattern Injury

Code	Description	Requires Text
4.1	Round	No
4.2	Ovoid	No
4.3	Crescent	No
4.4	Diamond	No
4.5	Rectangular	No
4.6	Irregular/Multiple	Yes

Surface Tissue Characteristics

Code		Description	Requires Text
5.1	Fixed		No
5.2	Mobile		No
5.3	Unknown		No

Underlying Structure

Code	Description	Requires Text
6.1	Bone	No
6.2	Cartilage (including ears and nose)	No
6.3	Muscle (including buttocks)	No
6.4	Fat (including breasts)	No
6.5	Other (including penis, testicles, Achilles tendon)	Yes

Cause Of Pattern Injury

Code	Description	Requires Text
7.1	Suggestive of animal origin	Yes
7.2C	Caused by NON animal (e.g. ringworm)	Yes
7.2S	Suggestive of NON animal organic agent causation	Yes
7.3C	Caused by NON formally living organism	Yes
7.3S	Suggestive of NON formally living organism causation	Yes
7.4C	Caused by other object (e.g. meat tenderizing hammer, zipper, chain, etc..)	Yes
7.4S	Suggestive of being caused by other object (e.g. meat tenderizing hammer)	Yes
7.5C	Caused by impact	Yes
7.5S	Suggestive of being caused by impact	Yes
7.6C	Caused by self inflicted biting	Yes
7.6S	Suggestive of self inflicted biting	Yes
7.7C	Caused by a bite mark from another human being	Yes
7.7S	Suggestive of a bite mark from another human	Yes
7.8C	Caused by an unknown human making a bite	Yes
7.8S	Suggestive of a human bite mark unknown agent	Yes
7.9	Suggestive of a bite mark pattern but no determination made	Yes
7.1	Suggestive of not being caused by a bite but no determination made	Yes
7.11	Not caused by a bite	Yes
7.12	Inconclusive	Yes
7.13	No determination or speculation as to causing agent / unknown	No

Field 10.048: Pattern Injury Or Latent Print Image Pattern Injury Descriptive Text

Dependent

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	1000	None	0	1

1

Pattern Injury Or Latent Print Image Pattern Injury Descriptive Text

- Used to describe those PIC codes marked as requiring text in Table Dental Supplement 2 for pattern injuries

Abbr: PIDT

XML: biom:PatternInjuryDescriptiveText

Field 10.049: Cheiloscopic Image Description

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Used only if Field 10.003 Image type / IMT is not SCAR, MARK or TATTOO.
- Specifies the location on the body where the (suspected) lip print occurred.
- If the (suspected) lip print is upon an object, the image shall be transmitted using Record Type-21, since Record Type-10
- This field may be also used for an image of the lips themselves, in which case, IMT shall be FACE.

Abbr: CID

XML: biom:CheiloscopicImageData

Field 10.049: Cheiloscopic Image Description

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	1	100	None	0	1

1 Lip Print Width

- The longest dimensions of the image measured with a standard ABFO # 2 scale ruler

Abbr: LPW

XML: biom:LipPrintWidthValue

Field 10.049: Cheiloscopic Image Description

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	1	100	None	0	1

2 Lip Print Height

- The shortest dimensions of the image, taken at a 90 degree angle from the width of the image measured with a standard ABFO # 2 scale ruler

Abbr: LPH

XML: biom:LipPrintHeightValue

Field 10.049: Cheiloscopic Image Description

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	1000	None	0	1

3 Lip Print Descriptive Text

- Lip print description
- Typical entry may be: “Lip print with lipstick on the neck” or “image of the lips”.

Abbr: LPDT

XML: biom:LipPrintDescriptiveText

Field 10.049: Cheiloscopic Image Description

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	1000	None	0	1

3 Lip Print Descriptive Text

- Analyst may wish to include Suzuki and Tscuchihashi classifications
  - Type I – Vertical grooves
  - Type I´ – Partial length grooves
  - Type II – Branched grooves
  - Type III – Intersecting grooves
  - Type IV – Reticular grooves
  - Type V – Irregular grooves

Abbr: LPDT

XML: biom:LipPrintDescriptiveText

Field 10.050: Dental Visual Image Data

Mandatory

			Value Constraints		
SUBFIELDS					

- Images of oral and perioral region
- Multiple subfields, each with a separate image

Abbr: VID

XML: biom:VisualImageData

Field 10.050: Dental Visual Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

1 Visual Image Capture Date

- Date of imaging

Abbr: VCD

XML: biom:VisualImageCollectionDate

Field 10.050: Dental Visual Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	3	15	Time Measure	0	1

2 Visual Image Capture Date Estimate Range

- This is the amount of time (plus and minus) of which VCD is the center point during which the tooth data could have been originally collected
- Format = YyyyyMmmDdd. Ex D05, means plus or minus 5 days from VUD

Abbr: VCDR

XML: biom:DateRangeText

Field 10.050: Dental Visual Image Data

Mandatory subfield

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS	3	30	Valid code from ANSI/ADA Standard No. 1058, Section 11.2 (integers and periods are in the codes)	1	1

3 Visual Image ADA Reference Code

- Any code value in Section **11.2** of the *ANSI/ADA Standard No. 1058*
  - 11.2.2.1 Frontal View
  - 11.2.2.2 Buccal Right and Buccal Left Views
  - 11.2.2.3 Maxillary Palatal Right, Maxillary Palatal Left, Lingual Right and Lingual Left Views
  - 11.2.2.4 Occlusal Maxillary and Mandibular Views

Abbr: VARC

XML: biom:ADAReferenceCodeText

Field 10.050: Dental Visual Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	0	5000	None	0	1

4 Visual Image Additional Descriptive Text

- Additional free text information item
- An example is “post-mortem with lips retracted”

Abbr: VADT

XML: biom:AdditionalDescriptiveText

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Used to describe a radiograph

Abbr: RID

XML: biom:RadiographImageData

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
Date	Encoding Specific		Encoding Specific	1	1

1 Radiograph Image Capture Date

- Date of imaging

Abbr: RUD

XML: Pending

Field 10.051: Radiograph Image Data

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
AN	3	15	Time Measure	0	1

2 Radiograph Image Capture Date Estimate Range

- This is the amount of time (plus and minus) of which RUD is the center point during which the tooth data could have been originally collected
- Format = YyyyyMmmDdd. Ex D05, means plus or minus 5 days from RUD

Abbr: RUDR

XML: Pending

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS	3	30	Valid code from ANSI/ADA Standard No. 1058, Section 12.5 (integers and periods are in the codes)	1	1

3 Radiograph Size

- Radiograph size
- Any code value in Section 12.5 of the ANSI/ADA Standard No. 1058 may be entered.
- Only one value may be entered
- Each image requires a separate Type-10 record within the transaction.

Abbr: RGS

XML: biom:ADAReferenceCodeText

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS	3	30	Valid code from ANSI/ADA Standard No. 1058, Section 12.5 (integers and periods are in the codes)	1	1

3 Radiograph Size

- 12.5.1 ISO/ANSI standard radiographic size film
- Examples of standard radiographic film sizes are:
  - 12.5.2 Child Periapical size 0 Film measures 7/8” x 1 9/16”
  - 12.5.3 Adult Periapical size 2 Film measures 11/4” x 15/8”
  - 12.5.4 Occlusal size 4 Film - 21/4” x 3”

Abbr: RGS

XML: biom:ADAReferenceCodeText

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
NS	3	30	Valid code from ANSI/ADA Standard No. 1058, Section 12.6 (integers and periods are in the codes)	1	1

4 Radiograph Image Series

- Any code value in Section 12.6 of the ANSI/ADA
- Standard No. 1058 may be entered.

12.6.4 As a general rule, a full mouth series is composed of 18 to 20 films:
12.6.4.1Four bitewings
12.6.4.1.1Two molar bitewings (left and right)
12.6.4.1.2Two premolar bitewings (left and right)
12.6.4.1.3One extra wide bitewing may be substituted (left and right) but not preferred for forensic odontological identifications
12.6.4.2Eight posterior periapicals
12.6.4.2.1Two maxillary molar periapicals (left and right)
12.6.4.2.2Two maxillary premolar periapicals (left and right)
12.6.4.2.3Two mandibular molar periapicals (left and right)
12.6.4.2.4Two mandibular premolar periapicals (left and right)
12.6.4.3Six to eight anterior periapicals
12.6.4.3.1Two maxillary canine periapicals (left and right)
12.6.4.3.2Two mandibular canine periapicals (left and right)
12.6.4.3.3Two central incisor periapicals (maxillary and mandibular): Where size #1 periapical film is used, three incisor views are made in the maxilla (one for each lateral incisor and one for the centrals)..

Abbr: RIS

XML: biom:ADAReferenceCodeText

Field 10.051: Radiograph Image Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	50	None	1	1

5 Radiograph Image In Series Text

- Which radiograph image in series text
- This is used to specify which individual image in a particular series is conveyed in this subfield.
- For example, if code 12.6.4.2.1 is selected (Two maxillary molar periapicals), this information item would specify ‘right’ for one Type-12 record and ‘left’ for another instance of Type-12

Abbr: RIIS

XML: biom:RadiographImageInSeriesText

Field 10.051: Radiograph Image Data

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
U	1	*	None	0	1

6 Radiograph Practitioner Information Text

- Free text information item. It should contain the practitioner's name, address and telephone or other contact information.
- May also be used for additional explanatory text, such as any unique features associated with the radiograph.

Abbr: RPRI

XML: biom:RadiographPractitionerInformationText

Field 10.051: NEMA DICOM Data

Optional

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
SUBFIELDS					

- Ideally, images are transferred electronically to the requesting agency in DICOM format. If the requesting agency does not have software that can read the DICOM format directly, then a DICOM Viewer with basic image export feature should be provided
- Contains descriptions of data formatted according to the standard Digital Imaging and Communications in Medicine (DICOM) of the National Electrical Manufacturers Association
- The data itself may also be included in this field

Abbr: DICM

XML: Pending

Field 10.051: NEMA DICOM Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
B	1	1	Binary Base64 object	**0**	**1**

1 **DICOM Data**

- Base64 representation of the data.

Abbr: DICD

XML: Pending

Field 10.051: NEMA DICOM Data

Mandatory

Character TYPE	MIN #	MAX #	Value Constraints	Occurrence Min #	Occurrence Max #
ANS	1	*	None	0	1

2 DICOM Source External File Reference Text

- Describing external file location

Abbr: DSEF

XML: biom:SourceExternalFileReferenceText

Questions So Far???

Type 10 Records

ANSI NIST ITL Dental Supplement

USE CASE SCENARIOS

Use Case 1

Suspected Pattern Injuries Of Intraoral Origin on a Human Victim With Dental Records Available from a Human Potential Comparison Candidate and one Canine.

- **Type-1** record (mandatory)
- **Type-2** record

Use Case 1

Records associated with the victim

- **Type-10** record containing a photograph of the pattern injury and any associated metadata.
- **Type-21** (optional) image of the person when the victim was found or the location where the injury supposedly occurred (such as on the front porch of the house).

Use Case 1

Records associated with the human candidate for comparison

- **Type-10** record containing a dental images of the human candidate.

Use Case 1

Records associated with the canine candidate for comparison

- **Type-21** record containing a dental images of the canine candidate.

Use Case 2

Body exhumed in cold-case for identification (no soft tissue; but hair, bones and teeth intact) -- no fingerprints possible -- no facial features

- **Type-1** record (mandatory)
- **Type-2** record containing information about the subject of the transaction. In this case it would be the victim. Complete in accordance with instructions of the implementation domain (such as NORAM or INTERPOL or RCMP)

Use Case 2

Records associated with the victim

- **Type-10** records containing images of the body as it is exhumed, and artifacts still intact that were buried with the victim
- **Type-21** records containing images of the exhumation process and artifacts still intact that were buried with the victim.
- **Type-21** record with either digital images of the original autopsy with the location of the report's location

Use Case 2

Records associated with the victim

- **Type-10** record with radiograph images of the subject. Note that one **Type-10** record instance is required for each radiograph.
- **Type-12** record containing charting of the buried victim.

Use Case 3

Latent prints of possible perioral origin on a glass - With lip print images available from a comparison candidate.

- **Type-1** record (mandatory)
- **Type-2** record containing information about the subject of the transaction. In this case it would be the victim. Complete in accordance with instructions of the implementation domain (such as NORAM or INTERPOL or RCMP)

Use Case 3

Records associated with the victim

- **A Type-21 record** (Source representation record) would be created for the image of the glass including the image of the lip print.

Use Case 2

Records associated with the comparison subject

- **Type-10 record** would convey a lip print image from a potential comparison subject.

Type 20 Records

No Changes

DENTAL AND ORAL COMPARISON CANDIDATES DATA

FOR FURTHER INFORMATION:

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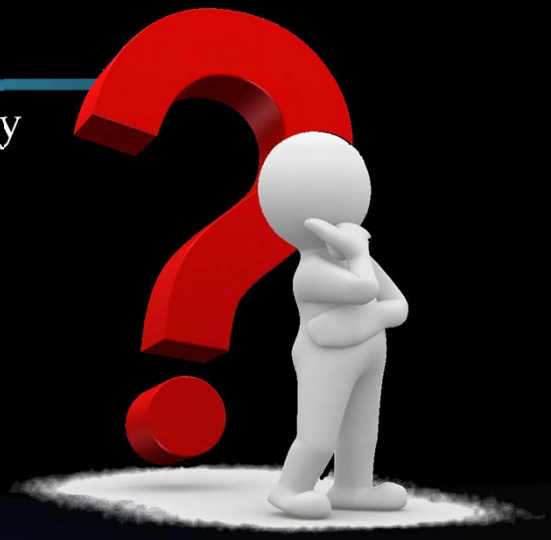
forensics@dental-nyc.com
212 988 2955



HTTP: //WWW.NIST.GOV/ITL/IAD /IG/ ANSI_STANDARD.CFM

Dr. Kenneth W. Aschheim
Assistant Chief Forensic Odontologist
The Office of Chief Medical Examiner New York City

Chairman ADA JWG 10.12 On Forensic Odontology Informatics

Dental Research at the Office of Chief Medical Examiner

ANSI/NIST-ITL 1-2000

National Institute
Standards and Tec
U.S. Department of C

New York City

Coding Granularity

Simple vs.. Detail Coding

The Capulets

The Montagues

The Dentists

The Anthropologist

Selective MFI Major Disasters

AVERAGE 37,969

MFI 1998 to 2010

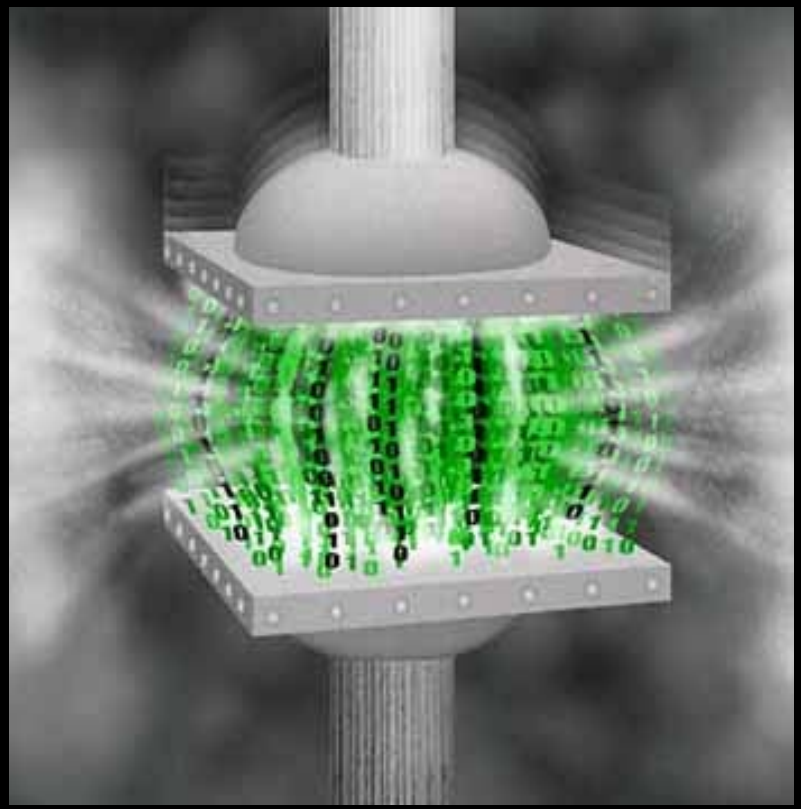
2010	Earthquake	Haiti	230,000
2008	Earthquake	China	87,476
2008	Storm	Myanmar	133,655
2007	Storm	Bangladesh	4,234
2006	Earthquake	Indonesia	5,778
2005	Earthquake	Pakistan	73,338
2005	Storm	United States	1,833
2004	Earthquake (Tsunami)	Indonesia, Thailand, India	225,841
2004	Storm	Haiti	2,754
2004	Flood	Haiti	2,665
2003	Earthquake	Iran	26,769
2003	Extreme heat	Europe	72,225
2003	Earthquake	Algeria	2,266

2002	Epidemic	Afghanistan	2,500
2001	Earthquake	India	20,005
1999	Flood	Venezuela	30,000
1999	Storm	India	9,843
1999	Earthquake	Taiwan	2,264
1999	Earthquake	Turkey	17,127
1998	Storm	Central America	18,345
1998	Earthquake (Tsunami)	Papua New Guinea	2,182
1998	Flood	China	3,656
1998	Storm	India	2,871
1998	Earthquake	Afghanistan	4,700
1998	Extreme heat	India	2,541
1998	Earthquake	Afghanistan	2,323
	TOTAL		987,191

What We Know?

- We (NYC/USA) have handled disasters up to 3,000 victims
- This means that Software such as WinID, Plass (Interpol) and even UDIM tested up to 3,000 victims
- We have not had a database of antemortem and postmortem dental data big enough to test our readiness
- Dental Data is very specific i.e. fillings are not randomly Placed
- We have never really been tested

We Need Data To Test The System

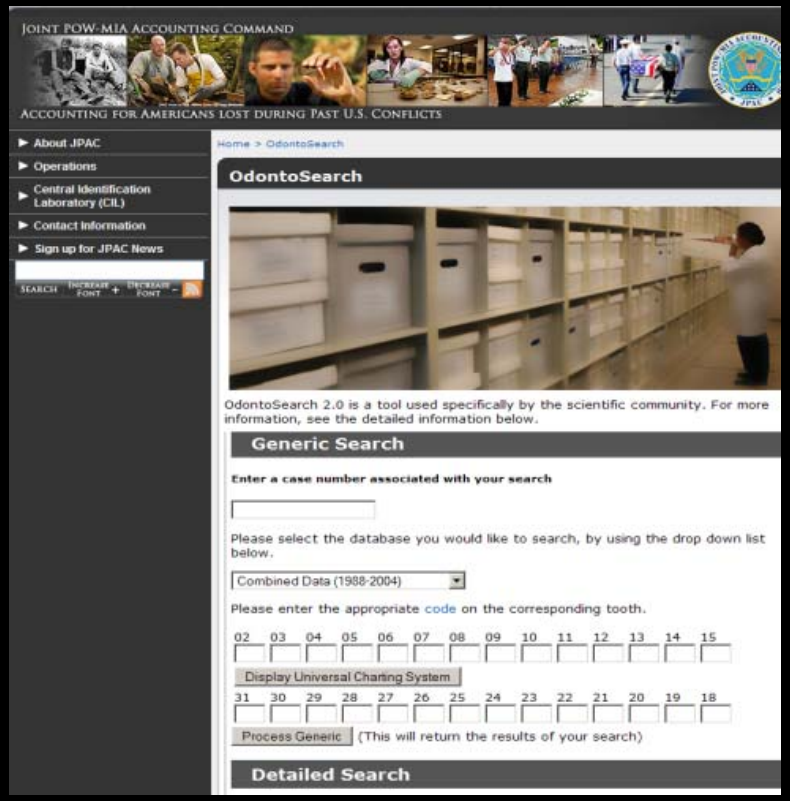


Look At Old Data WTC Data For Help

- Total Victims: 2,823
- Total Victims Identified: 1,058
- Uniformed Officers Among Those Identified:
  - 189 FDNY
  - 20 PAPD
  - 14 NYPD
  - 3 Non-FDNY EMS
  - 7 Court Officers & Others
- Remains Recovered: 19,497
- Whole Bodies Recovered: 289
- Debris Removed: 1,610,852 Tons

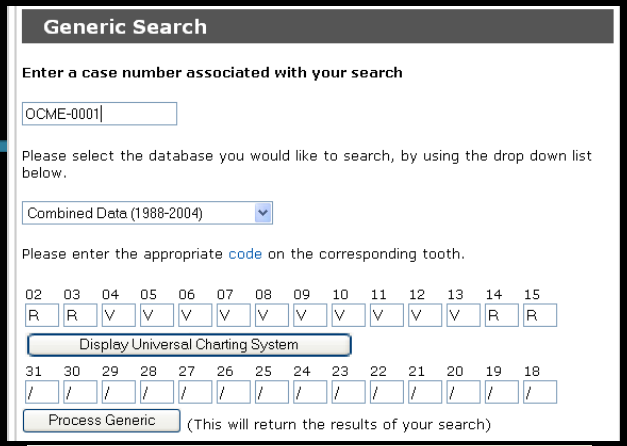
Background of Study

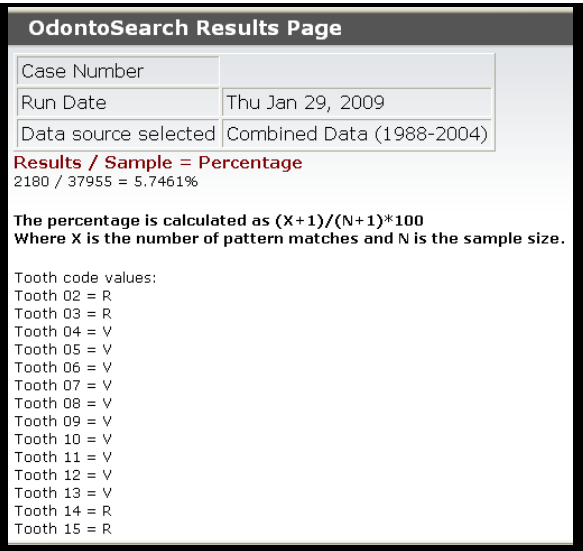
- Studies by Adams (2003) suggested that dental patterns formed by missing, filled, and unrestored teeth are very individualistic.
  - Statistical frequencies were found to be similar to mtDNA
  - Coding strategies did NOT affect frequency (except with significant postmortem loss)
- OdontoSearch Program www.jpac.pacom.mil



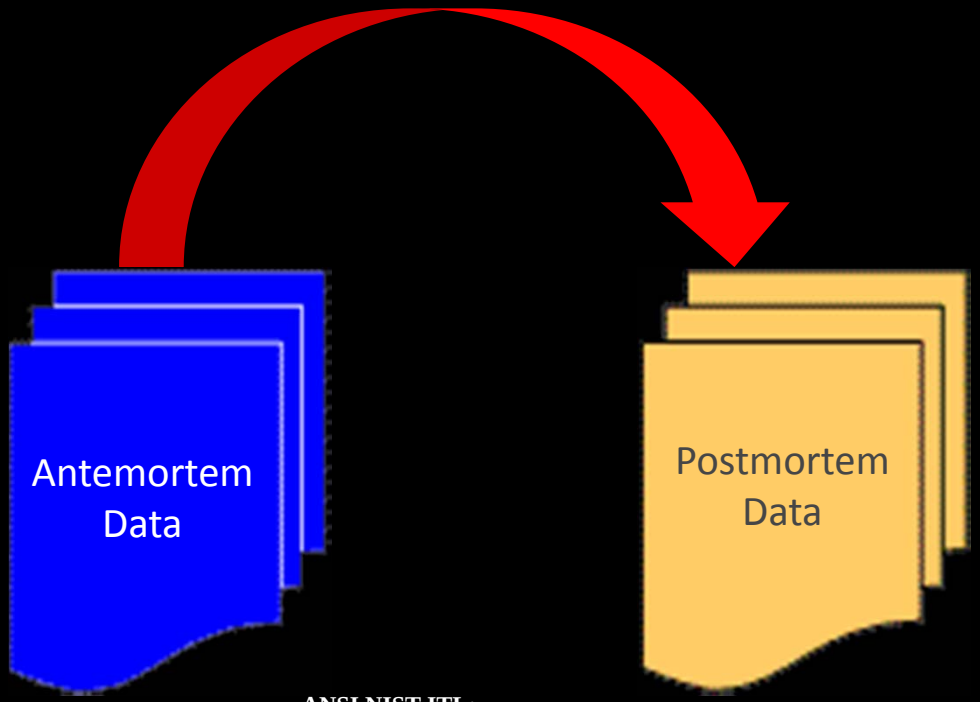
OdontoSearch

- Program calculates pattern frequency using either “Generic” or “Detailed” coding formats
- Appropriate for use when an antemortem and postmortem record match is discovered
- These results remove the subjectivity involved in making determinations on the strength of a match, especially when AM radiographs are not available.
- Results can be used to quantify to strength of a potential match between a missing individual and an unidentified body.
- It is NOT a tool for providing victim ranks.





We need To Create a Program to "Transition Data" From Antemortem to Postmortem Data



Ante-Post Transitioning Occurs in Four ways

- Codes Do Not Change
- Codes move in a Logical Direction of change via explainable discrepancies
- Codes move in an Illogical Direction of change via unexplainable discrepancies
- Codes do not move because of No Information

Identical

Antemortem

No Change

Postmortem

Antemortem Tooth #19 O Amalgam

Postmortem Tooth #19 O Amalgam

Reconcilable Discrepancy (Possible - "P")

Antemortem

Logical Direction Of Change

Postmortem

Antemortem Tooth #19 Virgin

Postmortem Tooth #19 O Amalgam

Irreconcilable Discrepancy (Miss - "M") ANTE To POST

Antemortem

Postmortem

Illogical Direction Of Change

Antemortem Tooth #19 O Amalgam

Postmortem Tooth #19 Virgin

reconcilable Discrepancy (No Information "N")

Antemortem

Postmortem

No Information

Antemortem Tooth #19 MOD Amalgam

No Information

We Created 10 separate database

- No Transitions Per Record (V)
- 2 Explainable Transitions Per Record (P2)
- 4 Explainable Transitions Per Record (P4)
- 6 Explainable Transitions Per Record (P6)
- 2 Unexplainable Transitions Per Record (M2)
- 4 Unexplainable Transitions Per Record (M4)
- 6 Unexplainable Transitions Per Record (M6)
- 1 Explainable / 1 Unexplainable Transitions Per Record (B2)
- 3 Explainable / 2 Unexplainable Transitions Per Record (B4)
- 3 Explainable / 3 Unexplainable Transitions Per Record (B6)

A Recipe For The "Perfect" Database

Database	Percent
Perfect	5.0%
P2	7.5%
P4	7.5%
P6	2.5%
M2	7.5%
M4	7.5%
M6	2.5%
B2 (P1/M1)	20.0%
B4 (P2/M2)	20.0%
B6 (P3/M3)	20.0%
Total	100.0%

What We Discovered

- Having a large scale reference database opens up many opportunities to test numerous scenarios and algorithms
- Evidence based testing is vital to determine effects of numerous scenarios
- Current software is able to function to the 30,000 victim level with excellent performance

Using the Data

THIS DATABASE HAS BECOME A TREMENDOUS TOOL FOR RESEARCH

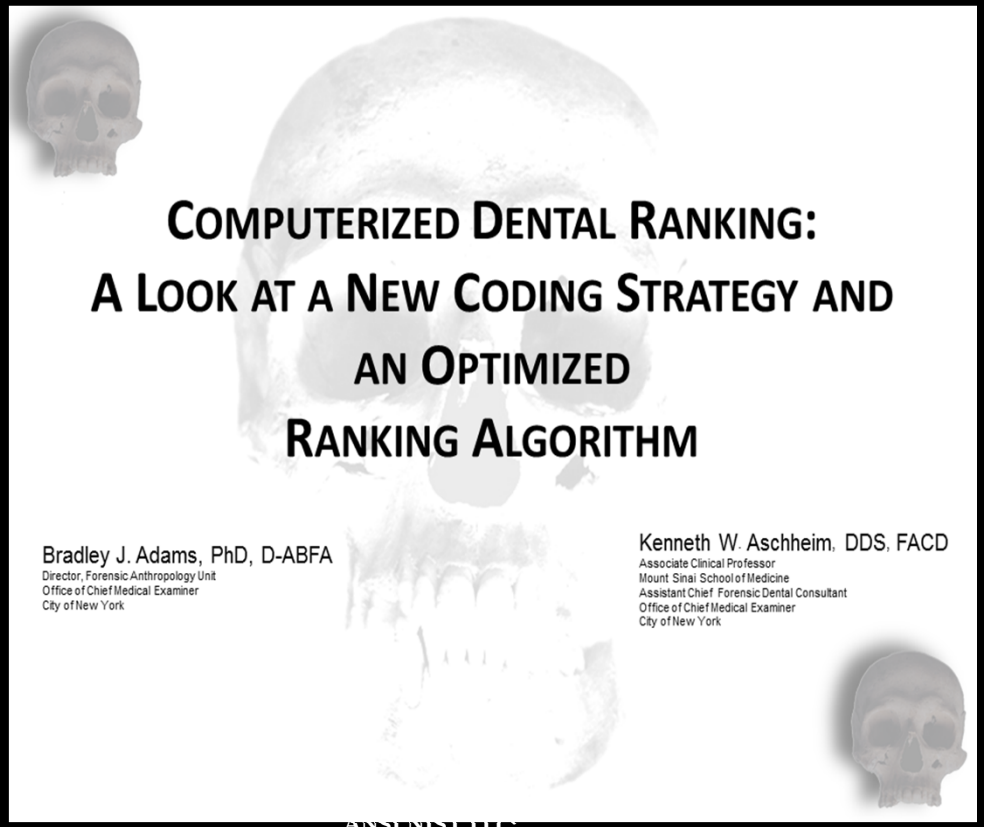
Data Codes Were Converted

Now What …..

SO NOW WE ARE LEFT WITH ONE SET OF DATA

WE NOW HAD A DATABASE OF 50,000 VICTIMS

Other Uses


COMPUTERIZED DENTAL RANKING:
A LOOK AT A NEW CODING STRATEGY AND
AN OPTIMIZED
RANKING ALGORITHM
Bradley J. Adams, PhD, D-ABFA
Director, Forensic Anthropology Unit
Office of Chief Medical Examiner
City of New York
Kenneth W. Aschheim, DDS, FACD
Associate Clinical Professor
Mount Sinai School of Medicine
Assistant Chief Forensic Dental Consultant
Office of Chief Medical Examiner
City of New York

Question We Wanted Answers

- What is difficult to match and why
- Effects of miscoding
- Effects of fragmentation
- Effects of Bitewings versus Full Mouth Series
- Searching Ante against Post vs. Post against Ante?
- What Happens when sample size changes
- Types of Coding, Newer Algorithms and problems with All Virgin and All Edentulous Cases

The Virgin Effect

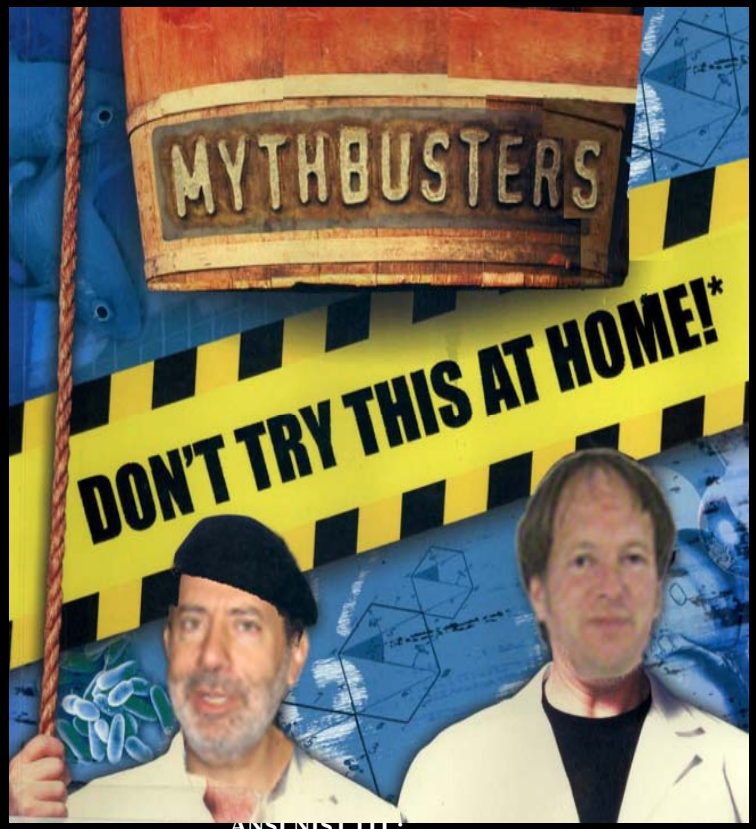
- We know that the lack of restorations make matching difficult however in a large database it becomes severed
- This is due to the fact that at least 20% of all data is either All ‘V’ or All ‘X’
- If a match gets stuck behind this block it get severely penalized (outliers)
- There may be a need for alternative metrics
- Since all virgins skew the data for TESTING purposes they were eliminated because they did not provide useful information

Let's Play Mythbusters

STARRING:

Kenneth Aschheim

Forensic Odontologist



Bradley Adams

Forensic Anthropologist

Bitewing Effect

Assume we a disaster of 30,000 victims with 400 full bodies found

What is the effect on ranking if instead of antemortem FMS we only had antemortem bitewings radiographs

- Would we have looked through
  - 10 % more records
  - 50 % more records
  - 100 % more records
- Would the results be the same if we had
  - 3000 Antemortem's Records?
  - 30000 Antemortem's Records?
- Could we even find it or would it be a "Needle in the Haystack"?

Myth # 1

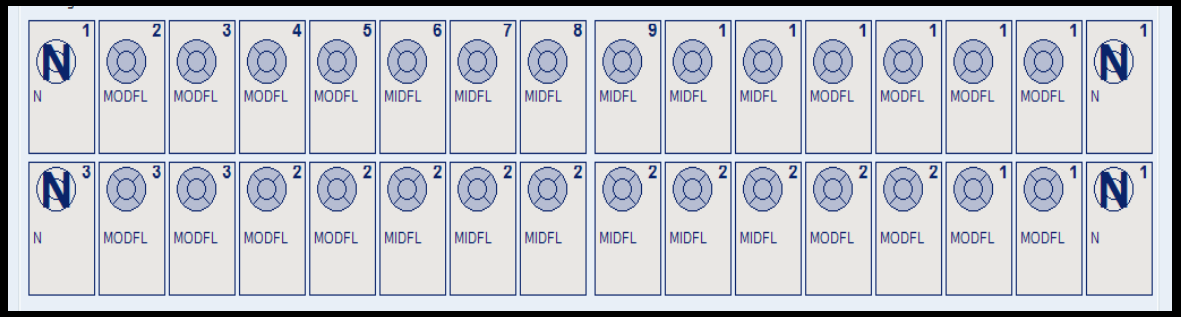
The use of bitewing radiographs instead of a full mouth series greatly increases the number of comparison needed to get a correct identification

Myth # 1

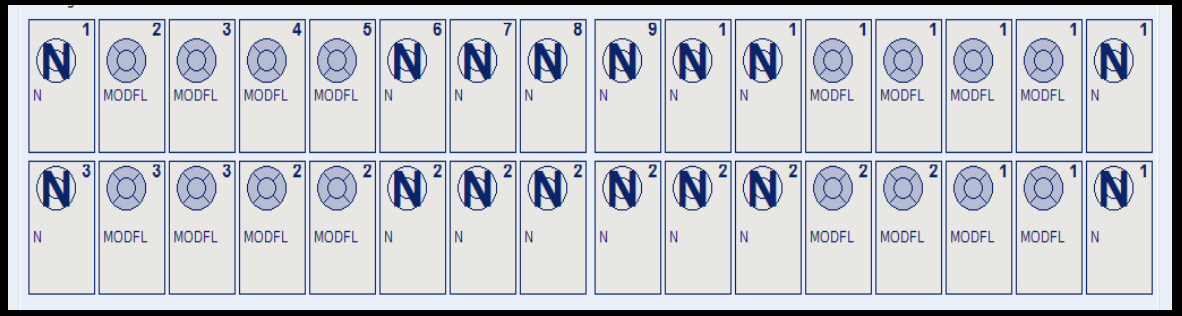
To test this myth we utilized a database of 400 postmortem records against two 30,000 Antemortem records, one with all FMX one with all BW

The Database Used

FMS Set

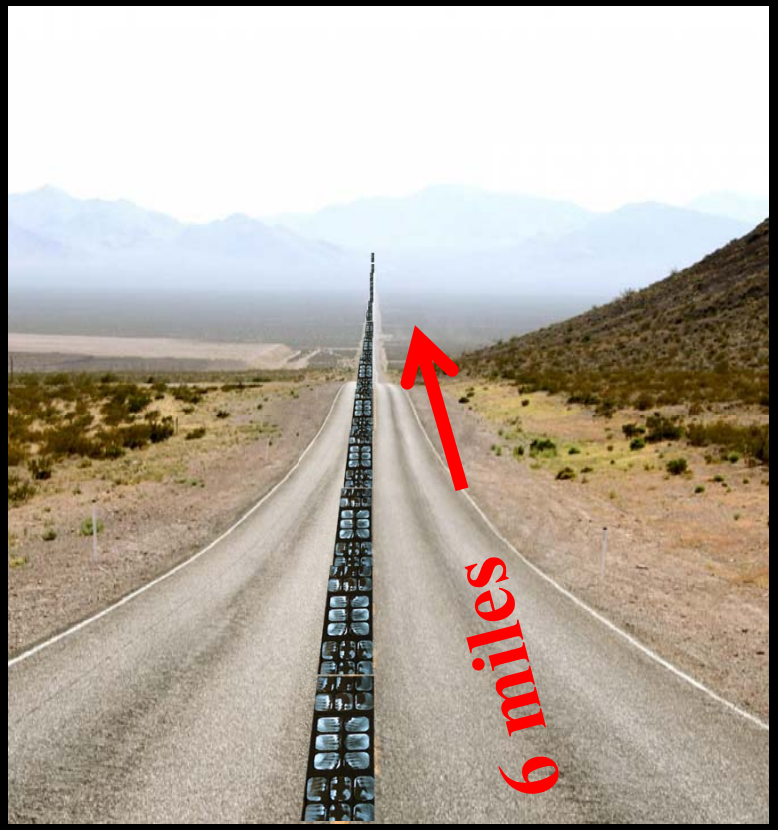


BW Set



How big are 30,000 Radiographs

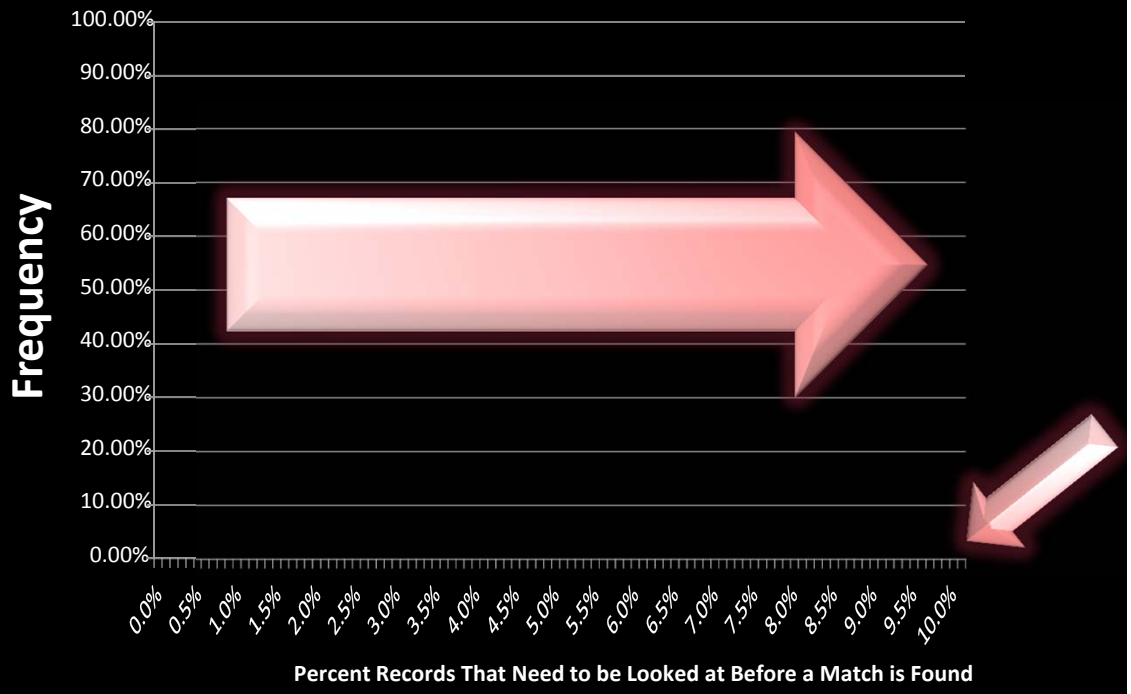
- If we laid the radiographs end to end they would stretch almost 6 miles
- If you tried to walk past them at a fast clip it would take you over 2 hours
- If you wanted to compare them and it took 30 seconds a comparison you would need to work 24/7 for over 10 days



Reading a Cumulative Frequency Chart

Horizontal Axis

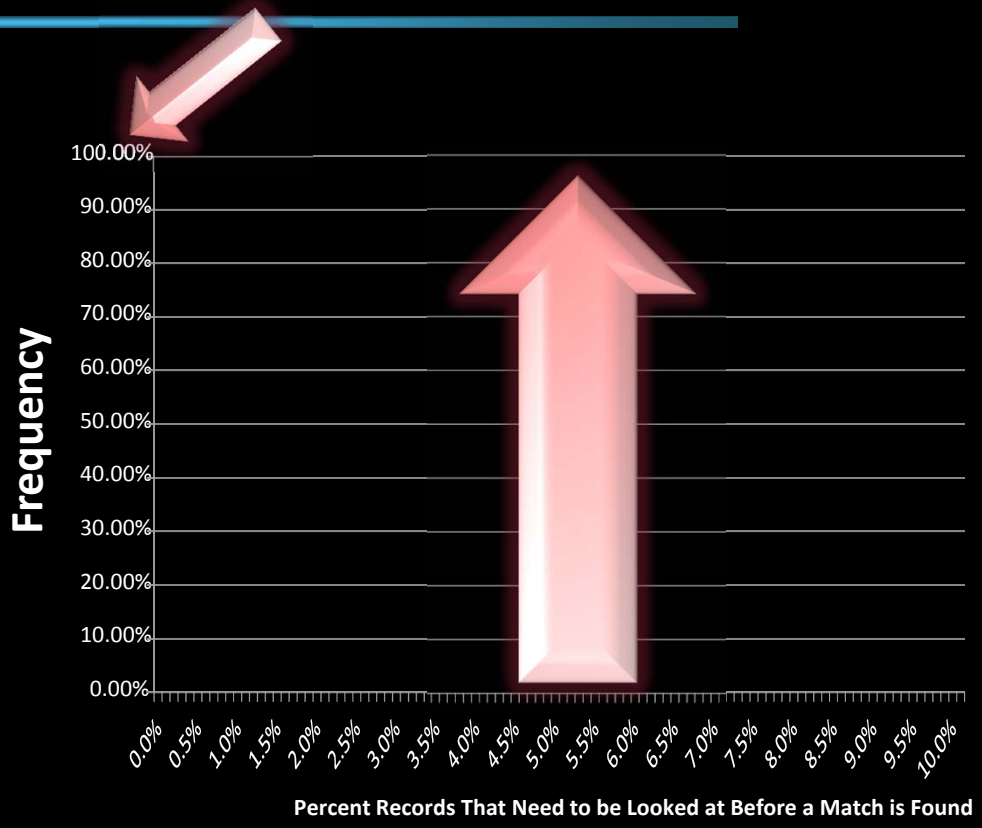
- This axis measures the percentage of radiographs you need to look through before you find a match
- Because forensic comparison software is so efficient it is rarely more the 10% but for 30,000 Antemortem's that is 3,000 comparisons



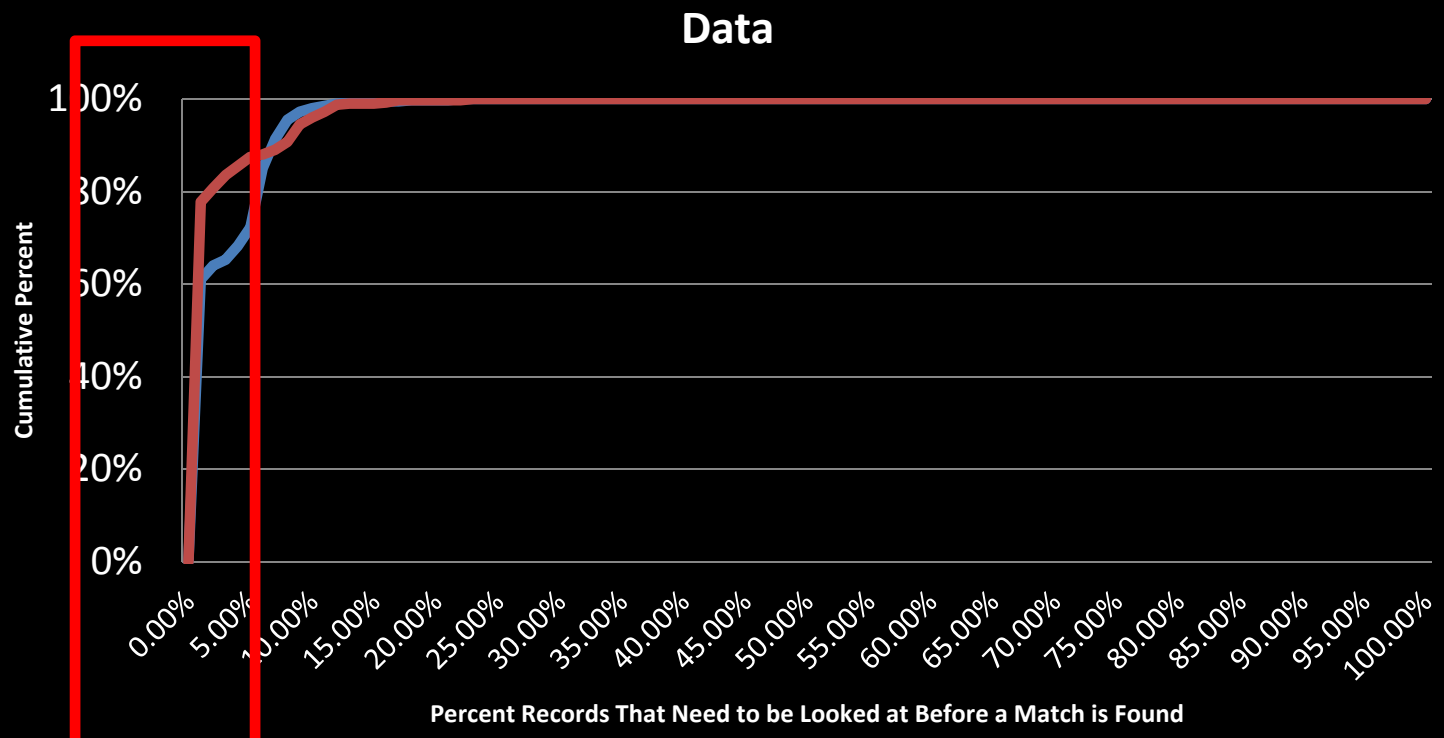
Reading a Cumulative Frequency Chart

Vertical Axis

- This axis measures the percentage of time that you would find a match after looking at X % of the images
- Because forensic comparison software is so efficient most of the time you need to look through less then 1% of the images before a match is found



Cumulative Frequency



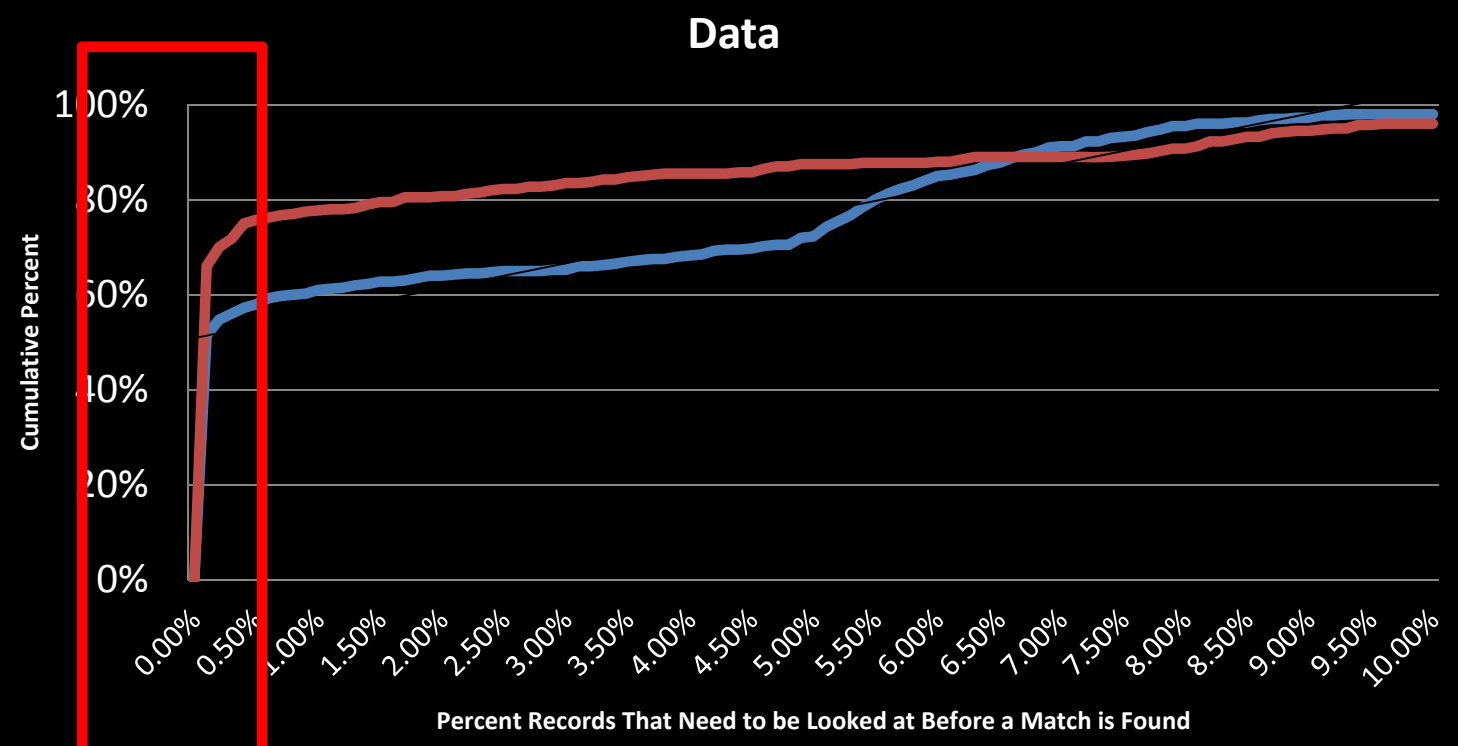
FMX

Average	1.47%
Max	52.46%
Min	.00%
Std Dev	4.43%
95%	8.84%

BW

Average	1.73%
Max	23.26%
Min	0.00%
Std Dev	3.46%
95%	6.91%

Cumulative Frequency



FMX

Average	1.47%
Max	52.46%
Min	.00%
Std Dev	4.43%
95%	8.84%

BW

Average	1.73%
Max	23.26%
Min	0.00%
Std Dev	3.46%
95%	6.91%

How Is This Possible?

Anterior Teeth

Information (fillings +)	33,531	9.3%
No Information (/, X, J)	326,469	90.7%
Total	360,000	100.0%

Posterior Teeth

Information (fillings +)	**160,153**	**33.4%**
No Information (/, X, J)	**319,847**	**66.6%**
Total	**480,000**	**100.0%**

Anterior teeth simply carry a lot less data

THIS CONFIRMS RESULTS SEEN IN ODONTOSEARCH - BRADLEY ADAMS

- Posterior teeth are 3 x as likely to have identifiable features
- Posterior teeth are 4 x as likely to be filled
- Posterior teeth are 2 x twice as likely to be missing
- Posterior teeth are 6x as likely to have a unique feature (RCT, crowns)

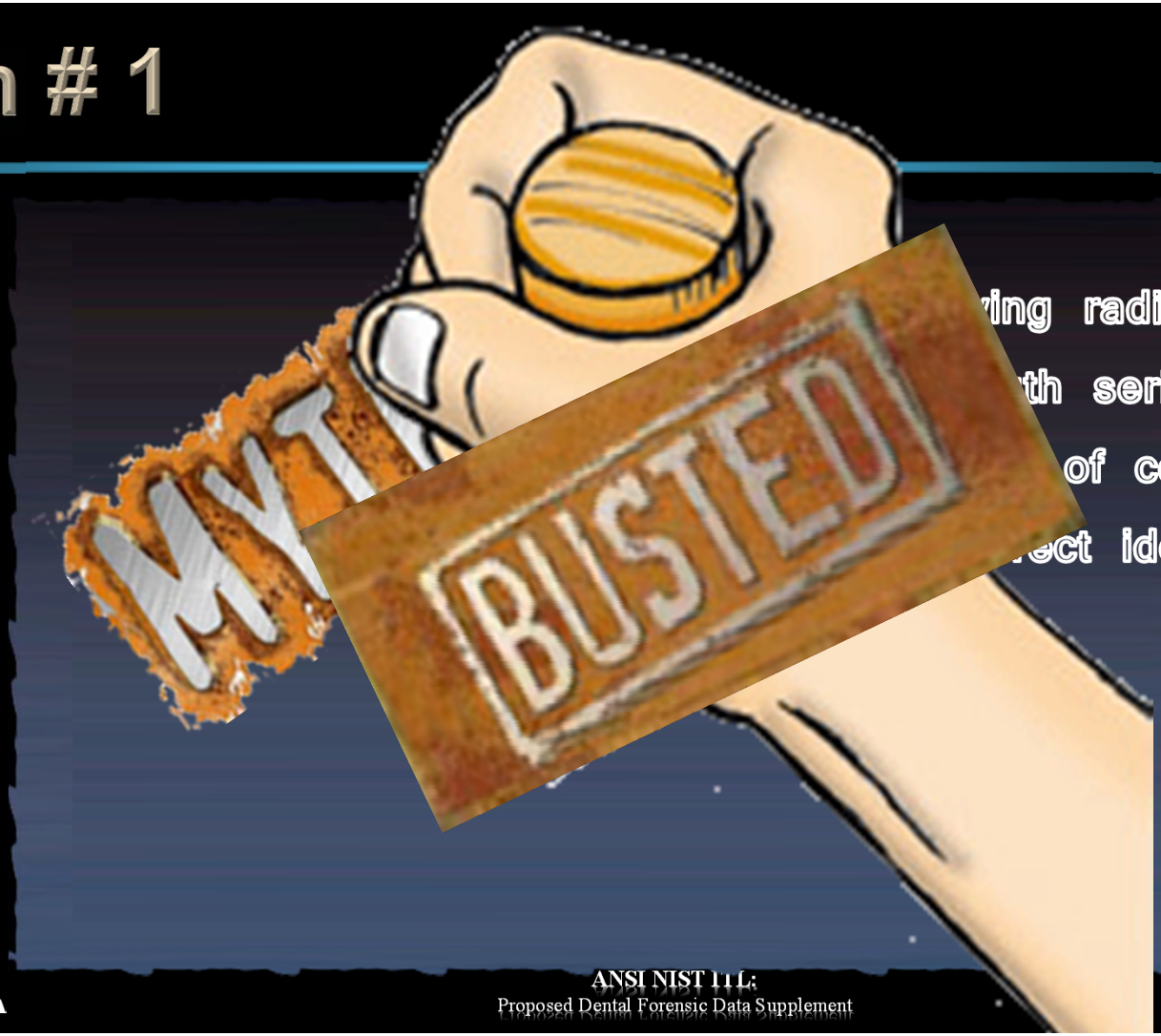
How Is This Possible - Part 2

Database	Percent
Perfect	5.0%
P2	7.5%
P4	7.5%
P6	2.5%
M2	7.5%
M4	7.5%
M6	2.5%
B2 (P1/M1)	20.0%
B4 (P2/M2)	20.0%
B6 (P3/M3)	20.0%
Total	100.0%

Possible Explanation

- UDIM Algorithms are designed to handle fragmentation and BW by using percentages in ranking not absolute numbers (WinID).
- As we discovered from previous disasters our “golden proportion” database contained at least 75% of the records with at least one illogical direction of change
- If the error was in an anterior tooth it would disappear and a 100% match score would occur.

Myth # 1



ing radiographs

th series greatly

of comparison

ect identification

Myth # 2

Older radiographs substantially increases the number of comparison needed to get a correct identification

Myth # 2

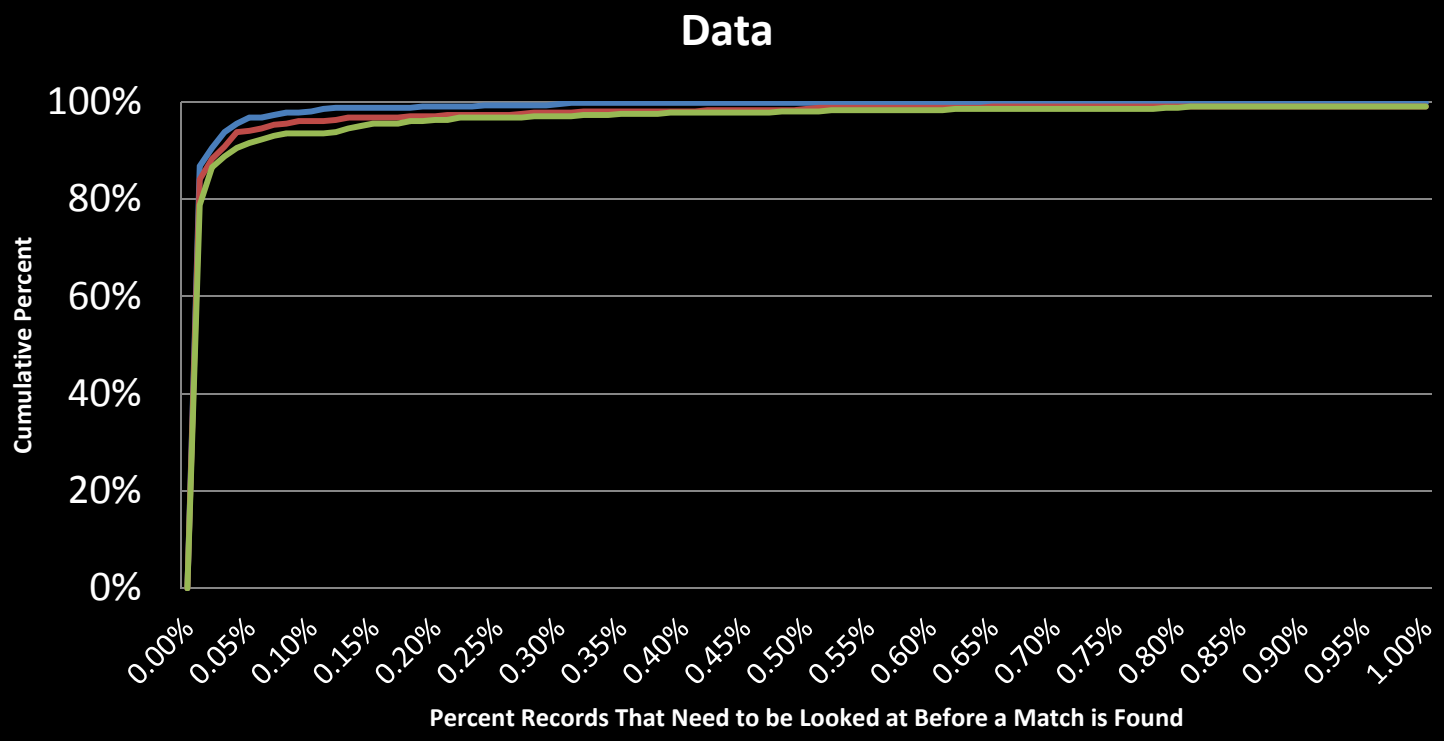
To test the myth we utilized a database of 400 postmortem records against three 30,000 Antemortem records showing differed degrees of logical change

The Database Used

FMS Set

N 1	MODFL 2	MODFL 3	MODFL 4	MODFL 5	MIDFL 6	MIDFL 7	MIDFL 8	MIDFL 9	MIDFL 1	MIDFL 1	MODFL 1	MODFL 1	MODFL 1	MODFL 1	N 1
N 3	MODFL 3	MODFL 3	MODFL 2	MODFL 2	MIDFL 2	MIDFL 2	MIDFL 2	MIDFL 2	MIDFL 2	MIDFL 2	MODFL 2	MODFL 2	MODFL 1	MODFL 1	N 1

Cumulative Frequency



P2

Average	0.03%
Max	4.05%
Min	0.00%
Std Dev	0.21%
95%	0.42%

P4

Average	0.08%
Max	6.65%
Min	0.00%
Std Dev	0.56%
95%	1.12%

P6

Average	0.08%
Max	7.19%
Min	0.00%
Std Dev	0.52%
95%	1.05%

Myth # 2

s substantially

er of comparison

ct identification

Myth # 3

More miscoding per record substantially increases the number of comparison needed to get a correct identification

Myth # 3

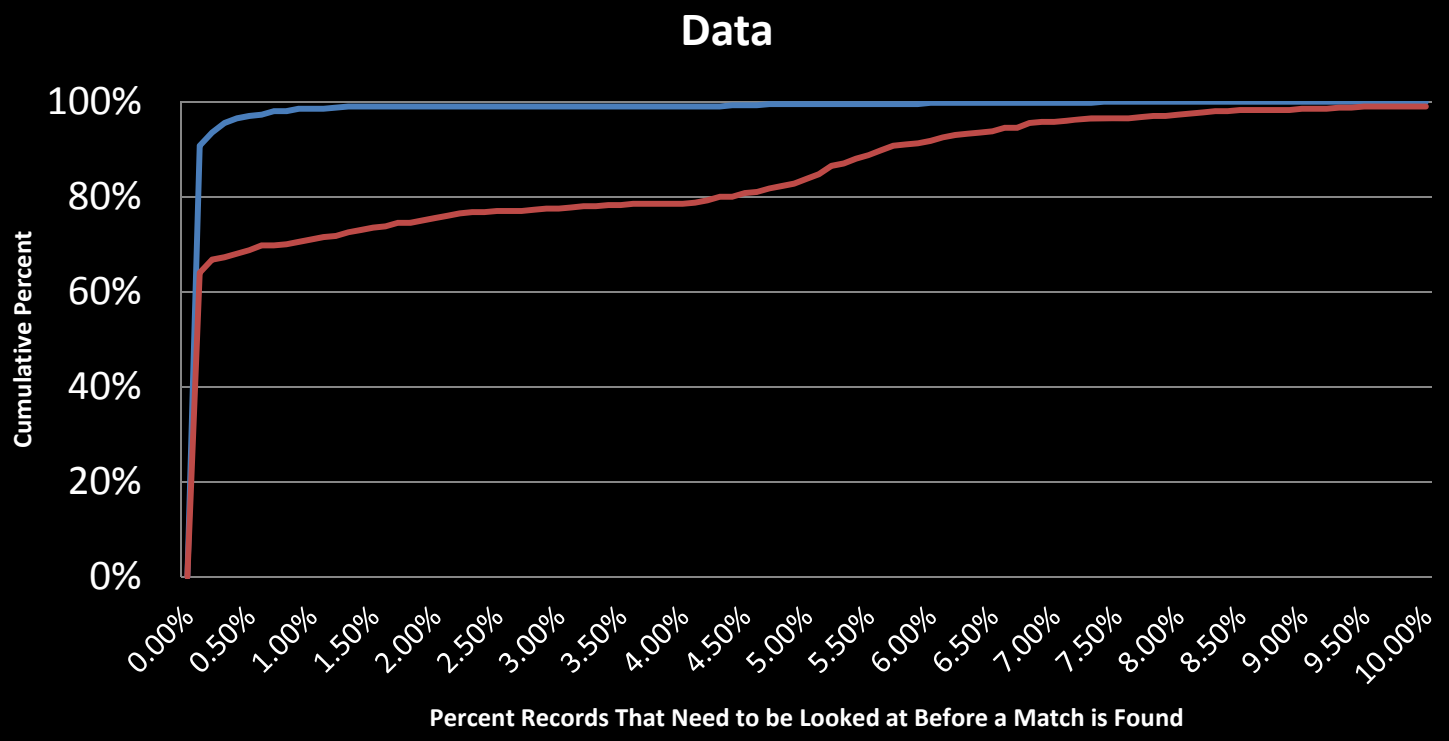
To test the myth we utilized two databases of 400 postmortem records against 30,000 antemortem records one showing significant number of explainable discrepancies the other showing significant number of unexplainable discrepancies

The Databases Used

FMS Set

1 N	2 MODFL	3 MODFL	4 MODFL	5 MODFL	6 MIDFL	7 MIDFL	8 MIDFL	9 MIDFL	1 MIDFL	1 MIDFL	1 MODFL	1 MODFL	1 MODFL	1 MODFL	1 N
3 N	3 MODFL	3 MODFL	2 MODFL	2 MODFL	2 MIDFL	2 MIDFL	2 MIDFL	2 MIDFL	2 MIDFL	2 MIDFL	2 MODFL	2 MODFL	2 MODFL	1 MODFL	1 N

Cumulative Frequency



P6

Average	1.46%
Max	11.55%
Min	0.00%
Std Dev	2.57%
95%	5.13%

M6

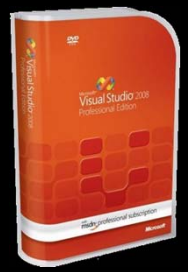
Average	0.10%
Max	7.35%
Min	0.00%
Std Dev	0.59%
95%	1.17%

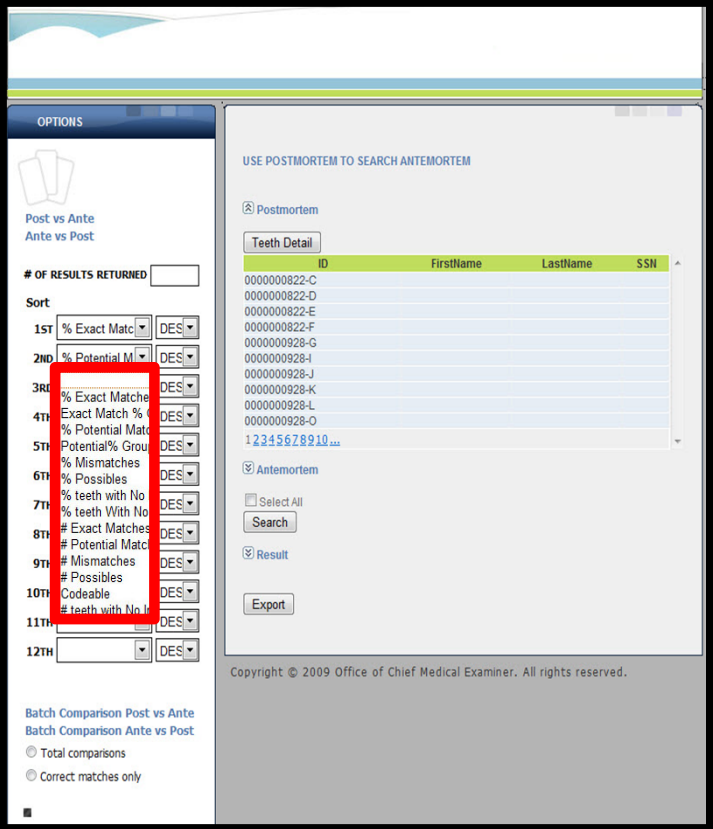
Myth # 3

utilized two databases of
cords against 30,000
e showing significant
crepancies the other
r of unexplainable
ncies

Using the Data

The Algorithmic Benchmarker



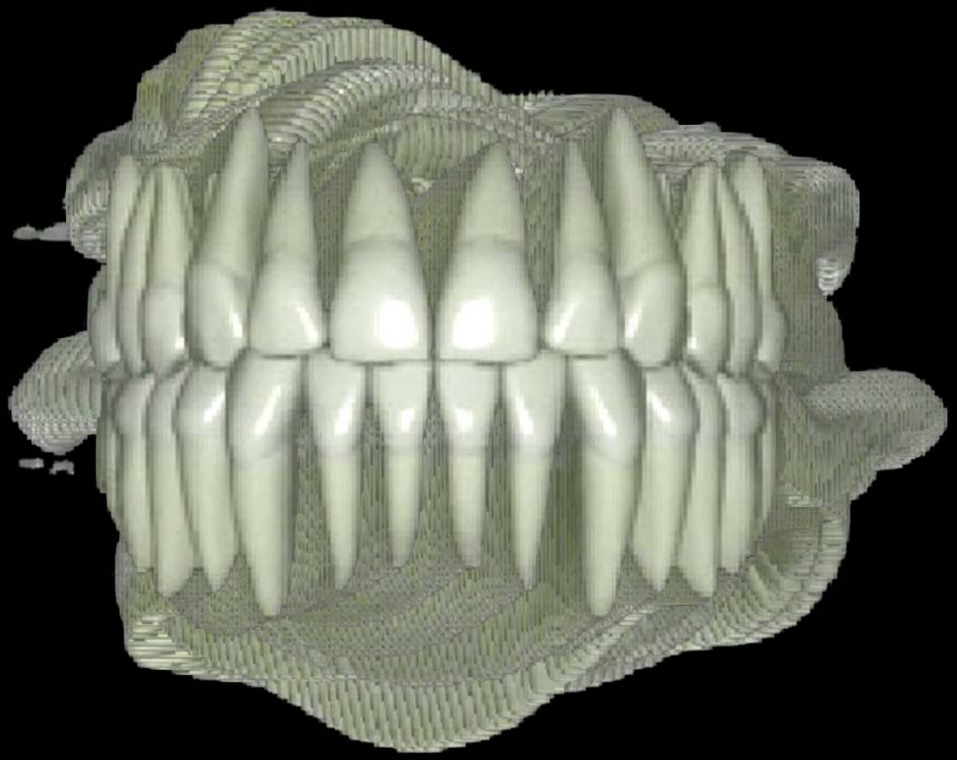


- Data loaded into a SQL Server
- Ability to see the results of multiple sorting options to multiple depths
- Combined with the “program” can test every possible combination of sorting options to multiple depth
- Can fine the “best algorithm” based on numerous benchmarks for different types of data and different sorting combinations

Conclusion

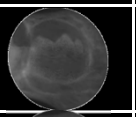
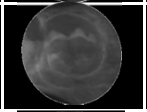
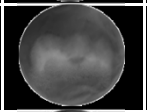
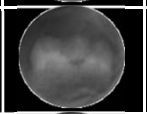
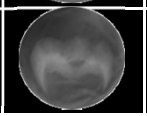
- Current algorithms utilizing detail coding can “list” matches in the top 10% of a comparison list at least 90% of the time.
- Since most forensic software can find matches relatively efficiently algorithm improvements can only come in improvements in the matching the outliers.
- As fluoride becomes more prevalent additional research may be needed with dealing the “Virgin Effect”
- Anthropologically stable landmarks should perhaps be included in Forensics software in order to deal with this problem
- There are numerous scenarios still to explore…

Dental Age Determination



Dental Age of [illegible] Years

Tooth Formation Standards (Smith, I991) Males

Developmental Stage				I_1	1_2	C	P_1	P_1	M_1	M_2	M_3
C_i	Cusp initiation			--	--	0.5	1.8	3.0	0.0	3.7	9.3
C_{co}	Cusps coalesced			--	--	0.7	2.4	3.5	0.2	3.9	9.7
C_{oc}	Cusp outline complete			--	--	1.4	2.9	4.2	0.5	4.7	10.4
$C_{½}$	Crown ½ formed			--	--	2.1	3.7	4.7	1.1	5.1	10.9
$C_{¾}$	Crown ¾ formed			--	--	2.9	4.5	5.4	1.6	5.6	11.6
C_{cc}	Crown completed			--	--	4.0	5.2	6.3	2.2	6.8	12.0

All ages in years Values calculated by B. Holly Smith from Moorrees, Fanning & Hunt (1963a) Adapted from Table 9 in Smith (1991), and Moorrees, Fanning & Hunt (1963a)

Tooth Formation Standards (Smith, I991) Males

Developmental Stage				I_1	I_2	C_1	P_1	P_2	M_1	M_2	M_3
R_i	Root initiated			--	--	4.8	5.9	6.9	2.8	7.1	12.8
R_{ci}	Cleft initiated			--	--	--	--	--	3.6	8.0	13.7
$R_{1/4}$	Root length ¼			--	5.4	5.7	6.9	7.7	4.6	9.4	14.5
$R_{1/2}$	Root length ½			5.3	6.3	8.0	8.6	9.5	5.2	10.1	15.1
$R_{3/4}$	Root length ¾			6.5	7.4	9.6	9.9	10.8	5.9	11.1	16.3
R_c	Root length complete			7.0	8.0	10.2	10.5	11.6	6.3	11.7	16.7
$A_{1/2}$	Apex ½ closed			7.7	8.6	11.8	11.9	12.7	7.6	12.9	18.2
A_c	Apex closed			8.1	9.3	13.0	13.4	14.3	9.4	14.9	20.0

All ages in years Values calculated by B. Holly Smith from Moorrees, Fanning & Hunt (1963a) Adapted from Table 9 in Smith (1991), and Moorrees, Fanning & Hunt (1963a)

Questions So Far???

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