OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Development of 3D databases of human dentitions

Keyword(s): 3D scanning, dental population data, teeth

Submitting subcommittee(s): Odontology **Date Approved:** 8/24/16

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

Large 3D databases of human dentitions do not currently exist. Creation of these databases would provide researchers the ability to investigate variations of dental features. The databases can be used to create dental profiles. An individual's profile can be assessed for relative similarity to other profiles in the databases. Direct comparisons between all profiles or individual profiles in the databases can establish and quantify similarities or differences. Specific profiles can be assessed for frequency of appearance in databases subdivided by sex, age, and ethnicity.

2. Key bibliographic references relating to this research need:

Girod S, Keeve E, Girod B. Advances in interactive craniofacial surgery planning by 3D simulation and visualization. Int J Oral Maxillofac Surg 1995; 24:120 – 125.

Vannier MW, Hildebolt CF, Conover G, Knapp RH, Yokoyama-Crothers N, Wang G. Three-dimensional dental imaging by spiral CT.A progress report. Oral Surg Oral Med Oral Pathol Oral Radiol Endo; 84:561 – 570. 1997

Chen LH, Chen WH. Three-dimensional computer-assisted simulation combining facial skeleton with facial morphology for orthognathic surgery. Int J Adult Orthodon Orthognath Surg 1999; 14: 140 – 145.

Motohashi N, Kuroda T. A 3D computer-aided design system applied to diagnosis and treatment planning in orthodontics and orthognathic surgery. Eur J Orthod 1999; 21: 263 – 274.

Thali et al. Bite Mark documentation and analysis: the forensic 3D/CAD supported photogrammetry approach. Forensic Science International 135 (2), 2003

Martin-de las Heras, S., Valenzuela, A., Ogayar, C., Valverde, A., and Torres, J., "Computer-Based Production of Comparison Overlays from 3D-Scanned Dental Casts for Bite Mark Analysis," Journal of Forensic Sciences, Vol. 50, No. 1, 2005

Evans S, Jones C and Plassmann P. 3D imaging in forensic odontology. Journal of Visual Communication in Medicine. 33. 2010

Bush MA, Bush PJ, Sheets HD, Similarity and match rates of the human dentition in three dimensions: relevance to bitemark analysis. Int J Legal Med 125:779–784, 2011

Sheets HD, Bush PJ, Bush MA, Patterns of variation and match rates of the anterior biting dentition: characteristics of a database of 3-D scanned dentitions. J Forensic Sci 58:60–68, 2013

3a. In what ways would the research results improve current laboratory capabilities?

Large 3D databases of dental features of human dentitions would enhance investigators' capabilities for assessments and quantifications of the similarity or differences among human dentitions.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Large 3D databases should enhance the scientific bases for human identifications and bitemark analyses by supplying qualitative and quantitative data analyses based on robust three dimensional population data.

3c. In what ways would the research results improve services to the criminal justice system?

Improved reliability and validity of comparisons and identifications.

4. Status assessment (I, II, III, or IV): II

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

Subcommittee Approval date: 8-24-2016

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes ☐ No ☐
2. Does the SAC agree with the status assessment? Yes ☐ No ☐

If no, what is the status assessment of the SAC:

Approval date:

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)