DRAFT Meta Data Specification for the NIST Ballistics Toolmark Database

The meta data (data about the data) for the NIST ballistics toolmark database is organized into several linked categories:

1) Study: Meta data describing the properties and creator of a ballistics toolmark study, typically involving several firings from one or more firearms.

2) Creator: Information about the creator of a ballistic toolmark study or the creator of measurement data.

3) Firearm: Meta data describing a firearm used in a ballistic toolmark study.

4) Bullet: Meta data describing a bullet specimen collected in a ballistic toolmark study.

5) BulletMeasurement: Meta data describing measurement data of a bullet specimen.

6) CartridgeCase: Meta data describing a cartridge case specimen collected in a ballistic toolmark study.

7) CartridgeCaseMeasurement: Meta data describing measurement data of a cartridge case specimen.

In addition, each measurement data file contains meta data describing the date of the measurement, person and organization that performed the measurement, the measurement instrument, and the measurement parameters.

The data fields described below are not intended to provide a detailed description, but rather a practical set of major differentiation properties relevant to a research database.

Table 1: Study

This table contains data describing the properties of a ballistic toolmark study.

StudyID : String (primary key)

Unique identifier of the study (generated by the database).

StudyName : String

Name of the study (typically the primary investigator)

Description : Memo

Short description of the study.

LiteratureReference : Memo

(Literature) reference to a report or paper describing the study.

CreatorID : String (foreign key)

Unique identifier of the study creator, typically the principal investigator (Assigned by the database).

HasPersistence : Boolean

Whether the study contains persistence firings (at least two bullet or cartridge case specimens fired from the same firearm with many intermediate firings).

HasConsecutive : Boolean

Whether the study contains firings obtained from firearms with consecutively manufactured components (or in close proximity).

HasDifferentAmmo : Boolean

Whether the study contains different brands of ammunition.

Table 2: Creator

This table contains data describing the creator of a ballistic toolmark study, typically the principal investigator, or the creator of a measurement data file.

CreatorID : String (primary key)

Unique identifier of the creator (Generated by the database).

FirstName : String

First name of the creator.

LastName : String

Last name of the creator.

Organization : String

Name of the creator organization.

Phone : String

Phone number of the creator (Internal NIST use only).

Email : String

Email address of the creator (Internal NIST use only).

Table 3: Firearm

This table contains data describing the properties of the firearm(s) used in a study. For a study involving one firearm with exchanged components, such as firing pins, each table entry describes one instance of the firearm used to generate a ballistic specimen.

FirearmID : String (primary key)

Unique identifier of the firearm instance (Generated by the database).

FirearmName : String

Unique identifier of a firearm instance within a study. This is typically the identifier used by the team that conducted the ballistic toolmark study.

StudyID : String (foreign key, primary key of the Study table)

Unique identifier of the study in which the firearm was used (Assigned by database).

IsConsecutive : Boolean

Whether the firearm component relevant to the generated bullet or cartridge case specimens is part of a set of consecutively manufactured components (or in close proximity).

Brand : String

Firearm brand.

Model : String

Firearm model.

Caliber : Enumeration

Firearm caliber.

FiringPinClass : Enumeration.

Classification of the firing pin surface (e.g., hemispherical, truncated cone, …).

BreechFaceClass : Enumeration

Classification of the breech face surface texture (e.g., arched, granular, striated, …).

NumberOfLands : Integer

Number of lands of the firearm barrel.

TwistDirection : Enumeration

Twist direction of the barrel rifling.

Comment : Memo

Comments about the firearm instance

Table 4: Bullet

This table contains data describing the properties of a bullet specimen obtained in a study.

BulletID : String (primary key)

Unique identifier of a bullet specimen (Generated by the database).

SpecimenName : String

Unique identifier of a bullet specimen within a study. This is typically the identifier used by the team that conducted the ballistic toolmark study.

FirearmID : String (foreign key)

Unique identifier of the firearm used to generate the specimen (Assigned by database).

Brand : String

Brand name of the ammunition.

NominalCaliber : Enumeration

Nominal caliber of the ammunition.

CartridgeDesignation : String

Cartridge model designation used by the manufacturer.

Weight : Enumeration

Weight (grain) of the bullet.

SurfaceMaterial : Enumeration

Material composition of the bullet surface (e.g., copper, brass, or steel).

FiringSequence : Integer

Field indicating the sequence number of the firing for a persistence study.

LotNumber : String

Manufacturing lot number of the ammunition.

Comment : Memo

Comments about the bullet specimen.

Table 5: BulletMeasurement

This table contains data describing the properties of a bullet measurement.

BulletMeasurementID : String (primary key)

Unique identifier of a bullet measurement (Generated by database).

BulletID : String (foreign key)

Unique identifier of the measured bullet specimen (Assigned by database).

CreatorID : String (foreign key)

Unique identifier of the creator of the measurement data (Assigned by database).

FileName : String

Name of the measurement data file.

MeasurementType : Enumeration

Type of measurement (e.g., stylus, disk scanning confocal, reflectance microscopy).

Measurand : Enumeration

Classification of the measured quantity (2D profile, 3D topography, or photo image).

RegionOfInterest : Enumeration

Measured specimen region (e.g., land engraved area or groove engraved area).

LeaOrGeaNumber : Integer

Number of the measured land engraved area or groove engraved area.

InstrumentBrand : String

Brand name of the measurement instrument.

InstrumentModel : String

Model designation of the measurement instrument.

LateralResolution : Real

Nominal lateral distance between two neighboring measurement points or pixels in micrometers.

VerticalResolution : Real

For 2D profile or 3D topography measurements, the resolution of the measurement data in the direction orthogonal to the measured surface.

LightingType : Enumeration

For photo images, the type of lighting used (e.g., ring light, or 3-o'clock side light)

ObjectiveMagnification :   Real

                Magnification of the objective.

ObjectiveNA   :   Real

                Numerical aperture of the objective.

Comment   :   Memo

                Comments about the measurement

Table 6: CartridgeCase

This table contains data describing the properties of a cartridge case specimen obtained in a study.

CartridgeCaseID   :   String (primary key)

                Unique identifier of a cartridge case specimen (Generated by the database).

SpecimenName   :   String

                Unique identification number of a cartridge case specimen within a study. This is typically the identifier used by the team that conducted the ballistic toolmark study.

FirearmID   :   String (foreign key)

                Unique identifier of the firearm used to generate the specimen (Assigned by the database).

Brand   :   String

                Brand name of the ammunition.

NominalCaliber   :   Enumeration

                Nominal caliber of the ammunition.

CartridgeDesignation :   String

                Cartridge model designation used by the manufacturer.

CaseMaterial   :   Enumeration

                Material composition of the cartridge case surface, excluding primer (e.g., copper, brass, or steel).

PrimerSurfaceMaterial   :   Enumeration

                Material composition of the primer surface (e.g., brass or nickel).

FiringSequence   :   Integer

Field indicating the sequence number of the firing for a persistence study.

LotNumber   :   String

Manufacturing lot number of the ammunition.

Comment   :   Memo

Comments about the bullet specimen.

Table 7: CartridgeCaseMeasurement

This table contains data describing the properties of a cartridge case measurement.

CartridgeCaseMeasurementID   :   String (primary key)

Unique identifier of a cartridge case measurement. Generated by the database.

CartridgeCaseID   :   String (foreign key)

Unique identifier of the measured cartridge case specimen (Assigned by database).

CreatorID   :   String (foreign key)

Unique identifier of the creator of the measurement data (Assigned by database).

FileName   :   String

Name of the measurement data file.

MeasurementType   :   Enumeration

Type of measurement (e.g., stylus, disk scanning confocal, reflectance microscopy).

Measurand   :   Enumeration

Classification of the measured quantity (2D profile, 3D topography, or photo image).

HasBreechFace   :   Boolean

Whether the measured area includes the breech face impression.

HasFiringPin   :   Boolean

Whether the measured area includes the firing pin impression.

HasEjectorMark   :   Boolean

Whether the measured area includes the ejector mark.

HasApertureShear : Boolean

Whether the measured area includes the firing pin aperture shear.

InstrumentBrand : String

Brand name of the measurement instrument.

InstrumentModel : String

Model designation of the measurement instrument.

LateralResolution : Real

Nominal lateral distance between two neighboring measurement points or pixels in micrometers.

VerticalResolution : Real

For 2D profile or 3D topography measurements, the resolution of the measurement data in the direction orthogonal to the measured surface.

LightingType : Enumeration

For photo images, the type of lighting used (e.g., ring light, or 3-o'clock side light)

ObjectiveMagnification : Real

Magnification of the objective.

ObjectiveNA : Real

Numerical aperture of the objective.

Comment : Memo

Comments about the measurement.