MICROSCOPE Specifications

Instrument
ID
Name
AnnotationRef

MicroscopeBody
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
EyepieceFieldNumber
AnnotationRef

MicroscopeTable
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
TableWidth
TableDepth
AnnotationRef

IntensityCalibrationTool
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
AnnotationRef

SampleHolder
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
MovementAxes
XTravelRange
YTravelRange
ZTravelRange
MaxVelocity
Type
RotationAngle
AnnotationRef

Children Entities (choose one)
- ObjectiveTurret
- MechanicalStage
- PiezoElectricStage
- PiezoElectricObjective

IS-A

Focusing-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
MovementAxes
XTravelRange
YTravelRange
ZTravelRange
MaxVelocity
Resolution
PositionLinearityError
SettlingTime
Repetability

AutoFocus
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
AnnotationRef

LightSource-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
NominalPower
AnnotationRef

IS-A

Children Entities (choose one)

Laser
Type
LaserMedium
Wavelength
FrequencyMultiplication
Tuneable
Pulse
PockelCell
RepetitionRate

Pump
ID (LightSourceID)

Filament
Type

Arc
Type

LightEmittingDiode
Type

LEDModule
PeakWavelenght
LumenPower
ProjectionAngle
CutIln
CutOut
WavelenghtProfileFIle

GenericExcitationSource
(The GenericExcitationSource element is used to represent a source as a collection of key/value pairs, stored in a Map. The other lightsource objects should always be used in preference to this if possible)

LightSourceCoupling-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Transmittance
CouplingLensRef
AnnotationRef

IS-A

Children Entities (choose one)

LightGuide
Type
PeakWavelength
RefractiveIndex
NumericalAperture
AcceptanceAngle
Geometry
MaterialName
SingleMode
WaveguideMode
Diameter

WavelengthRange
CutIln
CutOut
WavelenghtProfileFile

Direct
Mount
Type

Optovar
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
LensType
Magnification
AnnotationRef

Objective
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Correction
NominalMagnification
CalibratedMagnification
LensNA
NominalImmersionMedium
Infinity
CoverslipTickness
WorkingDistance
Iris
ObjectiveFieldNumber
ParfocalizingDistance
BackFocalPlanePosition
AnnotationRef

ExcitationFilterRef
ID (FilterID)

DichroicRef
ID (MirrorID)

EmissionFilterRef
ID (FilterID)

FilterSet
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
AnnotationRef

Children Entities (choose one)
- ExcitationFilter
- EmissionFilter
- AdditionalFilter

Lens-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
Geometry
Construction
Magnification
AttenuationCoefficient
RadiusOfCurvature
FocalDistanceToObject
FocalDistanceToImage
FocalLenght
MaterialName
GlassCode
RefractiveIndex
AbbeNumber
Density
Diameter
AnnotationRef

Children Entities (choose one)
- AdditionalLens — ID (FilterID)
- CouplingLens — ID (FilterID)
- RelayLens — ID (FilterID)

IS-A

Filter
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
ReflectionCoating
FilterWheel
TransmittanceProfileFie
AnnotationRef

IS-A

TransmittanceRange
CutIn
CutOut
Transmittance

Prism
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Type
Geometry
Reflectance
PrismAngle
AngleOfIncidence
DeviationAngle
MaterialName
GlassCode
RefractiveIndex
AbbeNumber
Density
WavelengthRange
AnnotationRef

WavelengthRange
CutIn
CutOut
WavelenghtProfileFile

Mirror-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Reflectance
MirrorType
Geometry
AngleOfIncidence
RadiusOfCurvature
SubstrateType
SubstrateMaterial
GlassCode
AnnotationRef

IS-A

Children Entities (choose one)

Reflector

Beamsplitter
Transmittance
TranmissionAngle

Dichroic
DichroicType
HardSputtered
AttenuationLevel
AttenuationMethod
Technology
Polarization
FilterWheel
TransmittanceProfileFile
ReflectanceProfileFile

TransmittanceRange
CutIn
CutOut
Transmittance

ReflectanceRange
CutIn
CutOut

PolarizationOptics
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Function
Construction
Fabrication
Retardation
MaterialName
GlassCode
WavelengthRange
AnnotationRef

WavelengthRange
CutIn
CutOut
WavelenghtProfileFile

Detector-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
Gain
Mount
ReadNoise
DetectorNoiseModel
DarkCurrentRate
PeakWavelength
QuantumEfficiencyatPeakWavelength
AmbientOperatingTemperature
AbientOperatingHumidity
AnnotationRef

IS-A

Children Entities (choose one)

PhotoMultiplier
Type (PMT, Photodiode, APD)
RadiantSensitivity

Camera-APE
Illumination
ArrayWidth
ArrayHeight
PixelWidth
PixelHeight
ImageWidth
ImageHeight
PixelWellCapacity
RegisterWellCapacity
VerticalClockSpeed
MaximumFrameRate
MaximumReadoutRate

IS-A

Children Entities (choose one)
- CCD — Type (Conventional, EMCCD, Interline)
- IntensifiedCCD — Type (Conventional, EBCCD)
- AnalogVideo
- CMOS — Type (Conventional, Scientific) ReadOutMode

GenericDetector
(The GenericDetector element is used to represent a source as a collection of key/value pairs, stored in a Map. The other lightsource objects should always be used in preference to this if possible.)

WavelengthRange
CutIn
CutOut
WavelenghtProfileFile

Notes	Legend
Units are omitted for simplicity sake. APE, Abstract Parent Entity AnnotationRef: This element always refers to a Comment/ Annotation element as described for Channel. However for simplicity sake most Comment/Annotation elements have been omitted and the AnnotationRef has been inserted in the referring element as an attribute. For questions or comments please contact: caterina.strambio@umassmed.edu	This is a graphical representation of a possible extension of the OME data model developed by members of the Imaging Working Group of the 4D Nucleome consortium. The graph utilizes the Entity-Relationship formalism. In this formalism information about a real world situation/thing (in our case a Microscope and an image acquired using that instrument) are represented by three types of model elements: 1) Entities = Boxes; 2) Relationships = lines connecting boxes; 3) Attributes = fields within boxes When describing a real life situation/thing: 1)ENTITIES corresponds to NOUNS = the things we want to collect information about. 2) RELATIONSHIPS corresponds to VERBS = actions/state/occurrence that connect Entities with each other 3) ATTRIBUTES corresponds to ADJECTIVES = the actual information about each Entity we want to collect In order to read the schema please start from INSTRUMENT and from and IMAGE for the Specifications and Settings section respectively. Then follow the lines to the connected boxes and think something like: 1) An Instrument has a Microscope_Body, might rest on a Microscope_Table, and has a Light_Source etc.; 2) An Image was produced as part of a specific Experiment, was collected in a specific Imaging_Environment, was collected using specific Microscope_Settings etc.

IMAGE ACQUISITION Settings

ImagingEnvironment
Temperature
AirPressure
Humidity
CO2Percent

MicroscopeSettings
ID (MicroscopeID)
FieldOfView
TotalEffectiveMagnification
OptovarRef
ObjectiveRef

TIRFSettings
ID
ThroughLens
TIRFAngle
Geometry
AnnotationRef

Description
A description for the TIRFsettings [plain-text multi-line string]

ObjectiveSettings
ID (ObjectiveID
CorrectionCollar
ImmersiumMedium
ImmersionRefractiveIndex
MeasuredRefractiveIndex
Temperature

Description
A description for the Microbeam Manipulation [plain-text multi-line string]

MicrobeamManipulation
ID
Type
ExperimenterRef
ROIRef

LightSourceSettings
ID (LightSourceID)
Attenuation
Wavelenght
WavelengthUnit
OutputPower
PowerAtSample

Description
A description for the experiment [plain-text multi-line string]

Experiment
ID
Name
Type
LabellingMethod
ExperimenterRef

Ref.

Sample
ID
Name
MountingMedium
MountingMediumRefractiveIndex
Sample/Description
AnnotationRef

Image
ID
Name
AcquisitionDate
SizeX
SizeY
SizeZ
SizeC
SizeT
PhysicalSizeX
PhysicalSizeY
PhysicalSizeZ
TimeIncrement
DimensionOrder
ChannelOrder
PixelType
SignificantBit
Interleaved
BigEndian
___
Image/Description
InstrumentRef
ExperimenterRef
ExperimentGroupRef
ROIRef
MicroBeamManipulationRef
AnnotationRef

Image Data
- TiffData
- TiffData
- TiffData
- IFD
- FirstZ
- FirstT
- FirstC
- PlaneCount
- UUID

Planes
- Plane
- Plane
- Plane
- TheZ
- TheT
- TheC
- Timestamp
- ExposureTime
- HashSHA1
- AnnotationRef

Channels
- Channel
- Channel
- Channel
- ID
- Name
- SamplesPerPixel
- IlluminationType
- PinholeSize
- AcquisitionMode
- ContrastMethod
- ExcitationWavelenght
- EmissionWavelength
- Fluorophore
- NDFilter
- PockelCellSetting
- Color

OpticalCalibration ImageRef
ID (ImageID)

Optical CalibrationReportRef
ID (FileURI)
OpticalCalibrationSoftware

OpticalCalibration
ID
Date
MedianSpotSize_FWHM
MedianTheoretical_FWHM
MinSpotSize_FWHM
MinTheoretical_FWHM
MaxSpotSize_FWHM
MaxTheoretical_FWHM
ZSpotSize_FWHM
ZTheoretical_FWHM
Planarity
Asymmetry
LateralChromaticShift
AxialChromaticShift
AnnotationRef

Children entities (choose one)
- ColoredBeadsSlide — BeadSize, BeadsConcentration, BeadVolume, BeadEmissionWavelenght, Type
- CalibrationSlide — Type, CalibratedMeasure
- DNAOrigami — Type

IS-A

OpticalStandard-APE
Manufacturer
Model
SerialNumber
LotNumber
SpecsFile
___
ID
Name
AnnotationRef

FieldCalibration
ID
Date
AnnotationRef

FlatFieldImageRef
ID (ImageID)

Children Entities (choose one)

ExcitationCalibration
ObservedExcitationWavelength
ObservedExcitationPower
Observed ExcitationVariance

DetectorCalibration
Method

IS-A

Intensity Calibration-APE
ID
Date
Description
IntensityCalibrationToolRef
AnnotationRef

CalibrationMap
MetricType
IlluminationIntensity
NrOfImages

Row
RowNr

Cell
CellNr
CellValue

MechanicalCalibration
ID
Date
MeasuredLateralDrift
MeasuredFocalDrift
MeasuredRepeatability
MeasuredSettlingTime
FocusingRef
AutoFocusRef
SampleHolderRef
AnnotationRef

SamplePosition
ID
Name
SamplePositionX
SamplePositionY
SamplePositionZ
SampleHolderRef

FocalPosition
ID
Name
StagePositionZ
FocusingRef
AutoFocusRef

LightSourceSettings
ID (LightSourceID)
Attenuation
Wavelenght
OutputPower
PowerAtSample

LightPath
ID
Name
AnnotationRef

DetectorSettings-APE
ID (DetectorID)
EffectiveOffset
Integration
CameraFieldOfView

IS-A

AnnotationRef
ID (AnnotationID)

Ref

LightSourceCouplingRef
ID (CouplingID)

FilterSetRef
ID (FilterSetID)

ExcitationFilterRef
ID (FilterID)

DichroicRef
ID (MirrorID)

EmissionFilterRef
ID (FilterID)

AdditionalOptics
ID
Name
AnnotationRef

AdditionalLensRef
ID (LensID)

PrismRef
ID (PrismID)

PolarizationOpticsRef
ID (PolarizationOpticsID)

AdditionalFilterRef
ID (FilterID)

AdditionalMirrorRef
ID (MirrorID)
ActualMountedAngle

Children Entities (choose one)

CameraSettings
Binning
AnalogToDigitalConverter
EMGain
ReadoutRate
FrameRate
OperatingTemperature

PhotoMultiplierSettings
PMTGain
PMTVoltage
EffectiveZoom

CommentAnnotation
ID
Namespace
Annotator (ExperimenterID)

Description
A description for the annotation. [plain-text multi-line string]

AnnotationRef
ID (AnnotationID)

Value
[string]