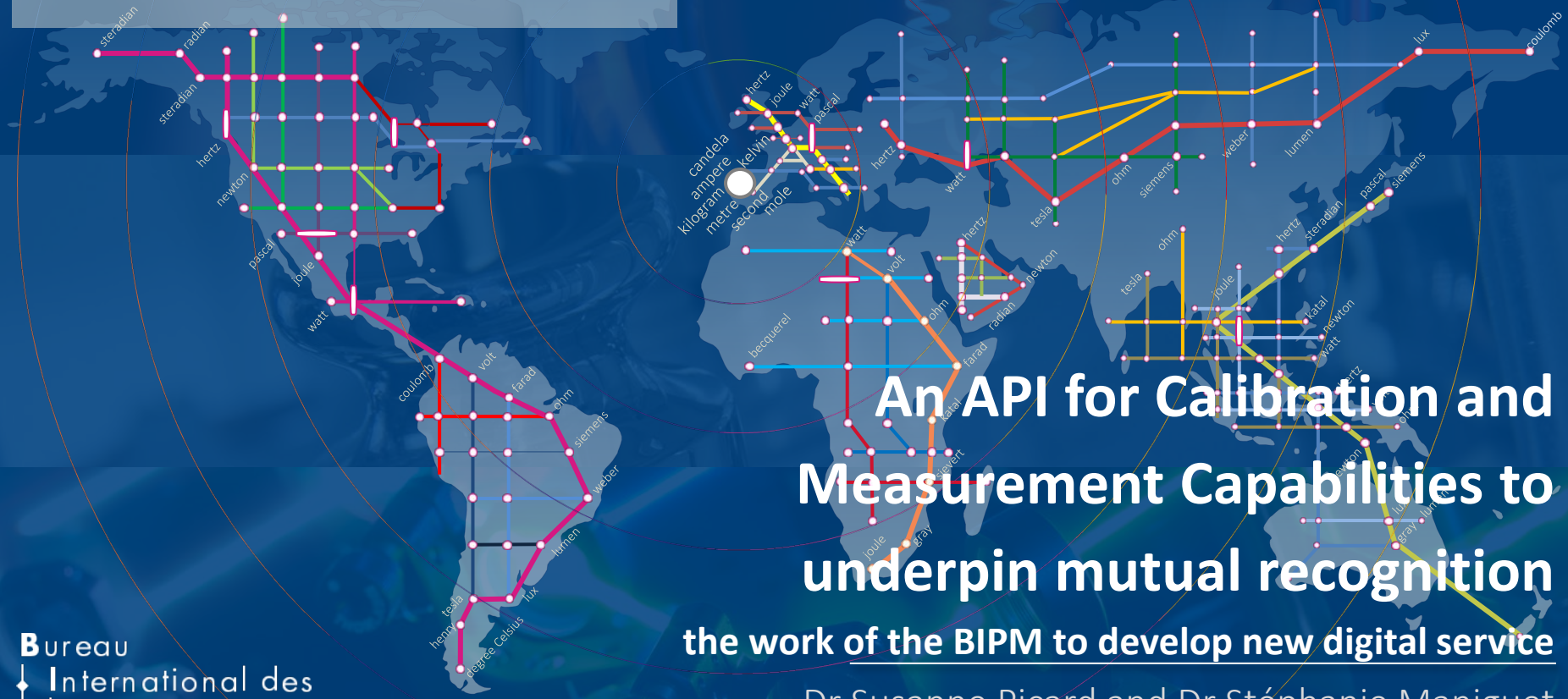
SciDataCon 2022 – 22 June 2022



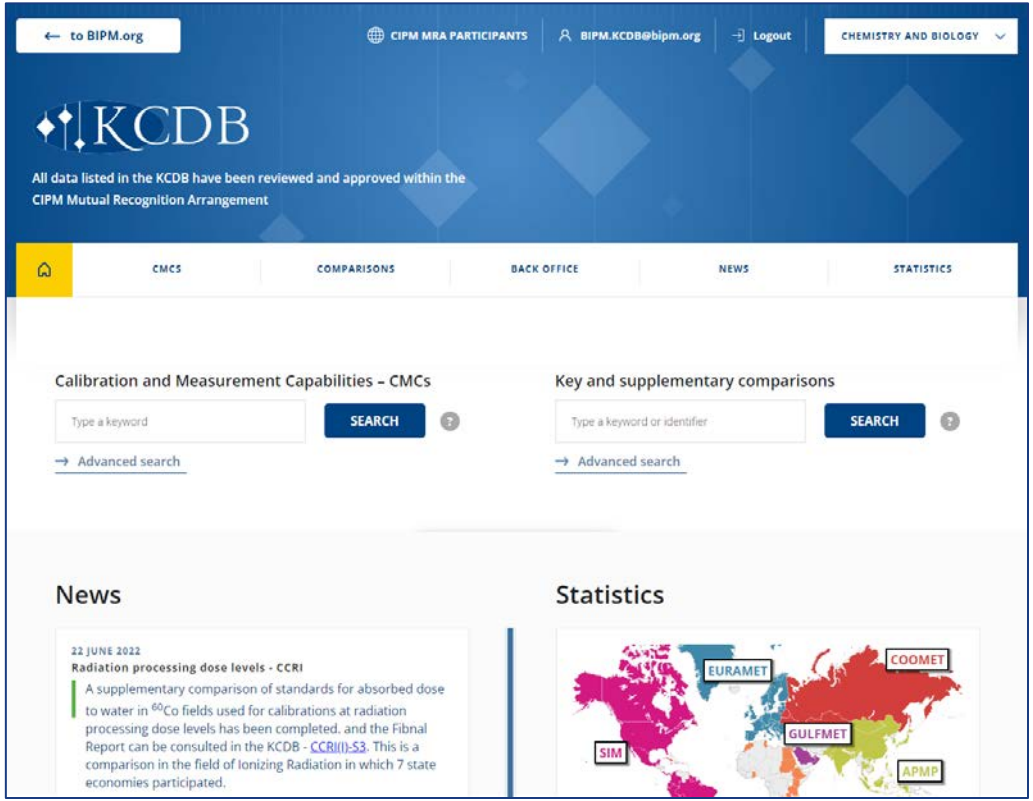
An API for Calibration and Measurement Capabilities to underpin mutual recognition

the work of the BIPM to develop new digital service

Dr Susanne Picard and Dr Stéphanie Maniguet
BIPM

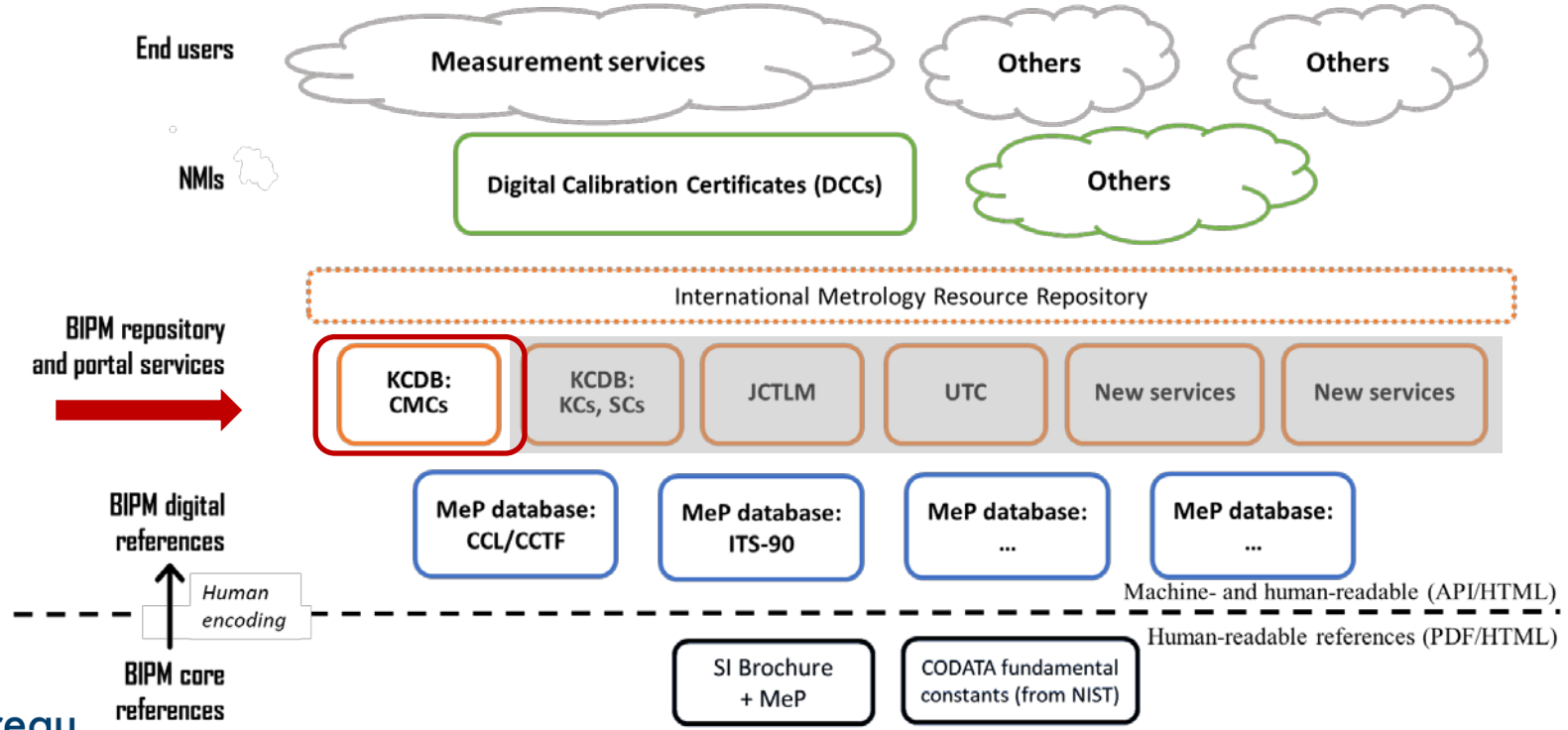
Bureau International des Poids et Mesures

CIPM MRA and API KCDB



CIPM MRA

Application and Programming Interface for published CMCs
- API KCDB -



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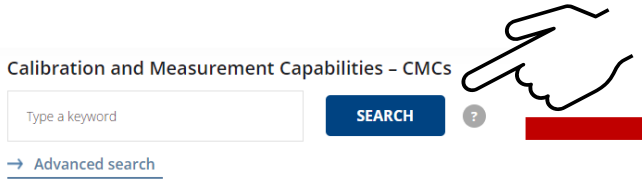
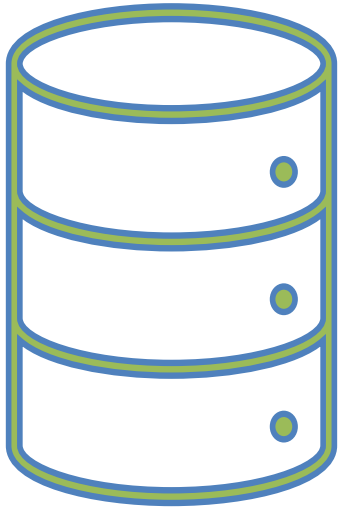
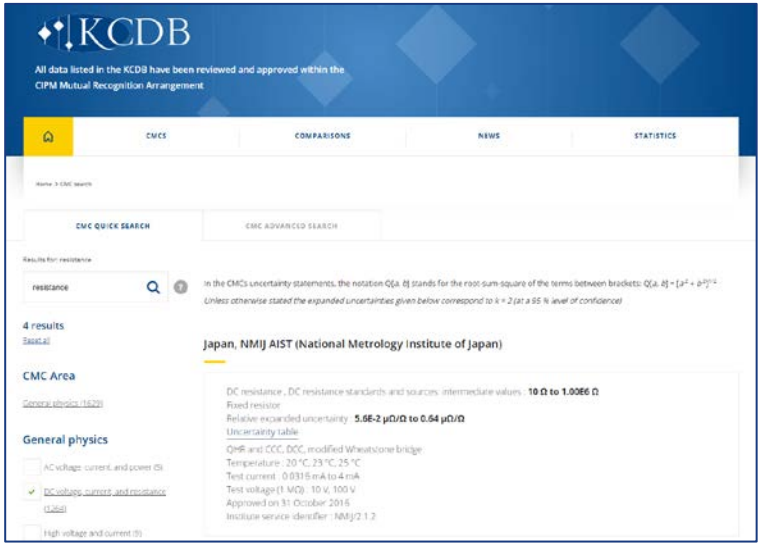
KCDB web

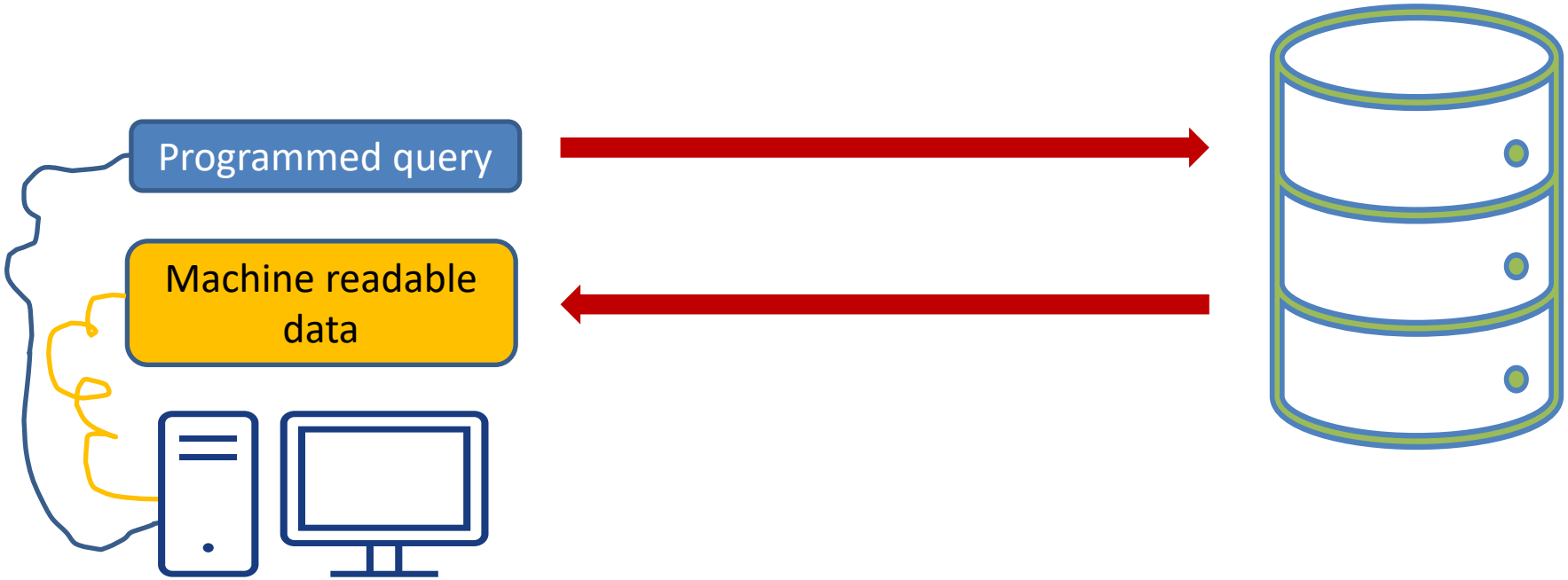






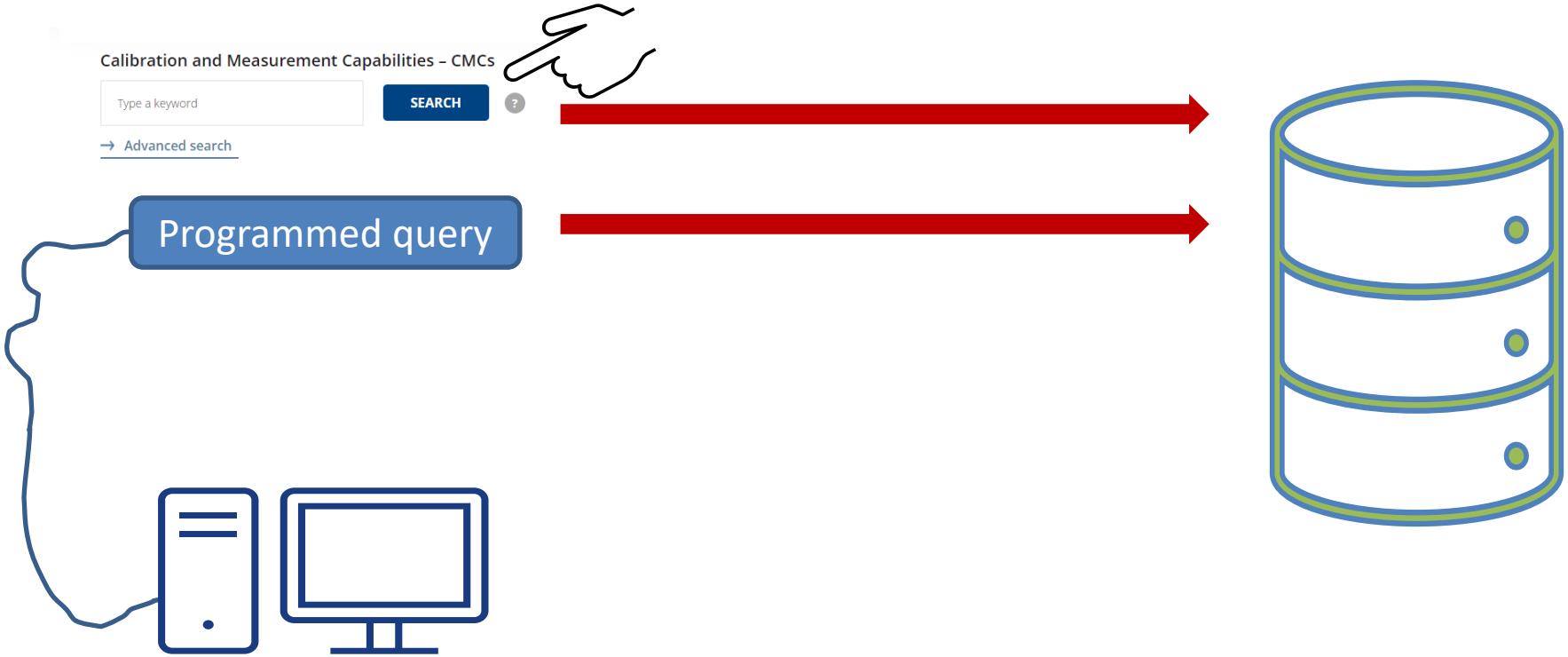
https://www.bipm.org/kcdb/

API - Application Programming Interface



https://www.bipm.org/kcdb/

API - Application Programming Interface



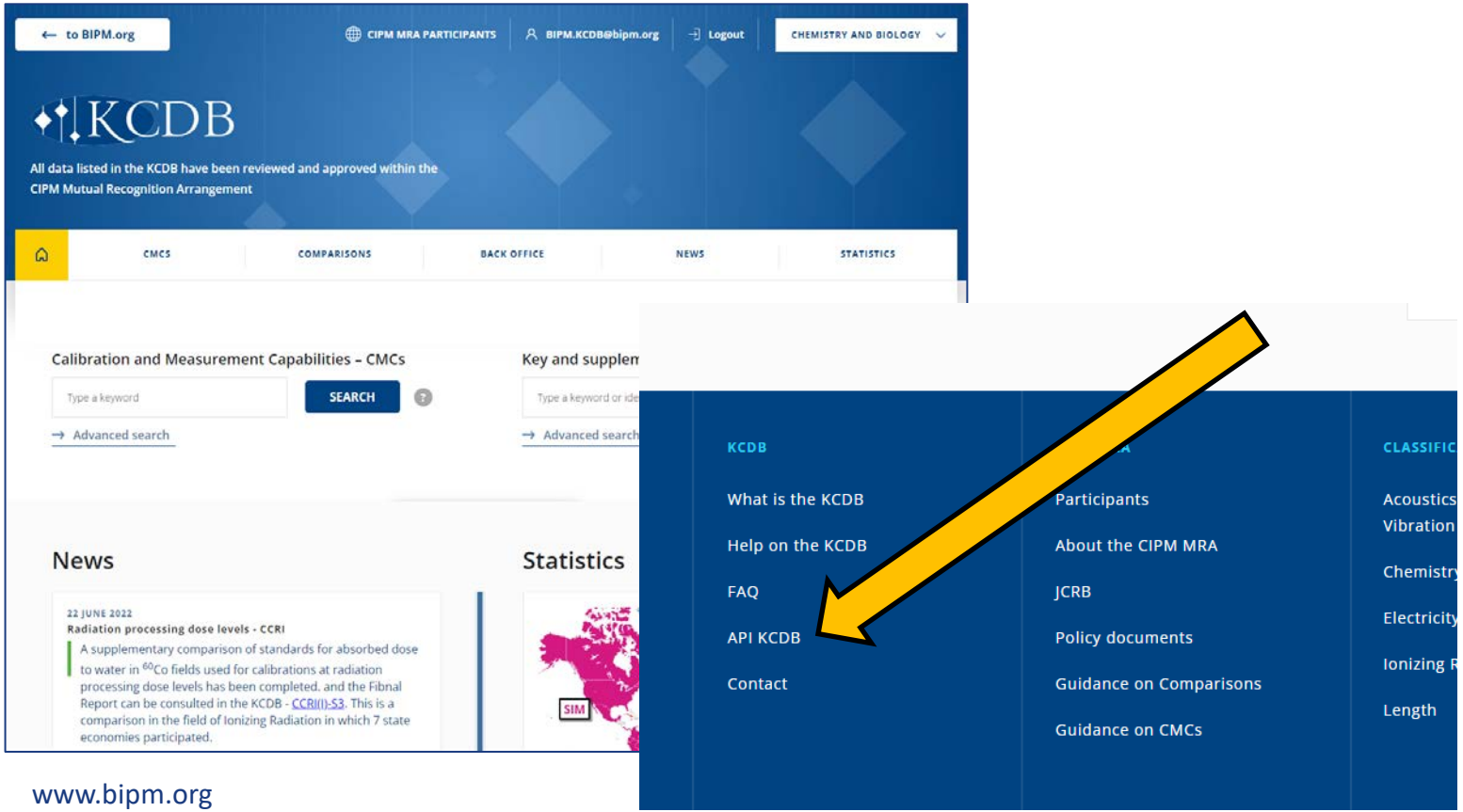
https://www.bipm.org/kcdb/

Advantages of an API KCDB

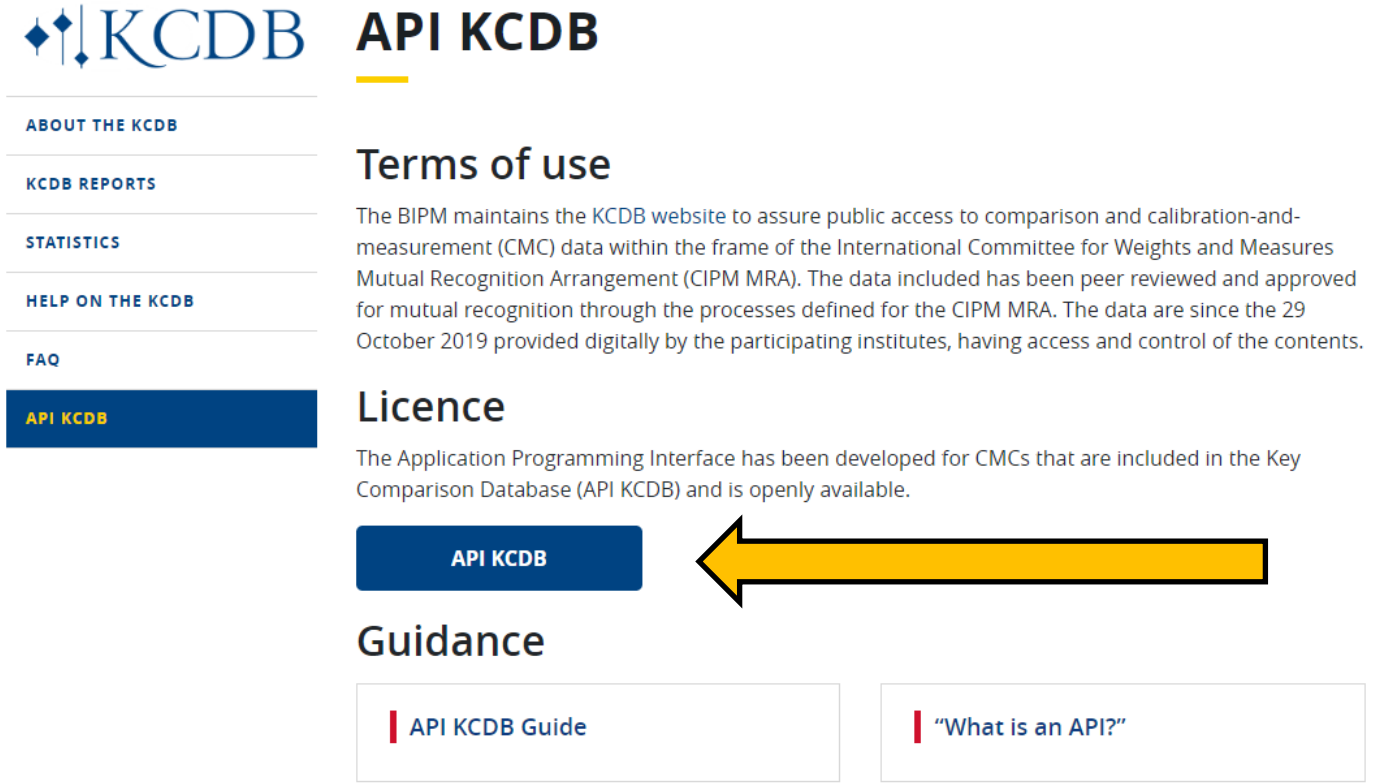
Possibility …

- to provide machine readable CMCs that can be referred to by Digital Calibration Certificates issued by National Metrology Institutes
- to follow the life cycle of a CMC by accessing obsolete data (presently not openly available)
- to enlarge statistical data treatment
- to combine CMC data with other types of information (“big data”)
- to adapt part of the contents to other languages than English

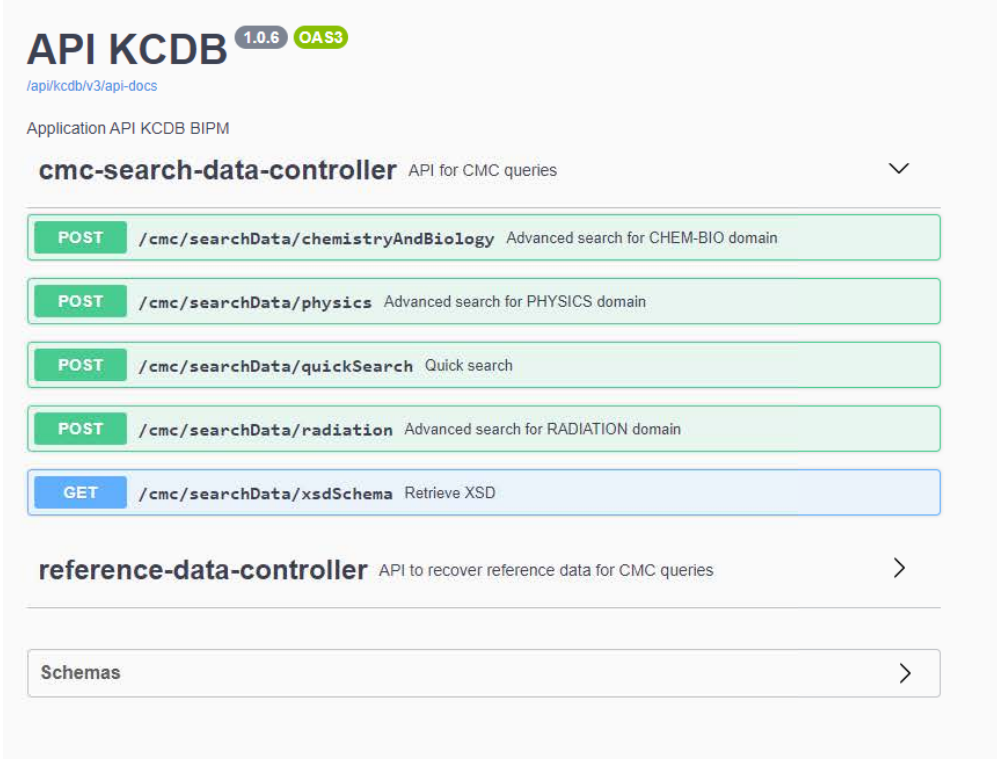
Get access to information on API KCDB



Get access to information on API KCDB



Access API KCDB



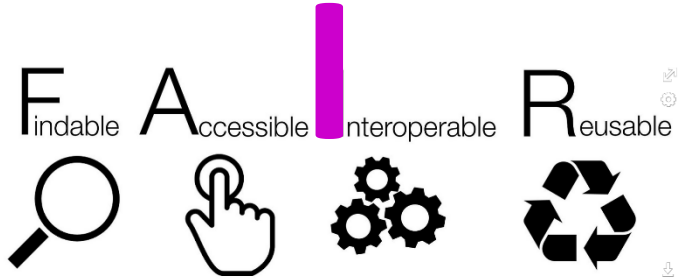
- possibility to program advanced (menu based) or quick (search word) search
- queries and results in xml or json
- supported by a guide for users not acquainted with the KCDB contents

Example of API KCDB query - xml

```
<?xml version="1.0" encoding="UTF-8"?>
<SearchCriteriaPhysics>
   <page>0</page>
   <pageSize>20</pageSize>
   <showTable>false</showTable>
   <metrologyAreaLabel>EM</metrologyAreaLabel>
   <branchLabel>EM/DC</branchLabel>
   <physicsCode>1.1.1</physicsCode>
   <keywords>voltage</keywords>
    <countries>
      <countryLabel>JP</countryLabel>
   </countries>
   <publicDateFrom>2005-01-31</publicDateFrom>
   <publicDateTo>2022-05-30</publicDateTo>
</SearchCriteriaPhysics>
```

```
<ResultsPhysics>
.
<status>Published</status>
<statusDate>2021-07-13</statusDate>
<kcdbCode>APMP-EM-JP-00000D0A-2</kcdbCode>
<metrologyAreaLabel>EM</metrologyAreaLabel>
<rmo>APMP</rmo>
<countryValue>Japan</countryValue>
<nmiCode>NMIJ AIST</nmiCode>
<nmiName>National Metrology Institute of Japan</nmiName>
<nmiServiceCode>NMIJ/1.1.1</nmiServiceCode>
<quantityValue>DC voltage sources: single values</quantityValue>
<cmc>
   <lowerLimit>1.0</lowerLimit>
   <upperLimit>10.0</upperLimit>
   <unit>V</unit>
</cmc>
<cmcUncertainty>
   <lowerLimit>8.0</lowerLimit>
   <upperLimit>45.0</upperLimit>
   <unit>nV</unit>
</cmcUncertainty>
.
<subServiceValue>DC voltage sources</subServiceValue>
<individualServiceValue>Single values</individualServiceValue>
</ResultsPhysics>
```

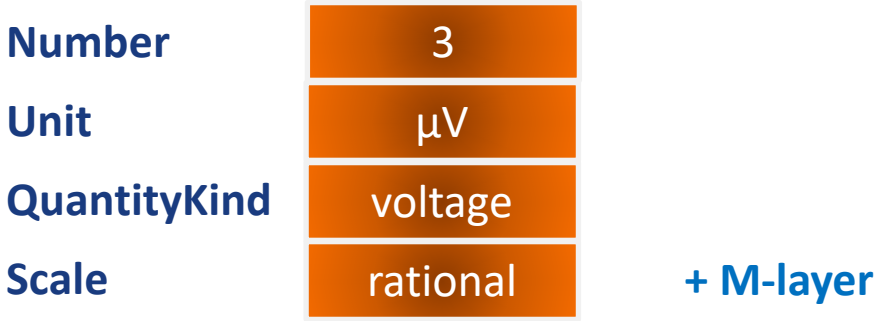
API KCDB and FAIR



Permit a universal exchange of data

API KCDB and FAIR

Preliminary **data model**
developed by the « expert group » under the auspices of CIPM TG-DSI



API KCDB and FAIR

Preliminary **data model**
developed by the « expert group » under the auspices of
CIPM TG-DSI

Number	10	55
Unit	dimensionless	dimensionless
QuantityKind	mole fraction	mass fraction
Scale	rational	rational

API KCDB and FAIR


```
<?xml
<Sear
  <pa
  <pa
  <sh
  <m
  <br
  <physicsCode>1.1.1</physicsCode>
  <keywords>voltage</keywords>
   <countries>
     <countryLabel>JP</countryLabel>
  </countries>
  <publicDateFrom>2005-01-31</publicDateFrom>
  <publicDateTo>2022-05-30</publicDateTo>
</SearchCriteriaPhysics>
```



```
<unit>V</unit>
<unit>µV</unit>
<quantityValue>DC voltage sources:
single values</quantityValue>
```



```
te>
/kcdbCode>
yAreaLabel>

e>

itute of Japan</nmiName>
erviceCode>
<quantityValue>DC voltage sources: single values</quantityValue>
<cmc>
   <lowerLimit>1.0</lowerLimit>
   <upperLimit>10.0</upperLimit>
   <unit>V</unit>
</cmc>
<cmcUncertainty>
   <lowerLimit>8.0</lowerLimit>
   <upperLimit>45.0</upperLimit>
   <unit>nV</unit>
</cmcUncertainty>
.
<subServiceValue>DC voltage sources</subServiceValue>
<individualServiceValue>Single values</individualServiceValue>
</ResultsPhysics>
```

API KCDB and FAIR

<unit>**V**</unit>

<unit>**µV**</unit>

<quantityValue>**DC voltage sources: single values**</quantityValue>

web ontology

web ontology

All data, including meta data, to become interoperable:
use recognized systems, standards and web ontologies

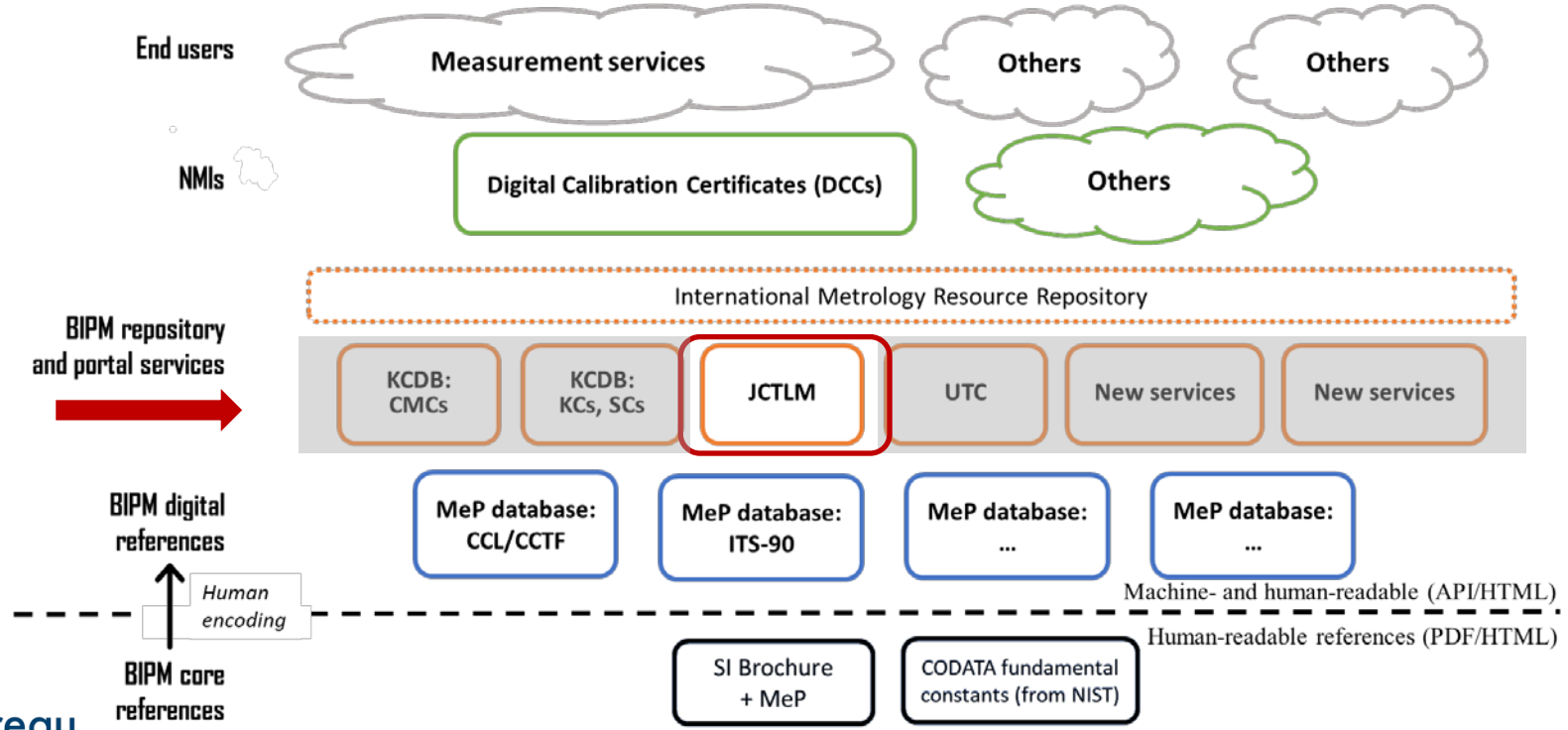
SI

ISO, IEC, CIE, ICRU…

QUDT, UCUM…

e.g. International Organization for Standardization
International Electrotechnical Commission
International Commission on Illumination
International Commission on Radiation Units and Measurements
etc. etc.

e.g. Quantity, Unit, Dimension and Type ontology
Unified Code for Units of Measure



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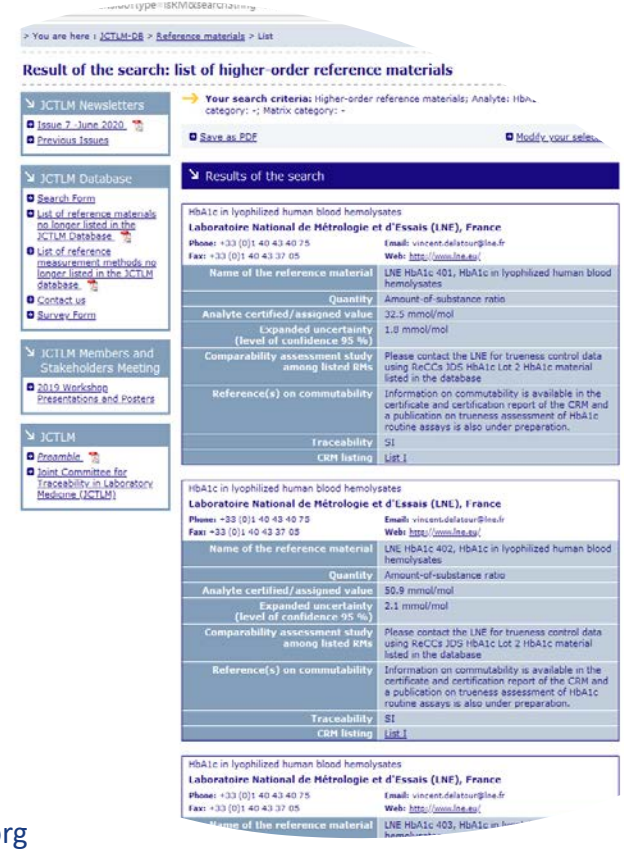
The JCTLM Database



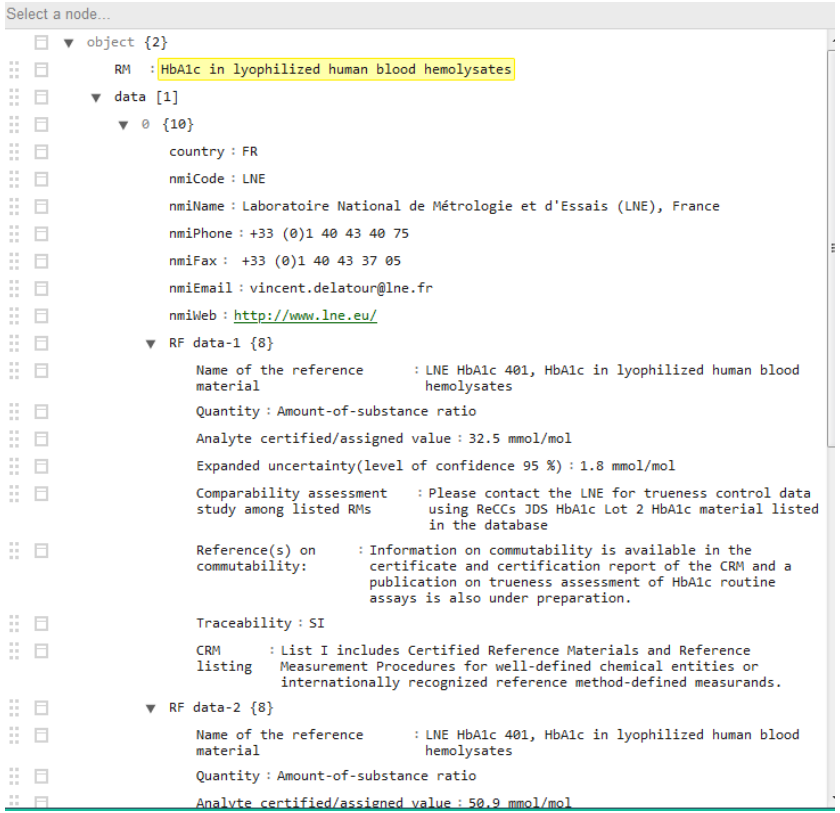
Joint Committee for Traceability in Laboratory Medicine

Database containing reference materials and analytic methods consultable via the website application

https://www.bipm.org/jctlm/

The New JCTLM Database: Added Attributes

JCTLM
Accurate results for patient care



JCTLM API – to become FAIR

machine readable via
JSON & XML formats

curl -X POST "https://www.bipm.org/api/jctlm/searchData/RM" -H "accept: application/xml" -H "Content-Type: application/json" -d \“RM\": \“HbA1\", \“ID\": \"C15RM64\"}"

… and to become Interoperable by applying a web ontology

Thank you

Bureau
International des
Poids et
Mesures