

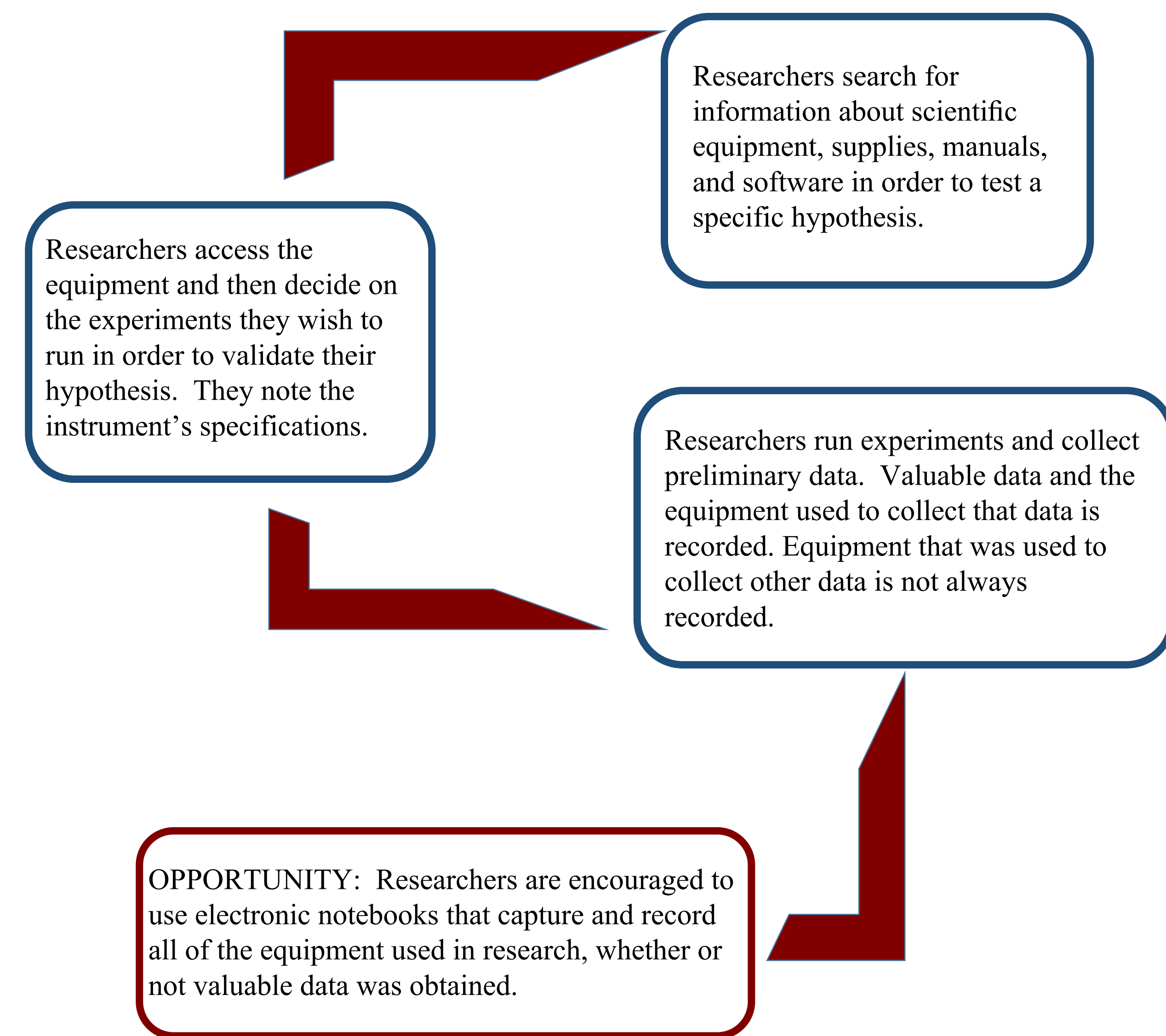
# Universal Scientific Equipment Discovery Tool (USEDiT): If you Used It..You Should Cite It

## Abstract

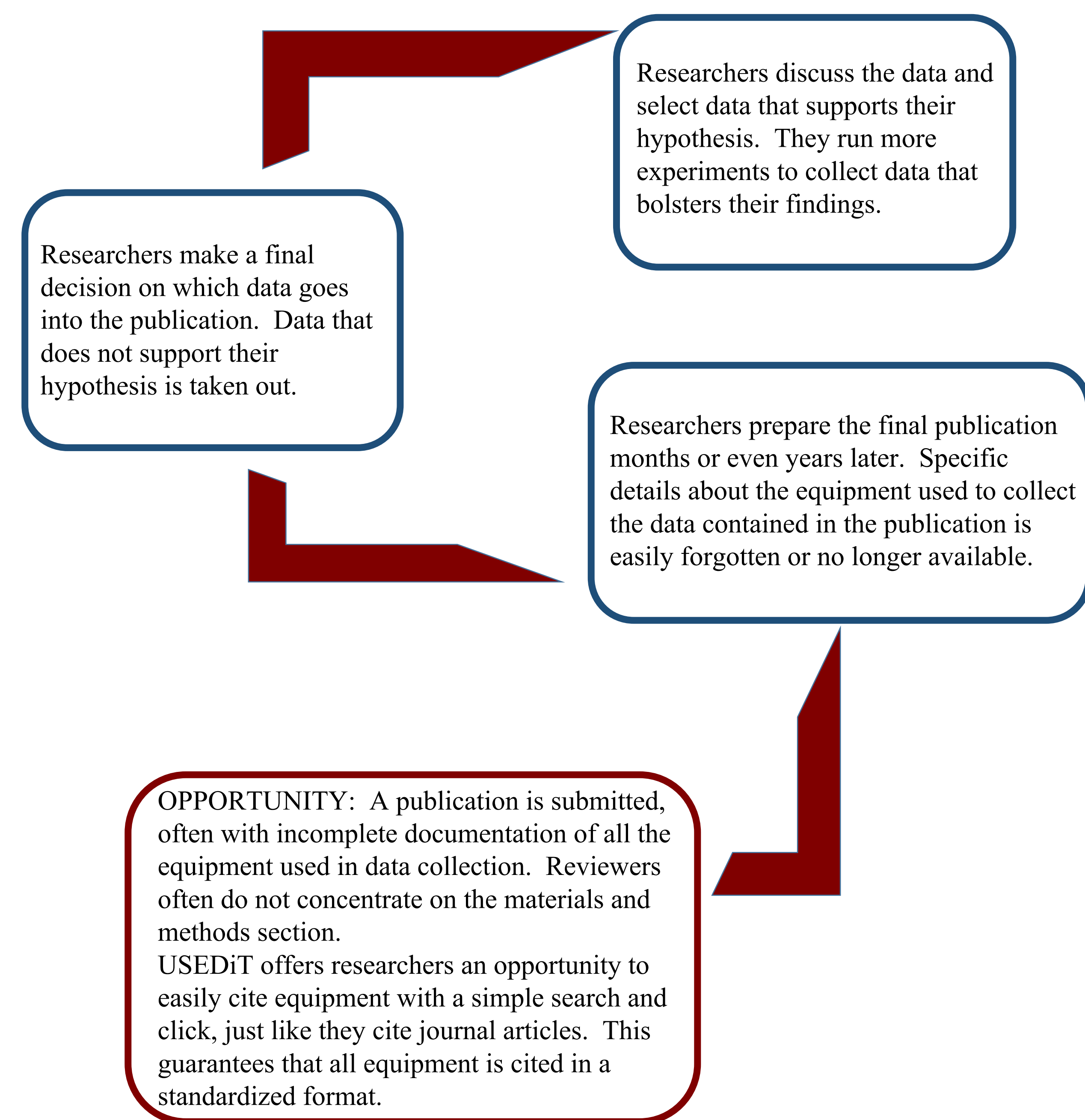
According to the NIH, "two of the cornerstones of science advancement are rigor in designing and performing scientific research and the ability to reproduce biomedical research findings." Dissemination of knowledge underpins scientific progress and discovery. It is critical that sufficient, detailed and transparent reporting is done to allow the researchers, funding agencies and policy makers to assess the veracity of the previous findings. Currently, the scientific community lacks a structured citation style or method for tracking what types of scientific lab equipment are being utilized to conduct research on grant funded projects or peer reviewed publications. This in turn presents a significant challenge to other researchers who are trying to reproduce the results published by other researchers. Not being able to systematically reference what equipment is being used to conduct experiments also contributes to the crisis in reproducibility that the scientific community is currently facing. This presentation introduces the Universal Scientific Equipment Discovery Tool (USEDiT). USEDiT assigns a universal unique identifier and a standardized set of information for each piece of equipment. Scientists can now easily cite any equipment they use. The goal of USEDiT is to create a tool that enables scientific discovery by making it easier for researchers to cite equipment in peer reviewed publications and in research grant applications. When equipment used in research is properly and consistently cited, the productivity of pieces of equipment can be unambiguously quantified.

## Previous Equipment Citation Process

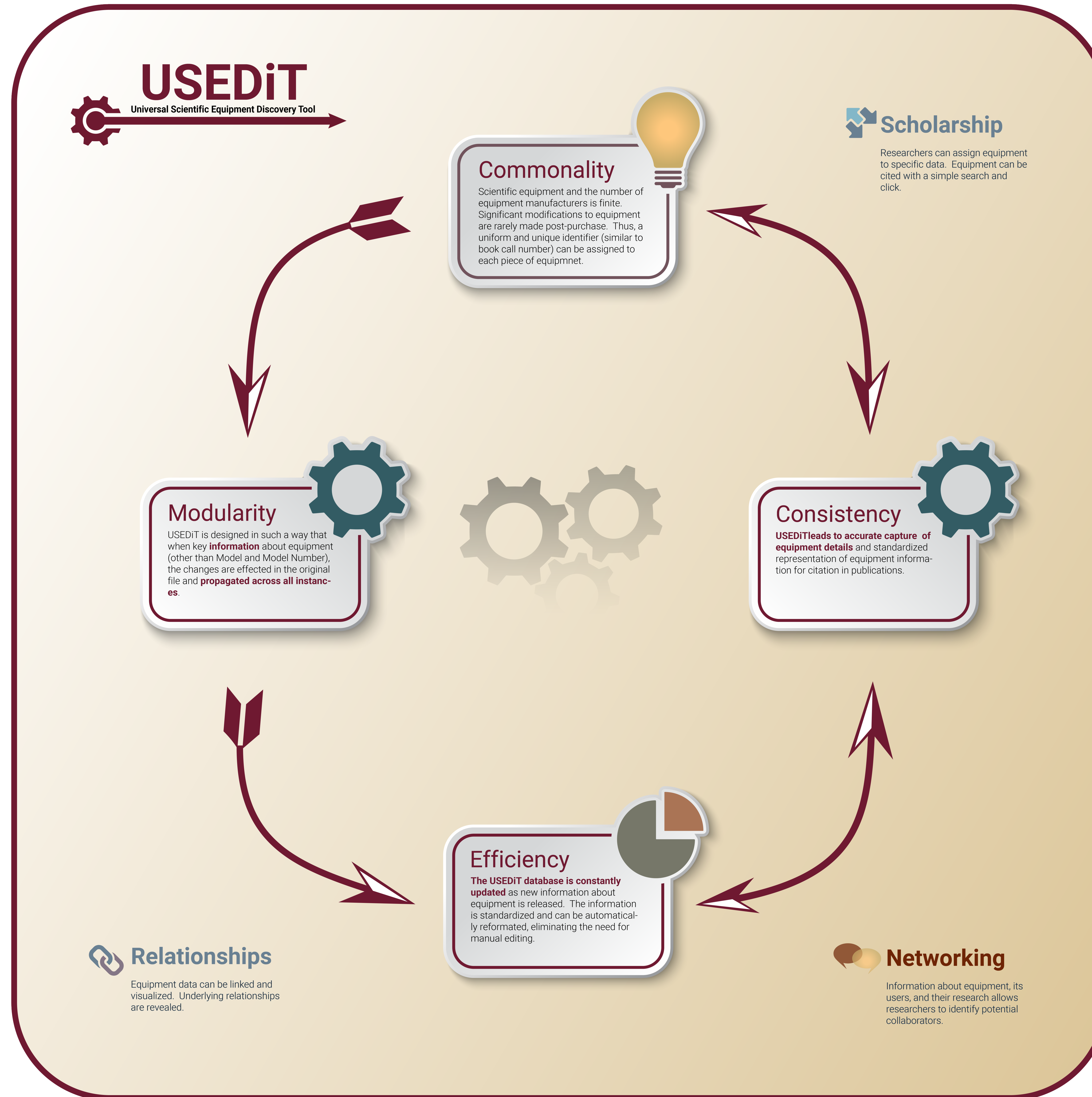
### Research stage



### Publication stage



Nicholas Ruhs<sup>‡</sup>, Claudius Mundoma<sup>#</sup>, Renaine Julian<sup>‡</sup>, Annie Glerum<sup>‡</sup>, Mark Lopez<sup>‡</sup>, Michael Meth<sup>‡</sup>  
<sup>‡</sup>Florida State University, University Libraries, Tallahassee, FL 32306  
<sup>#</sup>Florida State University, Institute of Molecular Biophysics, Tallahassee, FL 32306



## Sample MODS XML Record Schema

```
<?xml version="1.0" encoding="UTF-8" ?>
<mods:mods xmlns="http://www.loc.gov/mods/v3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:mods="http://www.loc.gov/mods/v3"
  xmlns:usedit="http://www.usedit.org/usedit/v0" xsi:schemaLocation="http://www.loc.gov/mods/v3
  http://www.loc.gov/standards/mods/v3/mods-3.6.xsd">
  <mods:titleInfo lang="eng">
    <mods:title>1296A Dielectric Interface System</mods:title>
  </mods:titleInfo>
  <mods:genre authority="rdacontent">three-dimensional form</mods:genre>
  <mods:originInfo eventType="manufacturer">
    <mods:place>
      <mods:placeTerm type="text">Farnborough, Hampshire, United Kingdom</mods:placeTerm>
    </mods:place>
    <mods:dateOther type="manufacture" encoding="w3cdtf" keyDate="yes">2018</mods:dateOther>
    <mods:publisher>Solartron Analytical</mods:publisher>
  </mods:originInfo>
  <mods:originInfo eventType="distributor">
    <mods:place>
      <mods:placeTerm type="text">Berwyn, Pennsylvania</mods:placeTerm>
    </mods:place>
    <mods:publisher>Ametek Scientific Instruments</mods:publisher>
  </mods:originInfo>
  <mods:language>
    <mods:languageTerm type="text">English</mods:languageTerm>
    <mods:languageTerm type="code" authority="iso639-2b">eng</mods:languageTerm>
  </mods:language>
  <mods:physicalDescription>
    <mods:form authority="rdamedia" type="RDA media terms">unmediated</mods:form>
    <mods:form authority="rdacarrier" type="RDA carrier terms">object</mods:form>
    <mods:form authority="useditcarrier" type="USEDiT carrier terms">equipment</mods:form>
    <mods:extent>1 analyzer : 13.39" (340 mm) x 4.72" (120 mm) x 11.81" (300 mm)</mods:extent>
  </mods:physicalDescription>
  </mods:mods>
```

The namespace at the top displays the schema used for the records (MODS) along with our local schema, allowing for proper validation of the record. Information such as the name of the equipment, manufacturer, dates, distributions, and equipment dimensions can be entered in the fields shown here.

## Controlled Vocabulary/Access Points

```
<mods:note displayLabel="Keywords">Impedance measurements, Impedance Spectroscopy</mods:note>
<mods:note displayLabel="Source of Title">Title from manual cover page.</mods:note>
<mods:note displayLabel="Description">The 1296A Dielectric Interface overcomes these limitations to give you fast, accurate and repeatable impedance measurements over 12 decades of frequency, yielding valuable insights into the characteristics of a wide range of materials, including polymers, ceramics, ion conductors, dielectrics, piezo/ferroelectrics, display materials etc. Coupled with easy-to-use software, a 1296A-based system takes care of experimental technique and lets you concentrate on interpreting the results.--Distributor's website.</mods:note>
<mods:note displayLabel="Specifications">Frequency Range: 10 µHz to 10 MHz (1296A+1260A/1255A), 10 µHz to 65 kHz (1296A+1250E), 1 mHz to 20 kHz (1296A+1253A); Signal Amplitude: up to 7 V rms (1296A+1260A/1255A), up to 10 V rms (1296A+1250E, 1296A+1253A); DC Bias: up to 240 V (1296A+1260A/1255A), up to 210 V rms (1296A+1250E, 1296A+1253A); Current measurement: 1 fA to 100 nA; Tan delta range <math>10^{-10}</math> to <math>10^1</math> (reference mode); Impedance range: 100 Ω to 4pF; 100 ΩQ (10140); Capacitance range: 1 pF to >0.1 F; Power supply: 85 VAC to 264 VAC (47 to 440 Hz); 30 VA max.; Weight: 12.13 lb (5.5 kg); Operating temperature range: 10 to 30° C (50 to 80° F).</mods:note>
<mods:subject authority="usedit" authorityURI="http://www.usedit.org/authorities/terms/" valueURI="http://www.usedit.org/authorities/terms/sm0022968755">
  <mods:topic>Dielectric analyzers</mods:topic>
</mods:subject>
<mods:subject authority="usedit" authorityURI="http://www.usedit.org/authorities/terms/" valueURI="http://www.usedit.org/authorities/terms/sm0022945655">
  <mods:topic>Impedance analyzers</mods:topic>
</mods:subject>
<mods:subject authority="leah" authorityURI="http://id.loc.gov/authorities/subjects/" valueURI="http://id.loc.gov/authorities/subjects/sh8508463">
  <mods:topic>Impedance (Electricity)</mods:topic>
</mods:subject>
```

The record will also allow the addition of a controlled vocabulary, or taxonomy, that can be used to index content, as well as content retrieval through browsing and searching. An example of a controlled vocabulary is "Library of Congress Subject Headings." We are also able to build and apply our own taxonomy.

## Local Schema Extension

```
<mods:subject authority="leah" authorityURI="http://id.loc.gov/authorities/subjects/" valueURI="http://id.loc.gov/authorities/subjects/sh8518677">
  <mods:topic>Scientific apparatus and instruments</mods:topic>
</mods:subject>
<mods:extension>
  <usedit:equipment authority="usedit" authorityURI="http://www.usedit.org/authorities/equipment/" valueURI="http://www.usedit.org/authorities/equipment/eq024296782">
    <usedit:modelName>[REQUIRED]</usedit:modelName>
    <usedit:modelNumber>[OPTIONAL]</usedit:modelNumber>
  </usedit:equipment>
  <usedit:ownership>
    <usedit:location>
      <usedit:country>[REQUIRED]</usedit:country>
      <usedit:state-province>[OPTIONAL]</usedit:state-province>
      <usedit:city>[REQUIRED]</usedit:city>
      <usedit:institution>[REQUIRED]</usedit:institution>
      <usedit:contact>
        <usedit:name title=">[OPTIONAL]>[REQUIRED]</usedit:name>
        <usedit:email>[REQUIRED]</usedit:email>
      </usedit:contact>
      </usedit:location>
    </usedit:ownership>
  </usedit:ownership>
</mods:extension>
<mods:recordInfo>
  <mods:recordCreationDate encoding="w3cdtf">2018-17-09T09:04:59.502-05:00</mods:recordCreationDate>
  </mods:recordInfo>
  <descriptionStandard>usedit</descriptionStandard>
</mods:recordInfo>
</mods:mods>
```

Within the MODS schema we can create our own local "USEDiT" schema that allows us to enter information such as equipment model information, location, and contact/institutional representative information. This section is also where we would include the Uniform Resource Identifier (URI) for the equipment.

## Visualization and Discovery

