AUT Calculations, Access Requirements, and Equipment Integration

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AUT Listed in Research Projects & S10 Summary Table

User Table

- **List Major and Minor users**
- Names of **PIs - 3+ major users** are required with active NIH funding
- Institutional affiliation
- Funding period
- Project titles

Projected usage

- Hours per week per user
- Annual usage per user (hours/year)
- AUT is simply the **sum of projected yearly instrument usage across users (hours/week × ~50 weeks)**
- Setup/optimization (reasonable fraction)
- Do not include maintenance time, idle time and analysis done off-instrument

Include Diverse Research Applications

- Total AUT across all major and minor users
- Present utilization across disciplines
- Target utilization: ~1200–2000+ hours/year

Successful proposals typically include:

- 10–20 NIH-funded users
- Centralized core facility
- Shared access model with service fees
- Synergetic equipment integration

Research Narratives Match Usage Estimates

- Ensure usage estimates directly reflect the experimental scope and intensity described in each investigator's research narrative based on specific methods, frequency of experiments, and data collection needs
- Avoid arbitrary or inflated numbers; estimates should be realistic and defensible
- Clearly link each PI to how they will use the many accessories
- Reinforce overall proposal credibility by showing thoughtful planning and alignment between need and usage
- Highlight how PI research, experience and publications support the feasibility of the projected usage

Summary for AUT

Reviewers look for:

- **Heavy but believable usage**
- Multiple funded users (NIH-funded especially)
- Clear need that **justifies the cost**
- Strong proposals often exceed **1500-2000 hours/year**
- Build a well presented **AUT table**
- Do a sanity-check for your numbers to make them **reviewer-proof**

Access Policy & Priority Rules

- **Describe how users will access the instrument**
  - Online scheduling system – iLab, iSmart
  - First-come, first-served vs priority-based
- **Showcase fairness and transparency**
  - No single lab monopolizes time
- **Conflict resolution**
  - Describe advisory board and how their input is sought to resolve conflicts

Reviewers Want Clarity on Management Plan:

- NIH-funded users → often given **priority access**
- Time allocation caps (if any)
- Handling high-demand periods

Emphasize Broad Institutional Access

Robust Training Plan

- Who can use the instrument:
  - Trained users vs core staff operation
- Training procedures
- Safety/compliance requirements

Institutional access

- Is access limited to:
  - Department
  - Institution
  - External users

Oversight structure

- Advisory committee or user committee
- How usage is reviewed periodically
- Mechanism for adding new users

Integration of Equipment

Clear complementarity - “This instrument fills a gap and synergizes —not a duplication”

Workflow integration - Fits into end-to-end pipelines: sample prep → measurement → analysis

Multi-user / multi-discipline relevance - Serves diverse NIH-funded investigators from different departments and colleges

Data integration and backup - Tied to computational infrastructure and IT team

Outreach – linked to institutional communications team

Business and Maintenance Plan – linked to a centralized business office for cores

Example 1 - Cryo-electron microscope

Integration:

- Complements existing **protein expression, purification, crystallography and biophysical analysis cores**
- Integrated with **high-performance computing clusters** for image processing
- **Impact:** Expands structural determination from atomic to near-atomic resolution for large complexes

2 - High-field NMR

Instrument: 600–800 MHz NMR spectrometer

Integration:

- Works alongside **mass spectrometry cores** for metabolite identification
- Supports **synthetic chemistry labs** for structure validation
- Integrated with **biomedical research programs** (metabolomics, drug discovery)
- **Impact:** Enables multi-modal molecular characterization

3 - Advanced mass spectrometry in proteomics pipelines

Instrument: Orbitrap or Q-TOF mass spectrometer

Integration:

- Paired with **liquid chromatography systems** and sample prep cores
- Linked to **bioinformatics pipelines** for proteomics analysis
- Supports both **basic science and clinical biomarker discovery**
- **Impact:** High-throughput, systems-level protein analysis

4 - X-ray scattering in Biophysics Cores

Instrument: BioSAXS system (e.g., Rigaku or Xenocs)

Integration:

- Complements:
  - **cryo-EM and crystallography**
  - **analytical ultracentrifugation (AUC)**
  - **light scattering (DLS/MALS)**
- Linked to **protein purification pipelines**
- Integrated with **modeling software (ATSAS, DENSS)**
- **Impact:** Provides solution-state structural information bridging static and dynamic methods

5 - Genomics sequencers integrated with multi-omics platforms

Instrument: Next-generation sequencer

- **Integration:**
- Combined with:
  - **RNA-seq, ChIP-seq workflows**
  - **single-cell platforms**
- Linked to **institutional bioinformatics cores**
- **Impact:** Enables large-scale genomics and systems biology

6 - High-Performance Computing Integration

Imaging + HPC + AI - High-throughput imaging data are streamed to an HPC system where machine learning models are trained and applied for automated feature extraction and classification.

- Imaging instrument → HPC → ML models
- Often framed as:
  - "end-to-end pipeline"
  - "integrated analytical environment"

Cryo-EM + HPC pipeline - This project utilizes an integrated cryo-electron microscopy and high-performance computing pipeline, in which large-volume imaging datasets are transferred to a centralized HPC cluster for parallelized 3D reconstruction, classification, and refinement.

7 - LC–MS/MS + UHPLC integrated system

Instrument: QTRAP 7500+ mass spectrometer

- Combined with: Exion UHPLC interface
- Function: High-sensitivity small molecule quantification
- Key feature: **Two components forming one analytical pipeline**

Why it worked:

- Not separate purchases → framed as **one analytical system**
- Enabled capabilities “no single component can provide”

Common successful structure: These components operate as a unified system enabling analyses not possible with standalone configurations.

- Core instrument (e.g., Orbitrap / QTRAP/SEC-MALS/Highthrouput-ITC/DSC/Robotics)

- Add-ons:
  - ion sources
  - chromatography front-ends
  - sample autosamplers

Successful Equipment Integration

- **Functional Interdependence**
  - Components must operate **together as a single system**
  - Each part's function should be **required for the whole workflow**
  - Example: Mass spectrometer + UHPLC interface → combined analytical capability
  - Rejected proposals often: Bundle unrelated items ("microscope + PCR machine") Or justify components independently instead of as a system
- **Single Scientific Capability**
  - Frame the integrated system as enabling **one overarching scientific goal**
  - Avoid listing unrelated instruments as independent items
- **Broad User Base**
  - Demonstrate that multiple NIH-funded projects or investigators will **actively use the system**
  - Shared access (core facility model) strengthens competitiveness
- **Non-Redundancy**
  - Show that the system **fills a gap** in capabilities at your institution
  - Reviewers look for **unique, high-impact integration**, not duplicate resources
- **Integrated Workflow Emphasis**
  - Highlight the **end-to-end process**: acquisition → processing → analysis
  - For HPC: data generation (instrument) + transfer + computation + software
- **Clear Justification**
  - Each component is justified **only as part of the integrated system**, not on its own
  - Clearly describe workflows that integrate the equipment into seamless research pipelines
  - Ensure institutional support (space, maintenance, staffing) is appropriate for the full suite of equipment