ATTACHMENT 50: Composite Metrics for RFP RFP NUMBER: 7591020R00062 24-Jun-21

Technical Services & Capabilities	Metrics (number of activities or projects per year)	Notes
Advanced scientific computing and bioinformatics	Maintain 2 data coordinating centers Maintain the NCI Cancer Research Data Commons and its associated nodes, including data curation, quality assurance, and establishing new nodes (with CBIIT) The Frederick Research Compute Environment (FRCE) is about 5% of Biowulf. FRCE currently has 100 HPE Gen10 servers with 3,400 CPU cores, including 192 very high memory, and 185 GPUs, including 57 NVIDIA P100s and 128 NVIDIA V100s Number of projects encompassing the following activities ≈ 500 - Engineer, install, configure, and maintain the scientific research computing environment based on modern HPC CPU and GPU nodes - Support and enhance the computing environment (Data analysis pipelines) - Cloud computing (Adopt and migrate plans, cloud application design and cloud management and monitoring) - Maintain and support bioinformatics tools and databases, e.g., gene sequencing - Provide software tools and computational algorithms to collect, integrate, analyze, visualize, and interpret data - Statistical design of experiments; data mining & knowledge discovery techniques; data workflow applications dev - Scientific web development - Develop and deploy web applications to support lab logistics and FNL business operations. - AI, Machine learning and/or Deep learning - Computational modeling, e.g., prediction of drug properties, molecular dynamics simulations, digital pathology - Quality assurance and control of software and data, e.g., harmonization of new and existing data - Bioinformatics Training (BTEP) - Bioinformatics Analysis	
Animal sciences	Animal cages: 2.3 million, including 350 non-human primate cages Mice: ~625,000 Rats: ~650 ~275 investigators supported and ~600 Active ASPs Animal Research & Tech Support project: ~30,000, including species identification and technical support for colony maintenance and experimentation. Gnotobiotics Animal Science project: ~2000 Genetically-engineered mouse models generated: ~65K mice STR profiling assays: 3500	
Assay development and execution	Clinical trial support CLIA assays (domestic): 5,000 samples Clinical trial support CLIA assays (ex-US): 30,000 sanples Clinical trial support Research Use Only (RUO) assays: 22,000 samples Preclinical RUO assays: 16,000 samples	Includes serology assays and multiple assay formats. "Preclinical" includes basic and translational research phases. Nucleic acid-based assays are covered primarily under Molecular Biology.
Biospecimen processing	DNA extractions: 35,000 Clinical sample processing: 30,000 Aliquoting: 2.2 M vials Sample shipping: 30,000 shipping events	
Cancer cell biology	Mass cytometry projects: 10 Flow cytometry projects, including cell sorts, cell line/organoid analysis : ~13,000 Cell sort projects: 300	
cGMP production of clinical materials, including validation assays	Vaccine production projects: ~15, up to 100K vials. Combination of broadly neutralizng mAbs, plasmid DNA, recombinant glycoproteins, antigen presenting nanoparticles Recombinant protein and antibody projcts: 10 projects (200-10,000 vials, 200L bioreactor/fermenter scale, 100 mg – 1 kg deliverable) Viral vectors: 12 (each avg 500 vials, 10e15 vp deliverable) Individual Cell Therapies: 80 (each avg 2 x 50 mL doses, 10e8 cells/dose)	
Chemistry	Small scale synthesis projects (~25 mg scale): 750 Larger scale synthesis projects (gram scale): 15 Natural product extractions from macro- and micro-organisms: 3,000	
Clinical studies support	600 active clinical trial protocols (50/50 US and ex-US); ~50 sites domestic and ex-US No. INDs: 45	NCI and NIAID trials included. Most ex-US trials are run by NIAID in Africa.
Drug discovery and development	In vitro screening projects: 80 Toxicology studies: 60 Pharmacokinetic (PK) studies: 25 Patient Derived Xenograft drug studies: 160 Xenograft drug studies (efficacy, PK/PD, tumor targeting): 80	Other Drug Discovery and Development activities are included under Animal Sciences, Chemistry, cGMP Production, Clinical Studies Support, Nanotechnology, and Pathology.
Imaging	In vivo tumor imaging projects: 200 Light microscopy projects: 140	See also Structural Biology.

IT services	Maintain 500+ biomedical databases to support multiple scientific projects. Maintain 100+ biomedical annotation databases used by multiple FNL/NCI projects. Maintain 30 databases to support ERP, Purchase Support Request Systems, FNL and NCI websites, electronic lab notebooks, and custom applications. Websites supported: >50 IP phones supported: 3,600 Desktop customers supported: 3,000 Hardware deliveries: 2000 (computers, phones, PDA's, printers) Mobile device hardware deliveries: 200 Printers supported: 1700 Government furnished mobile devices supported: 350 Servers Physical servers: 190 Virtual machines: 900 High Performance Computing: See Advanced Scientific Computing and Bioinformatics	
Molecular biology	Low and high-throughput gneotyping assays: ~ 80K assays (animal sciences facility) Samples studied with NGS and single cell sequencing platforms, specialized genomics applications and technologies, spatial genomics and in situ sequencing technologies: 32,000 Small-scale protein production projects: 75 (ug --> mg) Large scale protein production project: 50 (10s mg) Molecular cloning projects associated with protein expression: 150 DNA extractions: >2000	
Nanotechnology	20 formulation projects, including physical characterization and pharmacokinetics.	
Omics	Number of projects encompassing the following activities ≈ 800 - Identification of proteins and post-translational modifications - Post-translational modification (PTM) studies using established methods - Protein-protein and protein-DNA/RNA/peptide interactions - Large scale proteomics (including PTM) and analytical separation projects involving mass spectrometry analysis - Surface plasmon resonance studies - Targeted metabolite analysis using established assays - New targeted metabolite assays developed followed by sample analysis	
Pathology (preclinical & clinical)	H&E staining slides: 22,000 Immunohistochemistry slides: 9,000 Necropsies: 900 Laser capture microdissections: 1,100	
Repositories	Total samples: 21.5 million Anticipated to grow to approx. 46.5 million by 2033. A project to add automated storage and retrieval units, to store the majority of future samples, has been initiated. Estimate 19 million samples will be stored in the units by 2033.	
Structural biology	Cryo-Electron Microscopy: 350 sample data collections SEM & TEM (non-cryo): 900 sample data collections X-diffraction: 90 structure determinations Volume electron microscopy projects: 15	See also Imaging.
Virology	Develop virus-like particles for 9 HPV subtypes; 2-3 subtypes/yr	Viral DNA/RNA quantitation and serology assays included under Assay Development & Execution and Molecular Biology.

Administrative Services

Fleet services	84 vehicles maintained
Conference planning services	30 conferences and 5 seminar series planned

Distribution of work at FNLCR across programs and ICs	The requested work will include services to support NCI intramural investigators, extramural collaborators, national lab led activities, and infrastructure and operations. The following numbers represent the cost allocation among these four work categories in FY19 for the combination of in-house and subcontracted activities at the FNLCR. • National Lab Led Activities 8% • Extramural Research 31% • Intramural Research 36% • Infrastructure & Operations 25% In FY19, 60% of the NCI FNLCR budget supported in-house research vs. 40% for subcontracted research. In that year, 18% of the NCI FNLCR in-house budget and 23% of the subcontract budget supported IT and data science activities. Approximately 70% of the intramural research performed at the FNLCR is in support of NCI with the balance in support of other NIH institutes and centers.