

NTT_DATA_UCSF_NIAID-SEB_Subcontract_2021

Task Order #2

1. General ChimeraX improvements to support NIAID (Eric: 20%)
2. Support the NIH 3D pipeline development, including any changes to ChimeraX to support ongoing development. (Eric: 15%)
3. Improve multi-person VR (Tom: 35%)
 - a. Create video tutorials in how to use multi-person VR
 - b. Hold VR office hours to train researchers to use VR capabilities
 - c. Allow participants to add models from local files during a VR session
 - d. Set up VR meeting servers for Africa, Europe, Asia
4. Human Biomolecular Atlas Program (HuBMAP) multiscale visualization (Eric: 30%)
 - a. Develop ChimeraX tool to browse and select HuBMAP datasets for loading
5. Enhance ChimeraX's segmentation capabilities
 - a. Investigate increased use of simple ITK to support segmentation (Tom: 15%)
 - b. *Investigate utilizing web services to support more complex machine learning-based segmentation algorithms* (Tom: 15%)
 - c. *Investigate reading and displaying segmentation format(s) available from imaging databases (tissue microscopy, cancer imaging data, etc.)* (Tom: 10%)
6. DICOM (Tom: 25%, Eric: 5%)
 - a. *Improve ability to visualize and analyze medical images in VR with ChimeraX*
 - b. *Develop browser-style interface to show DICOM dataset contents and associated metadata such as sample characteristics*
7. Outreach
 - a. Instructional material and tools documentation. (20%)
 - i. Detailed instructions for all features shall be provided in a user manual
 - ii. Written user guides and tutorials shall be available as an HTML page
8. Administration (10%)
 - a. Submit monthly written reports of accomplishments

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Task Order #1

9. *General ChimeraX improvements to support NIAID use cases (~10%)*
10. **Support the NIH 3D pipeline development, including any changes to ChimeraX to support ongoing development.**
11. **Improve multi-person VR**
 - a. **Create video tutorials in how to use multi-person VR**
 - b. **Hold weekly VR office hours to train researchers to use VR capabilities**
 - c. **Allow participants to add models from local files during a VR session**
 - d. **Set up VR meeting servers for Africa, Europe, Asia**
12. Human Biomolecular Atlas Program (HuBMAP) multiscale visualization
 - a. Create visualization tools showing cell type classifications on 3D light microscopy imaging of tissues.
 - b. Provide user interfaces to clustering web services for classifying cells
 - c. Support analysis of 3D light microscopy by researchers who create and deposit data to HuBMAP
 - d. **Develop ChimeraX tool to browse and select HuBMAP datasets for loading**
13. Extend Hemagglutinin Structure Prediction server ([HASP++](#)) to other virus spikes
 - a. ChimeraX support for the processing pipeline, pre- and post-homology modeling
 - b. ChimeraX to download modeled virus spikes for in-depth visualization and analysis
 - c. Sequence comparison (mutations) and feature markup (cleavage sites)
 - d. Support for submitting homology-modeling or machine learning structure prediction jobs with novel sequences
14. Enhance ChimeraX's segmentation capabilities
 - a. **Investigate increased use of simple ITK to support segmentation**
 - b. *Investigate utilizing web services to support more complex machine learning-based segmentation algorithms*
 - c. *Investigate reading and displaying segmentation format(s) available from imaging databases (tissue microscopy, cancer imaging data, etc.)*
15. DICOM? -- *is there interest in continuing this?*
 - a. *We found an enthusiastic collaborator, Gabriel Massano, Biomodelos 3D, Hospital de Ninos, Córdoba, Argentina, www.biomodelos3d.com.ar*
 - b. *Improve ability to visualize and analyze medical images in VR with ChimeraX*
 - c. *Develop browser-style interface to show DICOM dataset contents and associated metadata such as sample characteristics*
16. Outreach
 - a. *Workshops, training and presentations*
 - i. *Remote training for African Centers of Excellence participants*
 - b. **Instructional material and tools documentation.**

- i. Detailed instructions for all features shall be provided in a user manual
- ii. Written user guides and tutorials shall be available as an HTML page

17. Administration

Highest/High

Medium (nice to have)

Low (included if there is time)