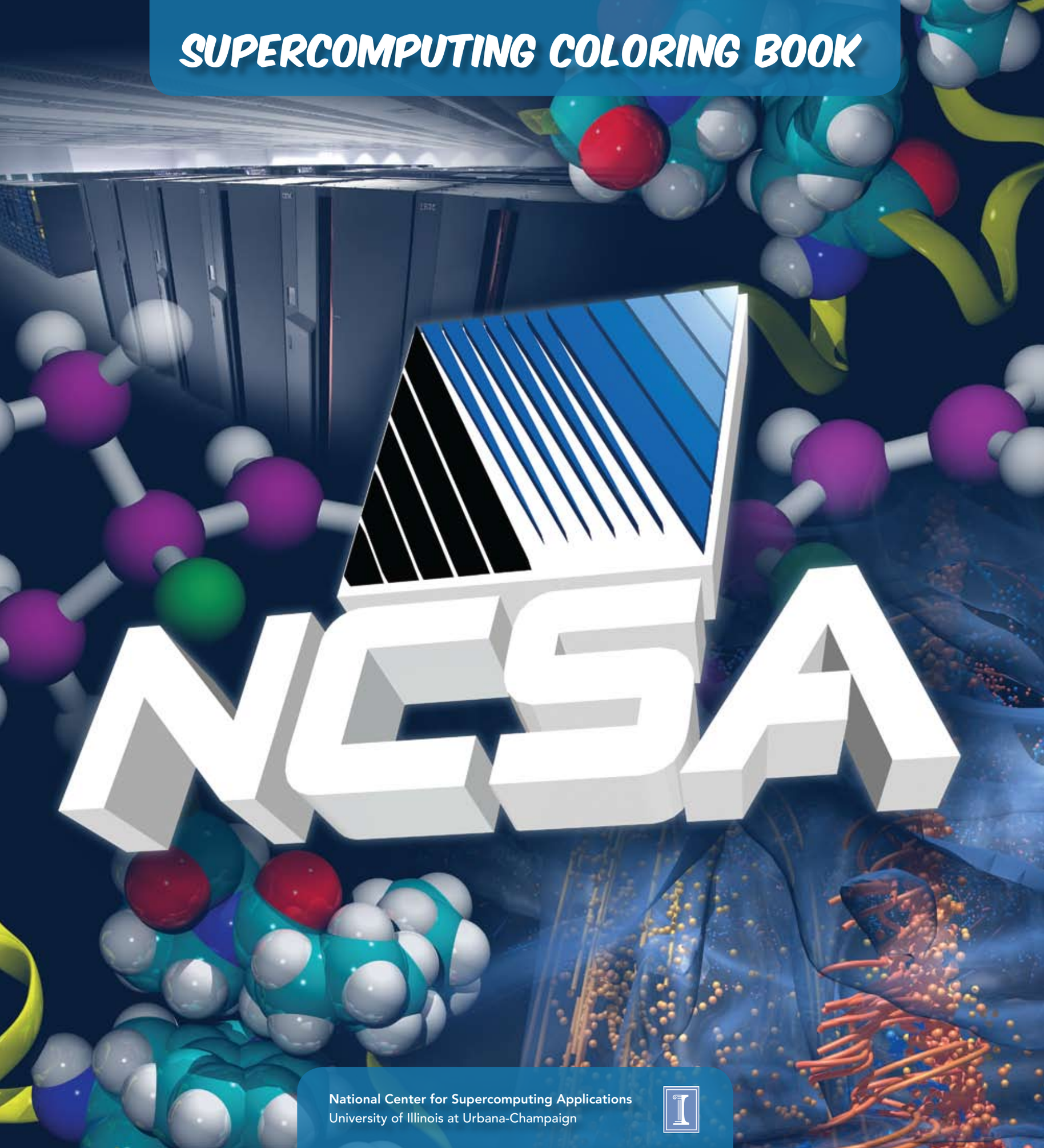
SUPERCOMPUTING COLORING BOOK



National Center for Supercomputing Applications
University of Illinois at Urbana-Champaign

ABOUT NCSA

The University of Illinois' National Center for Supercomputing Applications (NCSA) operates some of the world's most powerful supercomputers and develops software and tools to help researchers efficiently use these systems. NCSA and its partners are developing a sustained-petascale computing system, called Blue Waters, which will be available to the nation's researchers in 2011. Blue Waters will provide sustained performance of at least 1 quadrillion calculations every second on a range of science and engineering applications, helping researchers make extraordinary leaps in knowledge and discovery.

NCSA FOCUSES ON:

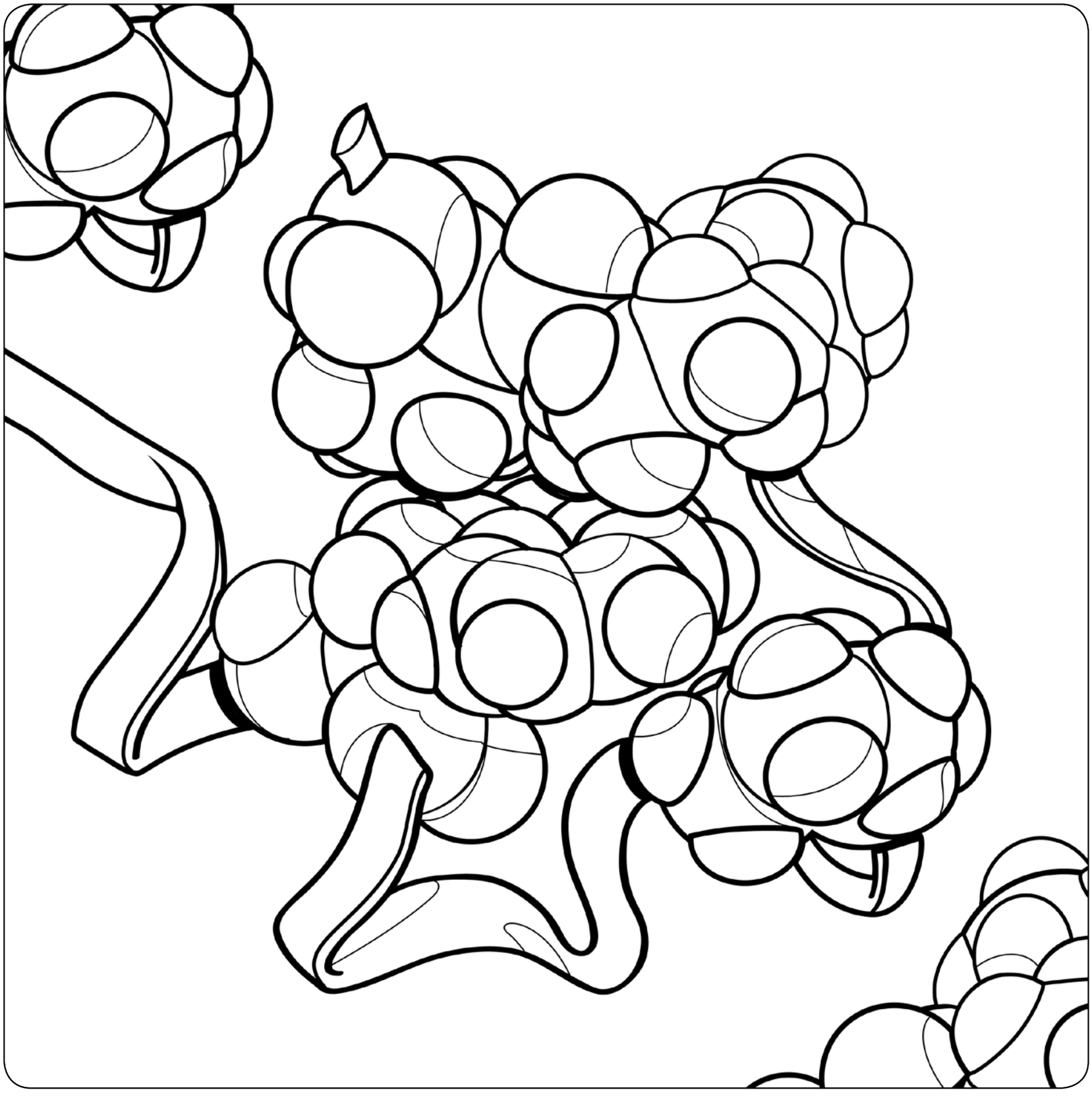
- Developing and deploying powerful, reliable computing, data, and networking resources that enable researchers to solve the most demanding science and engineering problems in a timely manner. We develop and explore innovative architectures and techniques to achieve petascale science.
- Working with research communities to develop the tailored cyberenvironments that provide the means to fully exploit the extraordinary resources available on the Internet (computing systems, data sources and stores, and tools).
- Researching and developing software, techniques, and tools to improve national cybersecurity and to help law enforcement better respond to cyberattacks.
- Providing insights into complex systems and sharing the thrill of scientific discovery with the broadest possible audience through artful visualizations of scientific phenomena.
- Preparing the next generation of scientists and engineers to effectively use the growing national cyberinfrastructure.

FUNDING SUPPORT

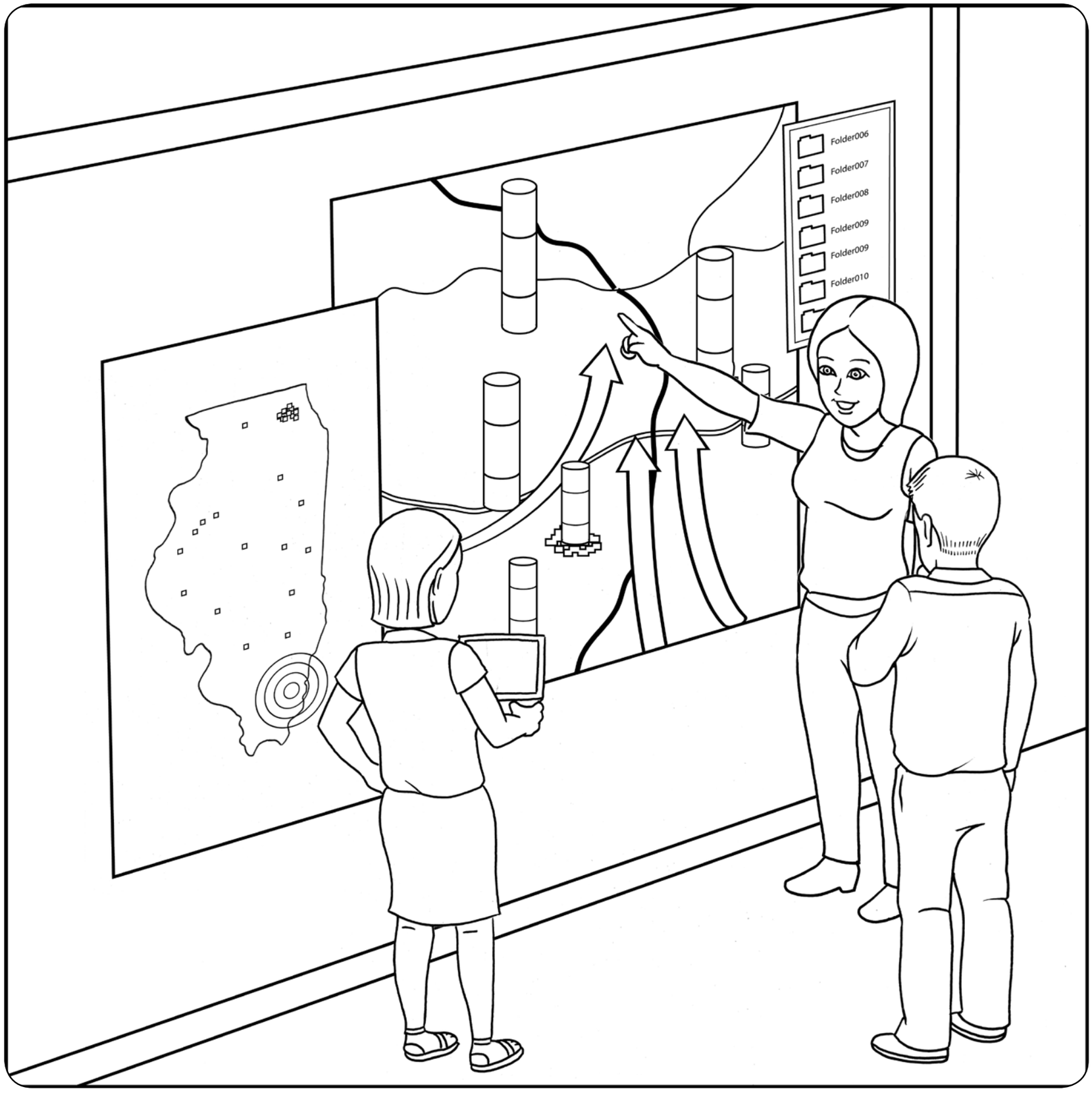
The National Science Foundation, the state of Illinois, the University of Illinois, industrial partners, and other federal agencies support NCSA.



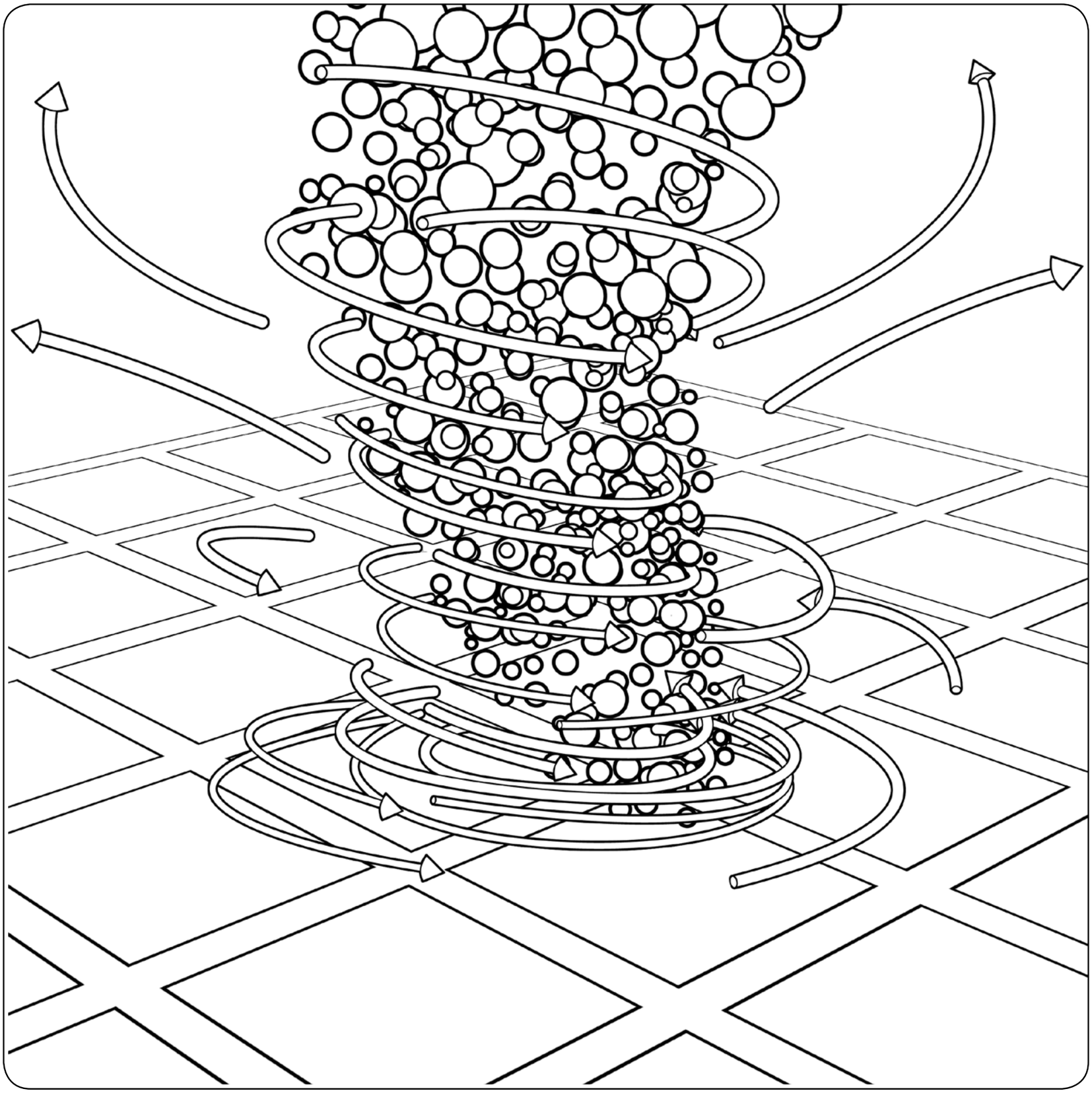
NCSA Deputy Director Rob Pennington (left) and Director Thom Dunning (right) stand in NCSA's machine room, which provides researchers across the country 155 teraflops of computing power. When the Blue Waters supercomputer comes online in 2011, it will sustain more than 1 petaflop of computing power.



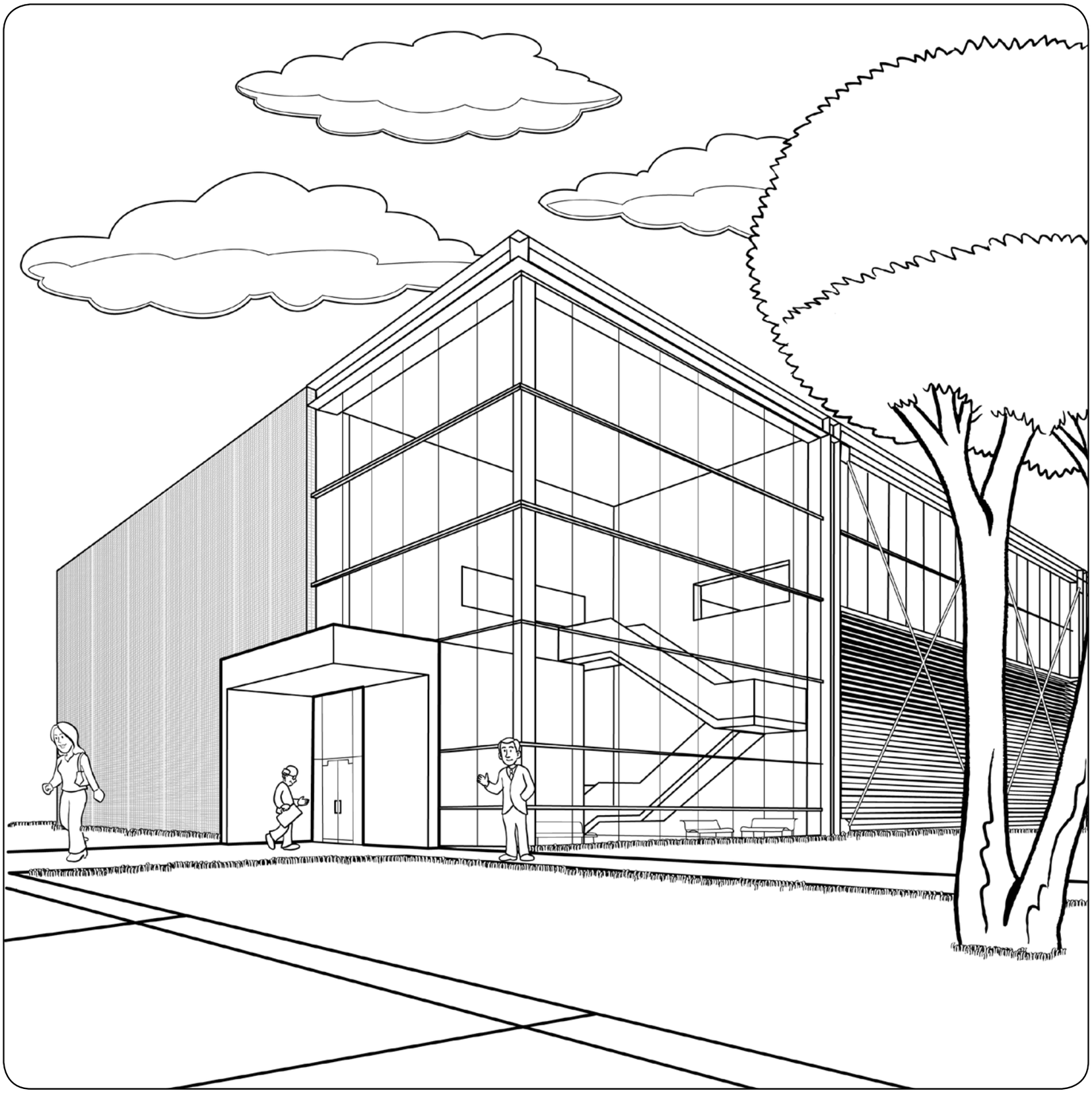
Researchers use supercomputers to simulate the folding and unfolding of proteins – like this tryptophan cage protein – in an effort to understand how folding errors can cause diseases.



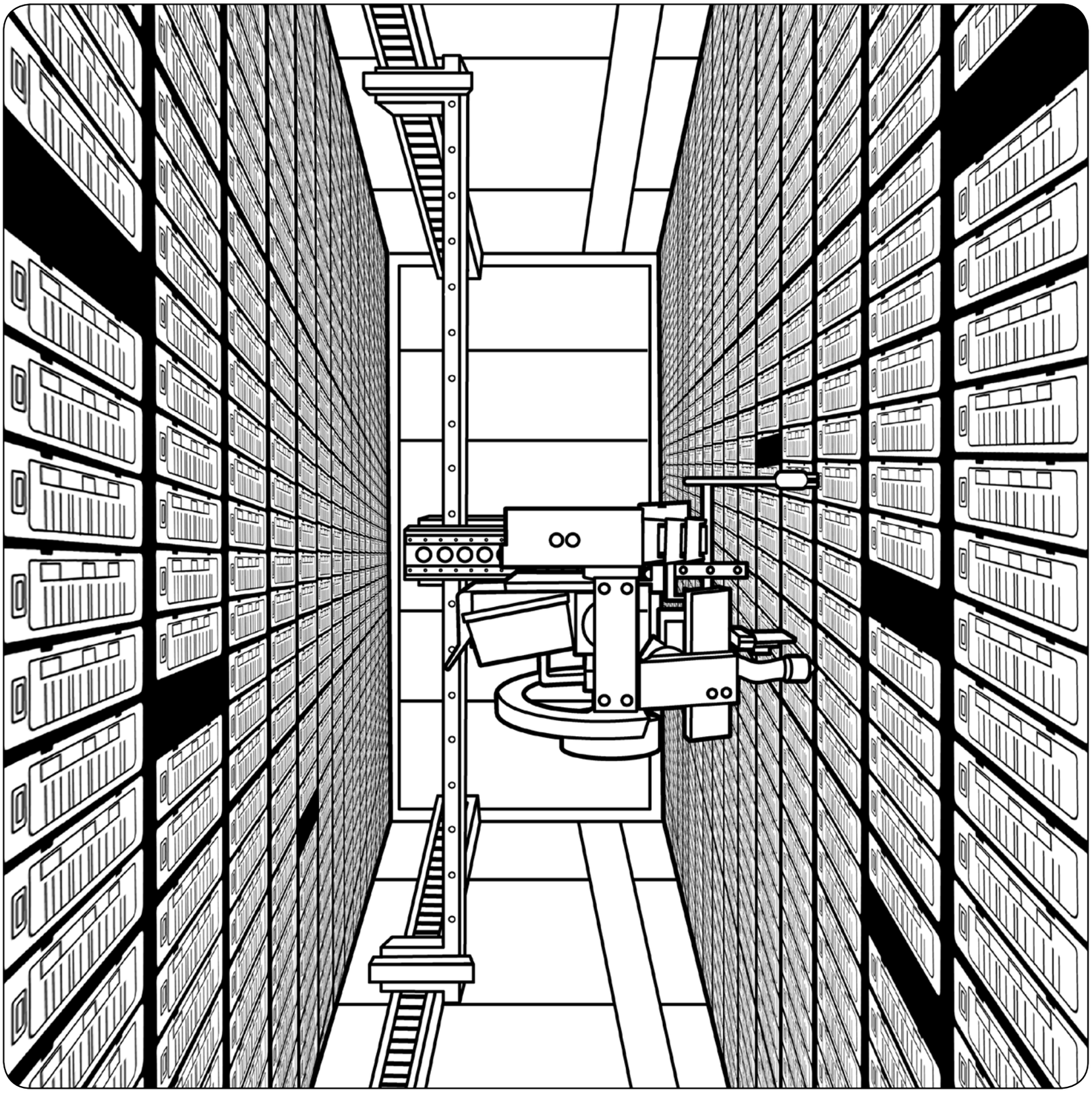
NCSA works with communities of researchers to develop tools like MAEviz, which provides policymakers with detailed predictions of the structural, economic, and social damage that could result from an earthquake.



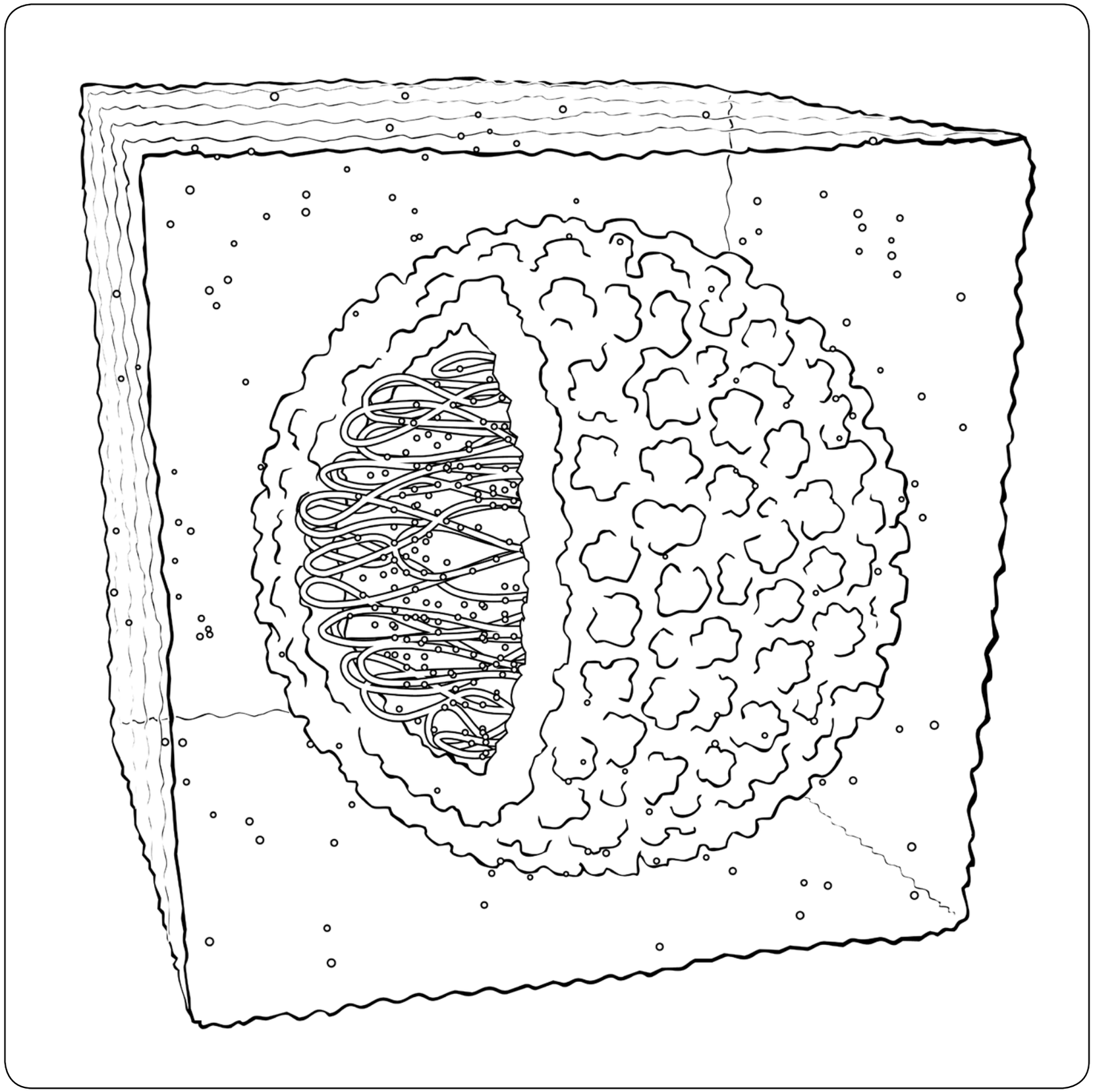
Atmospheric scientists simulate the formation of dangerous storms, like this powerful tornado, to better understand when and where they will strike and to give people more effective warnings. NCSA's visualization team created this animated tornado for a TV documentary.



The new Petascale Computing Facility will house Blue Waters, which is expected to be the world's most powerful computer for open scientific research when it comes online in 2011. Blue Waters is a joint project of the University of Illinois, NCSA, IBM, and the Great Lakes Consortium for Petascale Computation.



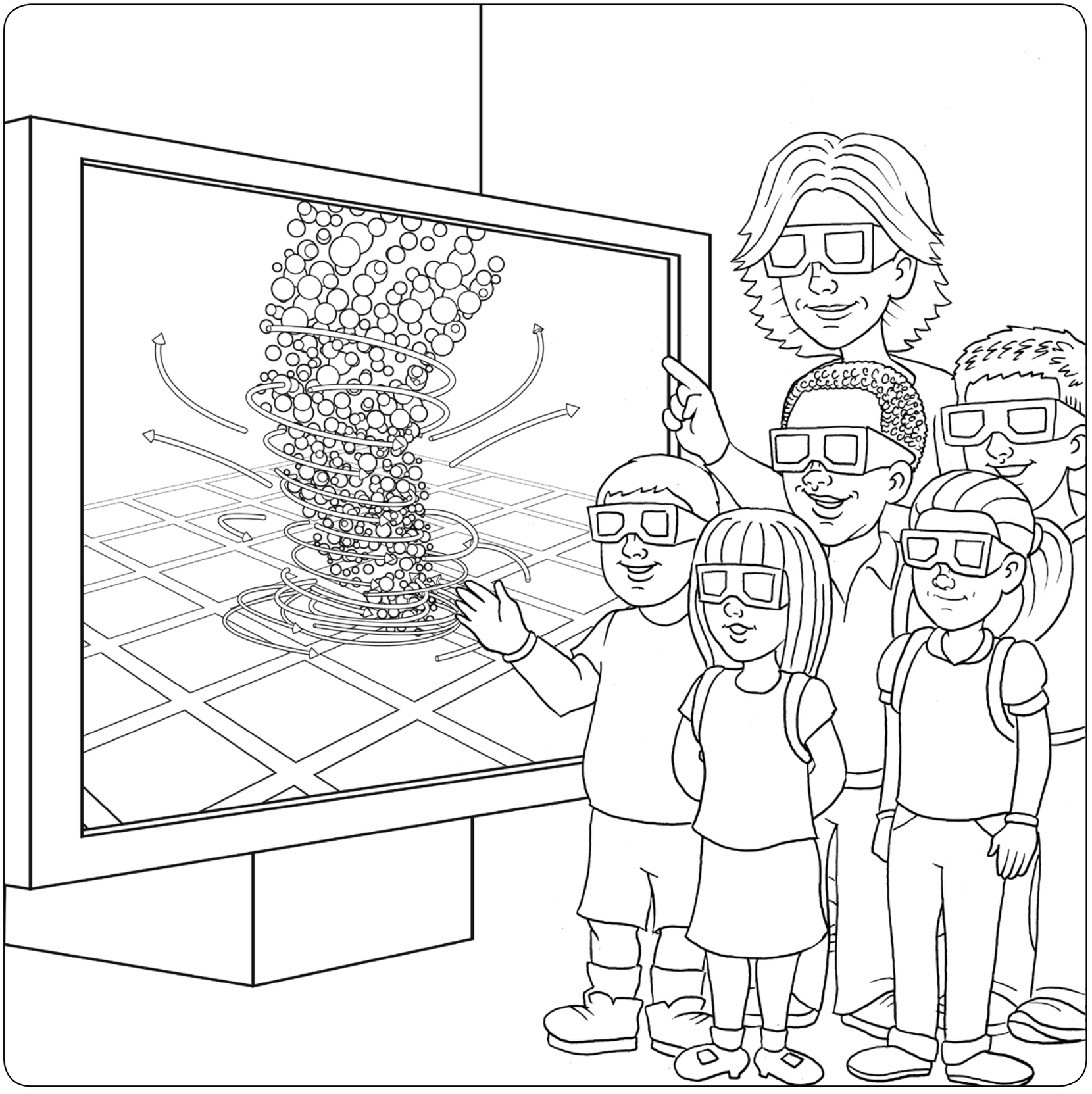
Computer modeling produces a flood of data that continues to grow as computers become more powerful and researchers can perform more detailed, longer simulations. Petabytes of data are stored on tape at NCSA.



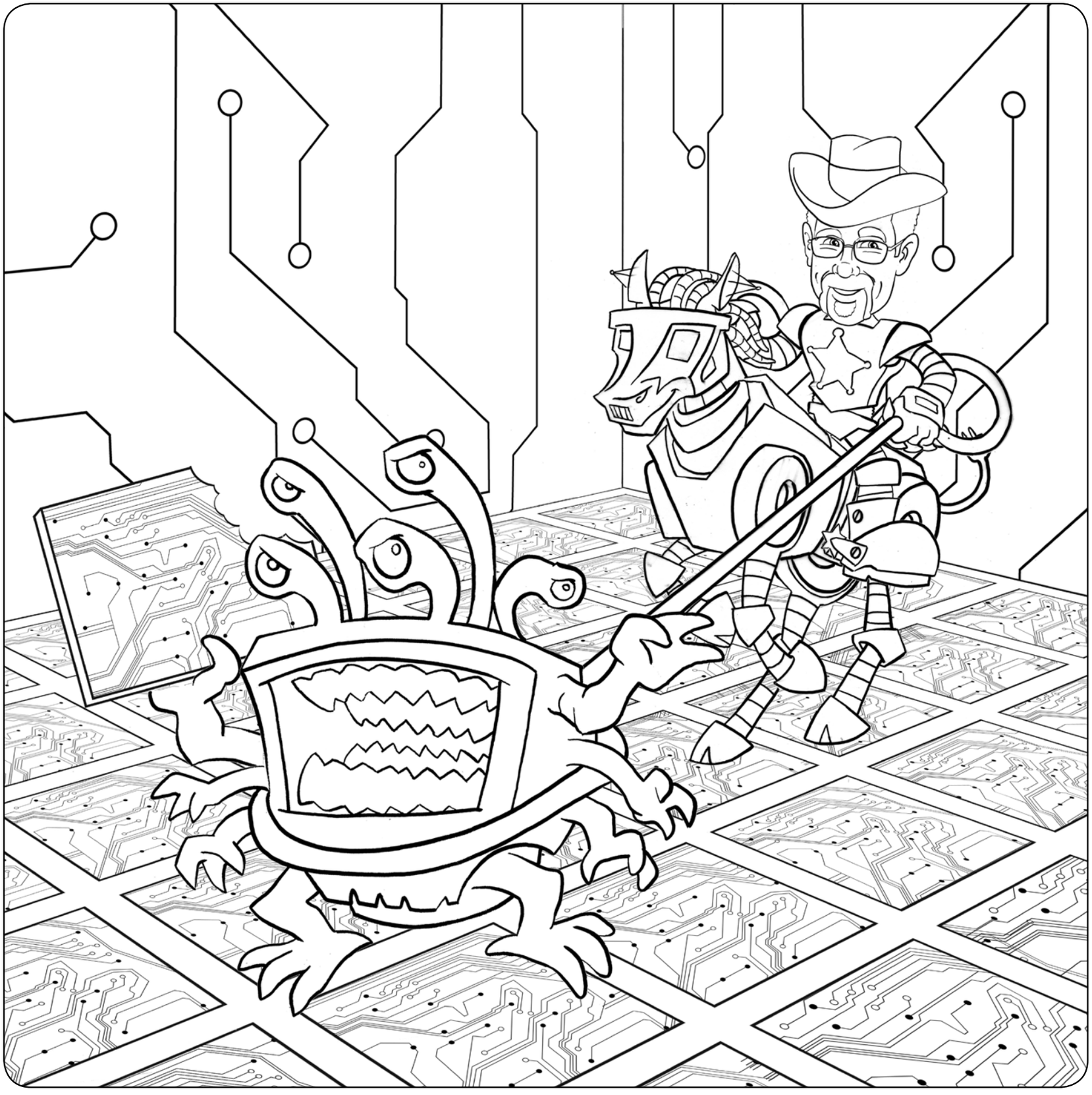
In a breakthrough molecular dynamics simulations, University of Illinois researchers modeled an entire organism (the tobacco mosaic virus) at the atomic level.



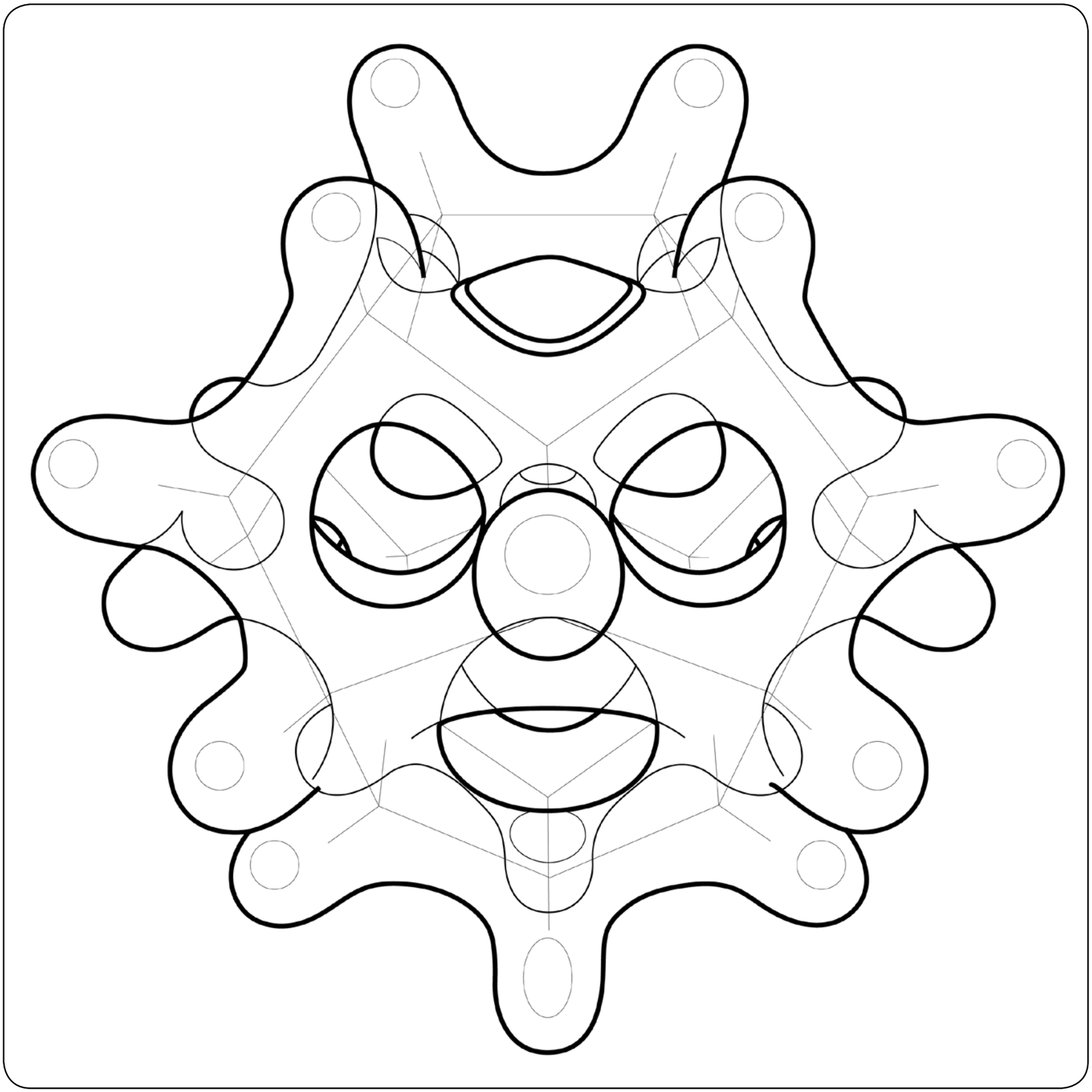
NCSA helps prepare the next generation of researchers. The GEMS (Girls Engaged in Math and Science) program, for example, excites middle-school girls about the possibilities of math, science, and technology careers.



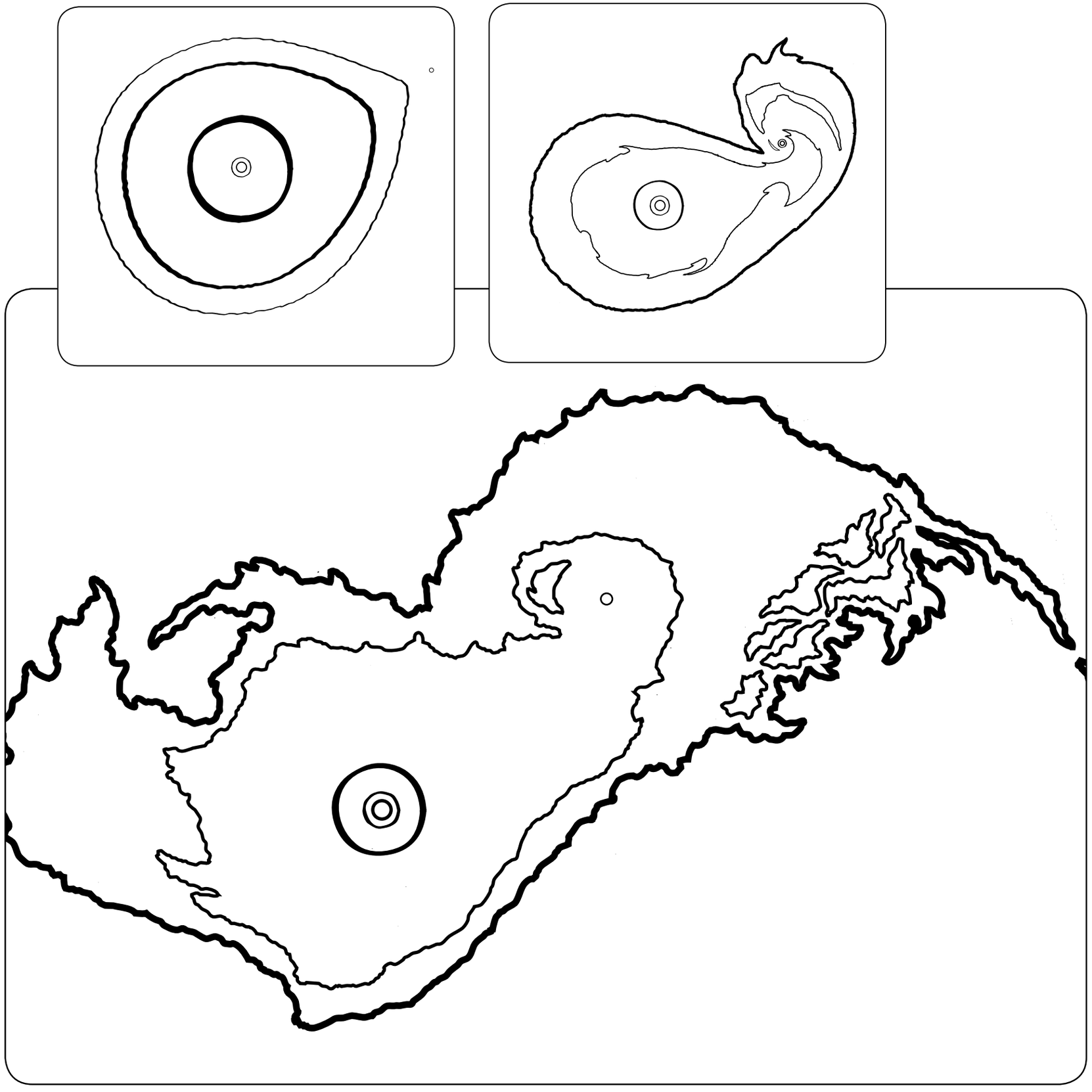
NCSA transforms dry data into artful animations that have been showcased at the American Museum of Natural History, in an Oscar-nominated IMAX movie, in television documentaries, and at planetariums and theaters around the globe. Many students visit NCSA to see these 3D visualizations.



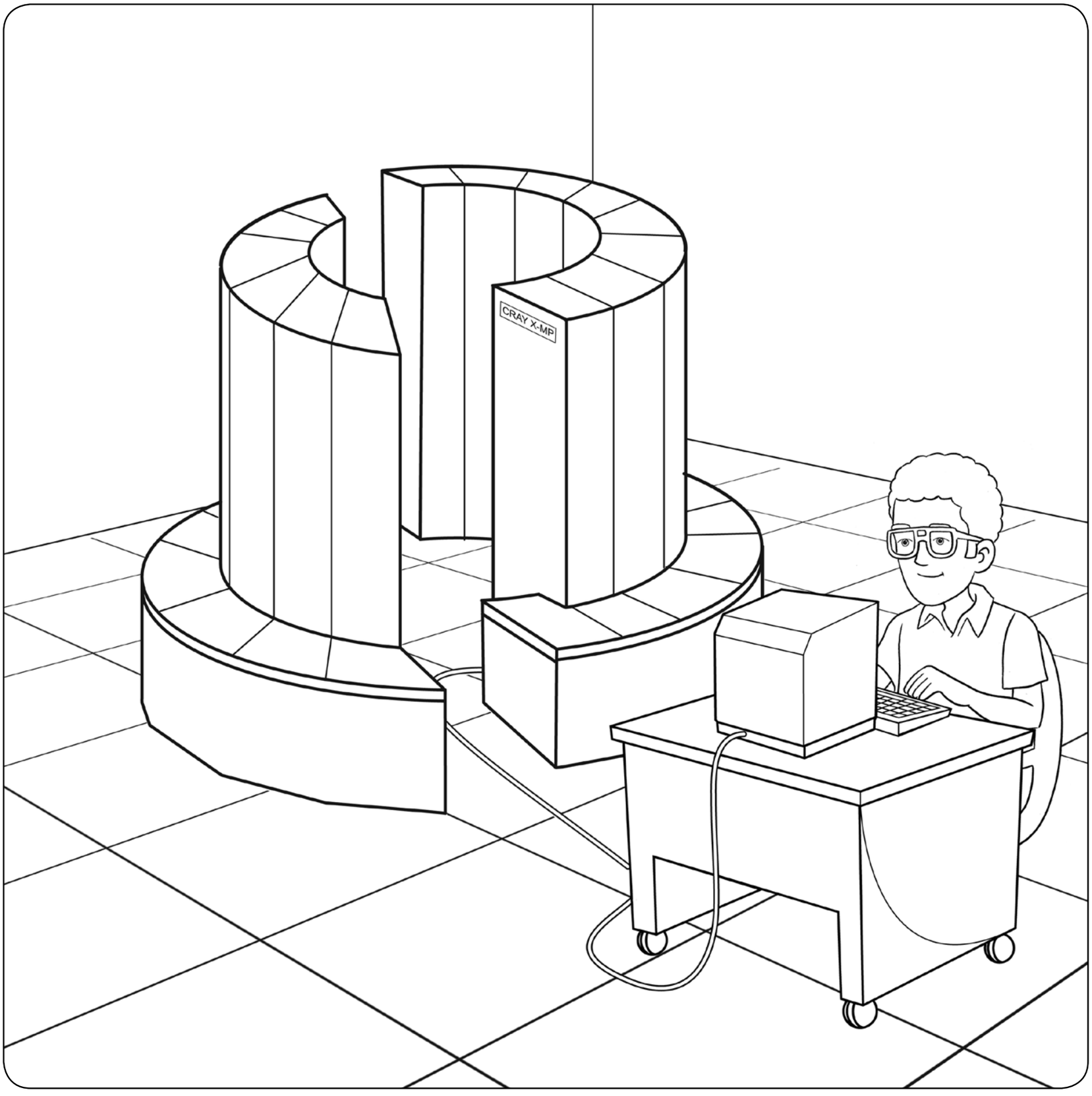
NCSA's computer security experts block malicious intruders and help law enforcement agencies fight cybercrime.



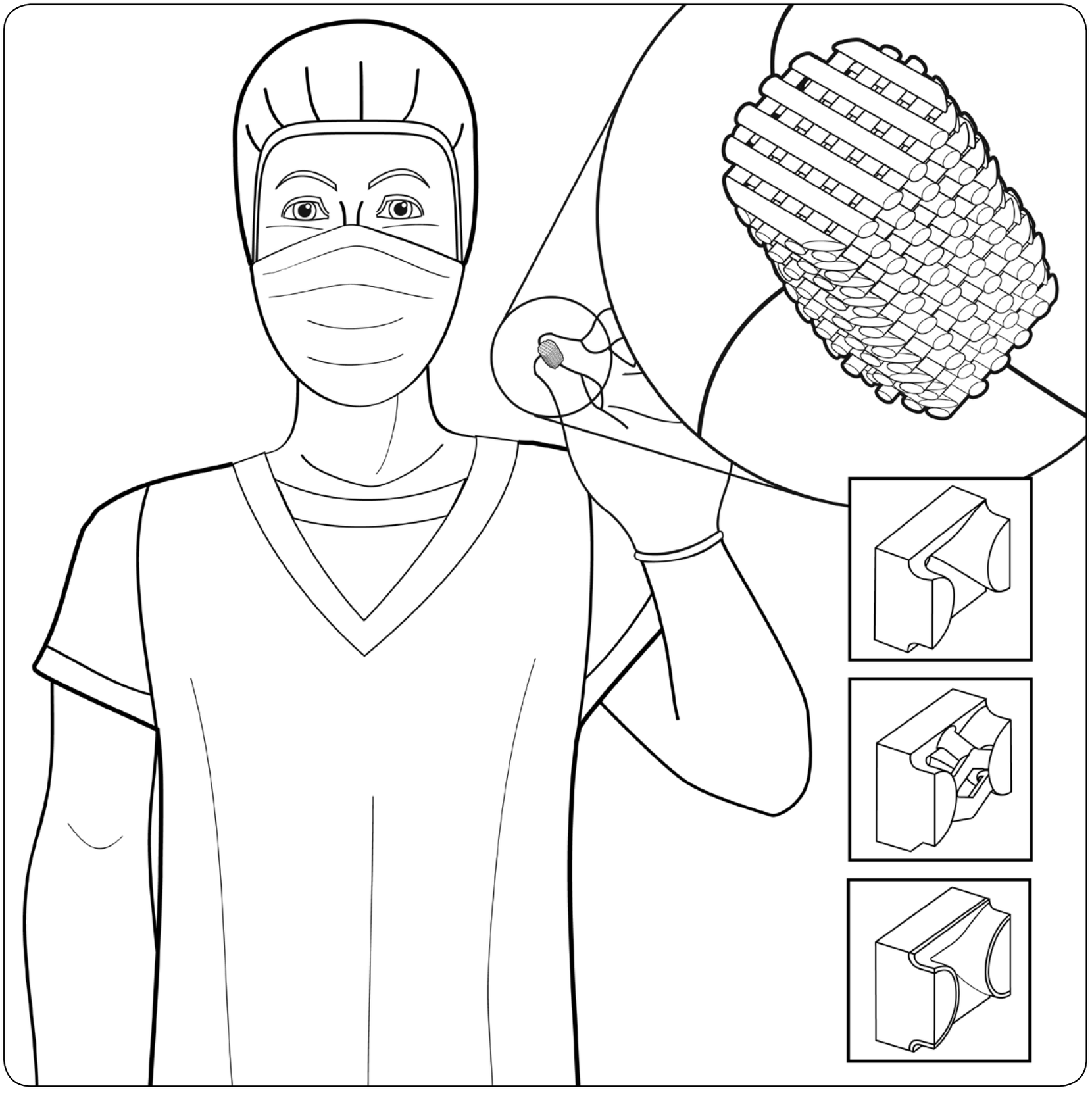
Scientists use computers to calculate the electronic structure of molecules to predict how they will behave under a variety of conditions. This model shows the valence electron density of a silicon nanocrystal; nanocrystals emit light of different colors when hit with infrared or UV radiation.



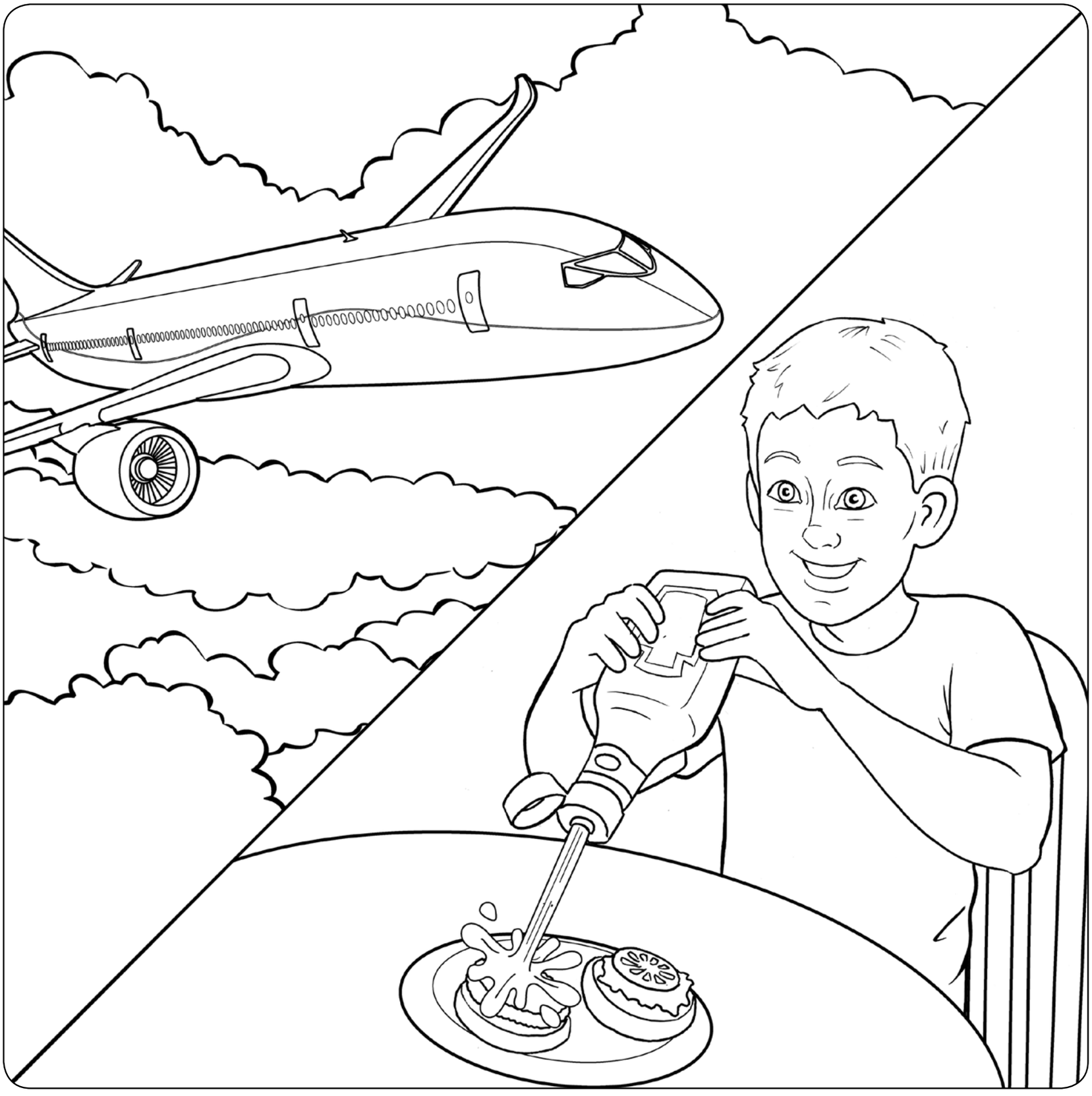
Astrophysicists model the volatile interactions of binary stars; during the common envelope stage, the stars' atmospheres share a single boundary. This phase is marked by extreme changes in the nature of the stars and intense interaction between them.



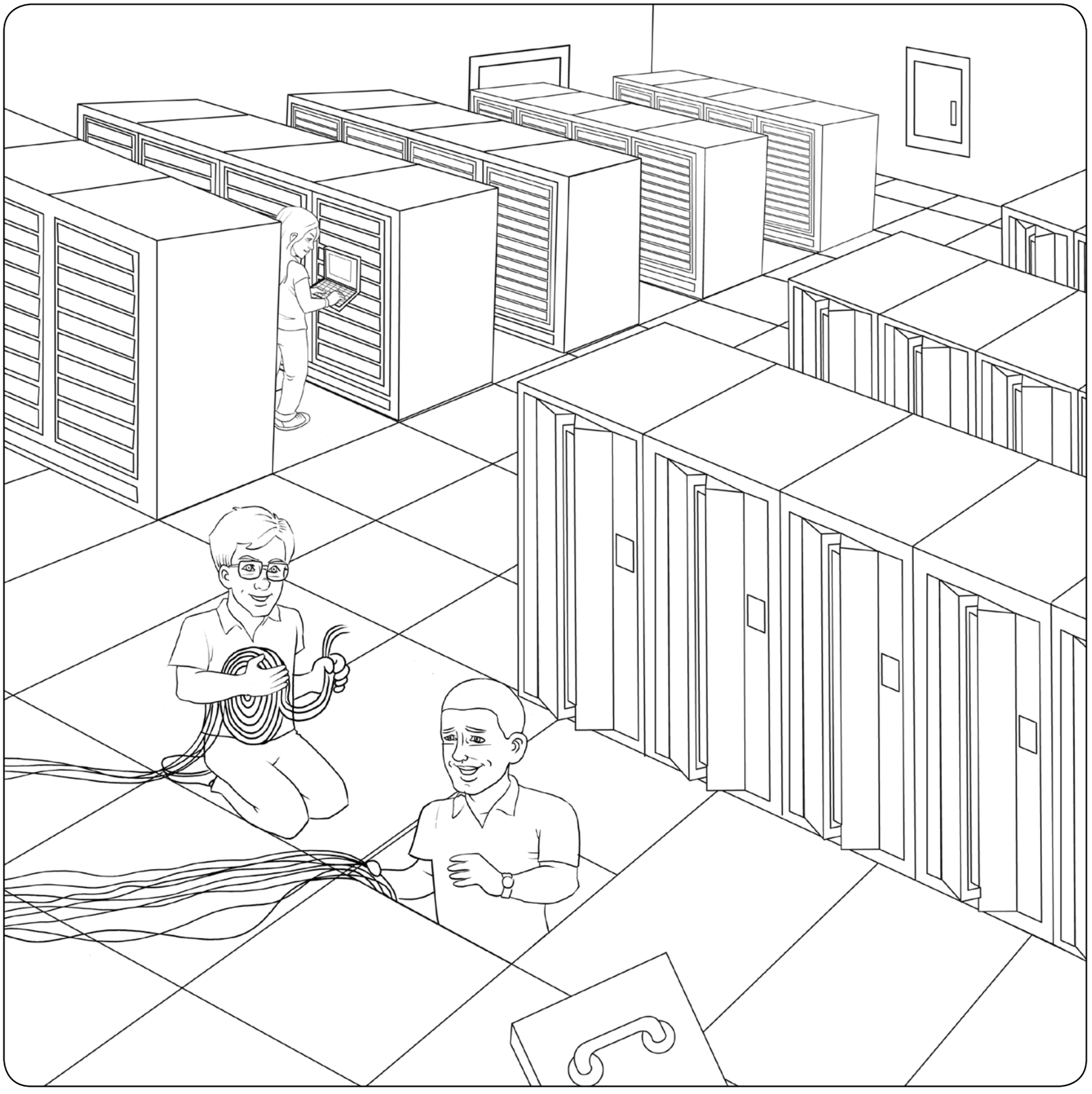
In 1986, NCSA's first supercomputer was a Cray X-MP/24 with a peak speed of 200 megaflops. The Blue Waters system, in contrast, will provide sustained performance of 1 petaflop. That's millions of times faster!



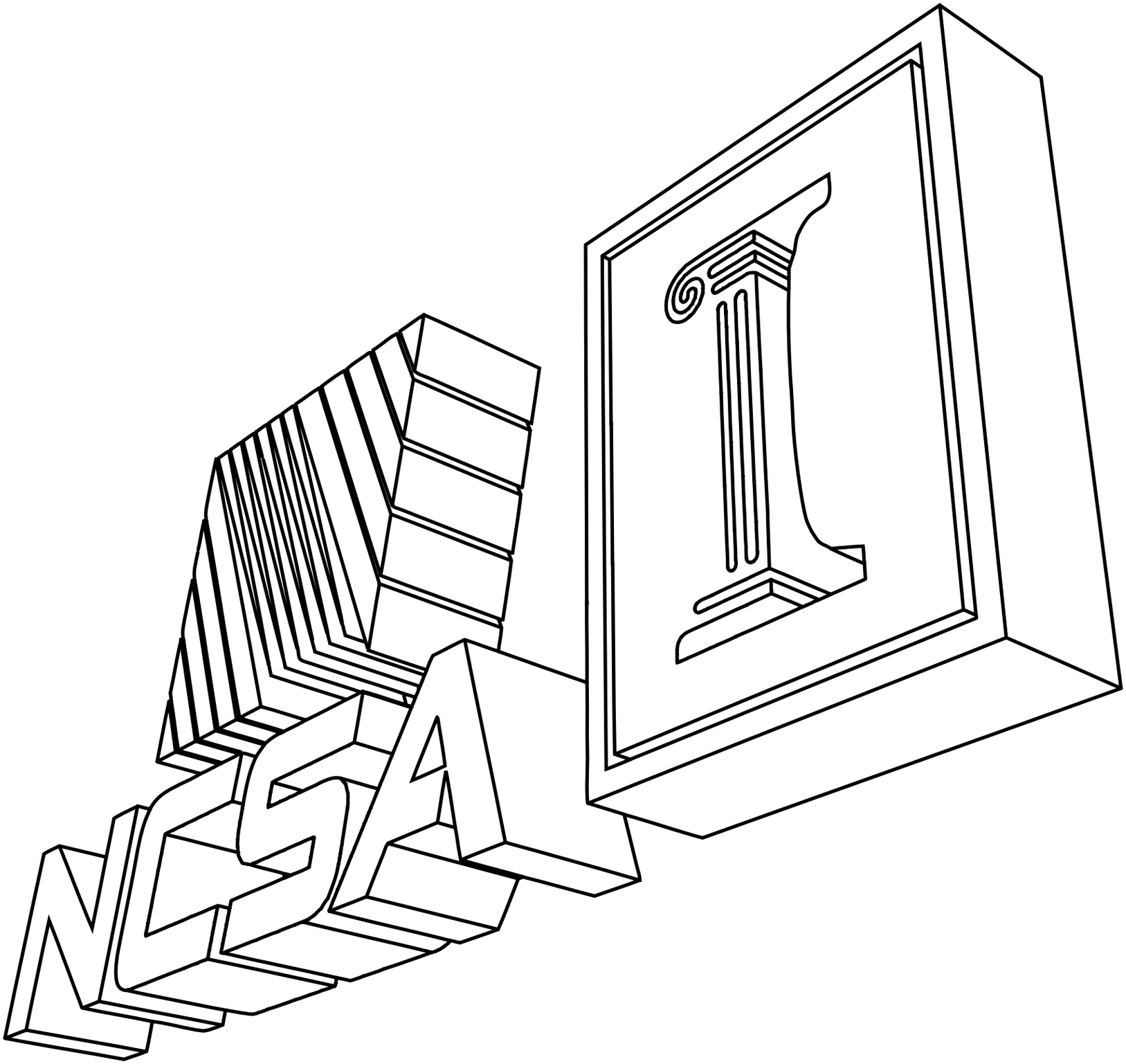
Simulations help determine the ideal properties for ceramic bone scaffolds, that could help repair severe injuries.



Companies use supercomputers to design and refine products, from airplane wings to the spouts on ketchup bottles. Through its Private Sector Program, NCSA provides a competitive edge to business and industry partners.



NCSA's Machine room offers a variety of systems, including the new Lincoln cluster, which uses accelerator hardware that was first investigated by our Innovative Systems Lab.



National Center for Supercomputing Applications
www.ncsa.uiuc.edu

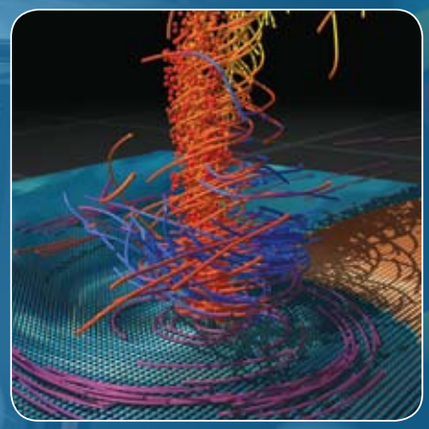
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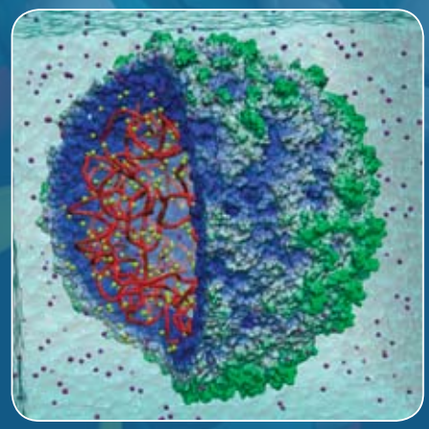
Tryptophan cage protein

Carlos Simmerling, Stony Brook University, New York.



F3 tornado

Robert Wilhelmson, Matthew Gilmore, University of Illinois; Lou Wicker, NSSL/NOAA; NCSA Advanced Visualization Lab.



Tobacco mosaic virus

Klaus Schulten, University of Illinois at Urbana-Champaign.



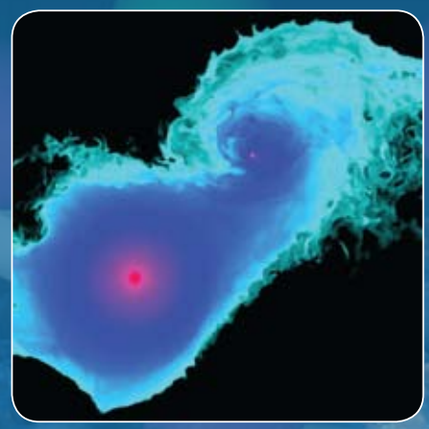
Silicon nanocrystal

Zachery Helms, North Carolina State University.



Bone scaffold

Amy Wagoner Johnson, University of Illinois at Urbana-Champaign.



Gas density interactions of a red giant and binary star

Ronald Taam, Northwestern University; Paul Ricker, NCSA and University of Illinois at Urbana-Champaign.



MAEviz

Mid-America Earthquake Center, University of Illinois; NCSA Cyberenvironments and Technologies Group.

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