

Manufacturing and the Smart Grid: Partnering for Success

SMART Wind Manufacturing Forum

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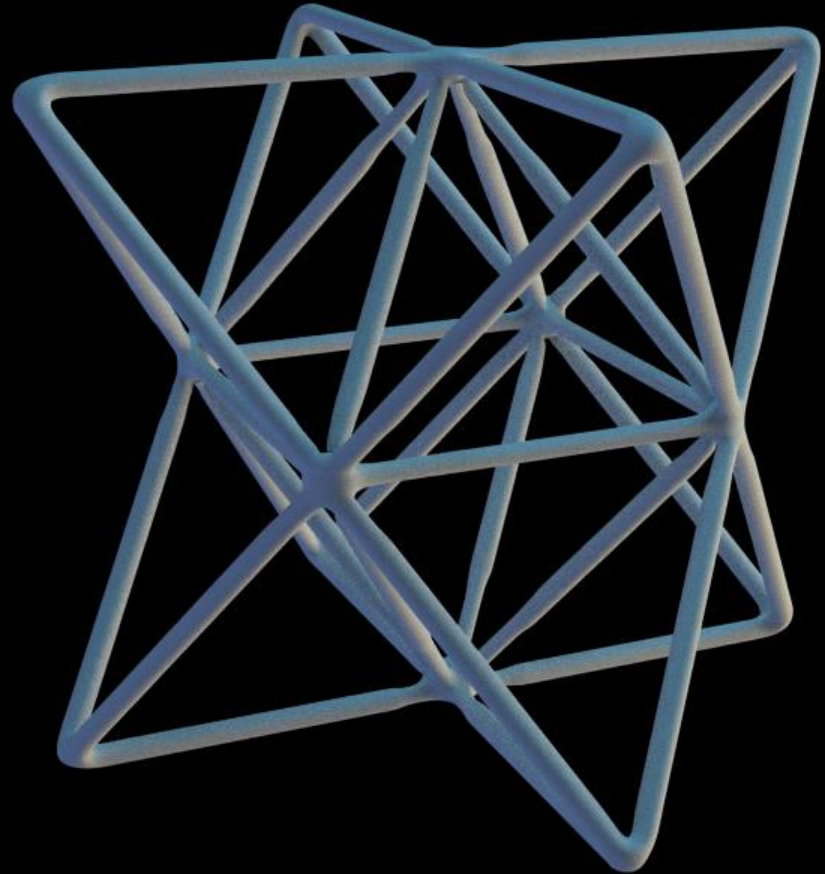
September 30, 2015



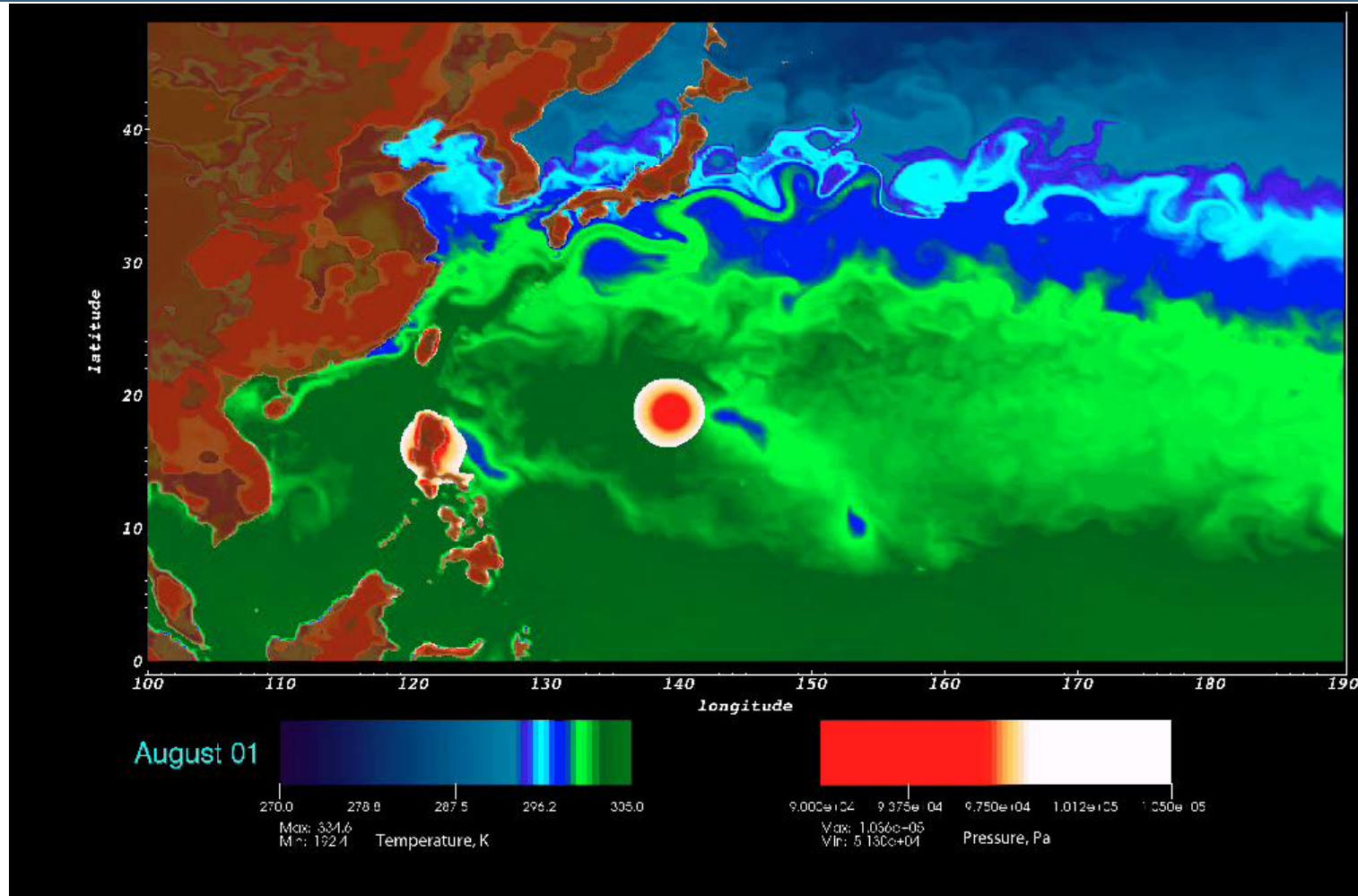
New Manufacturing Technology



OCTET TRUSS MICROLATTICE
(COMPUTER MODEL)

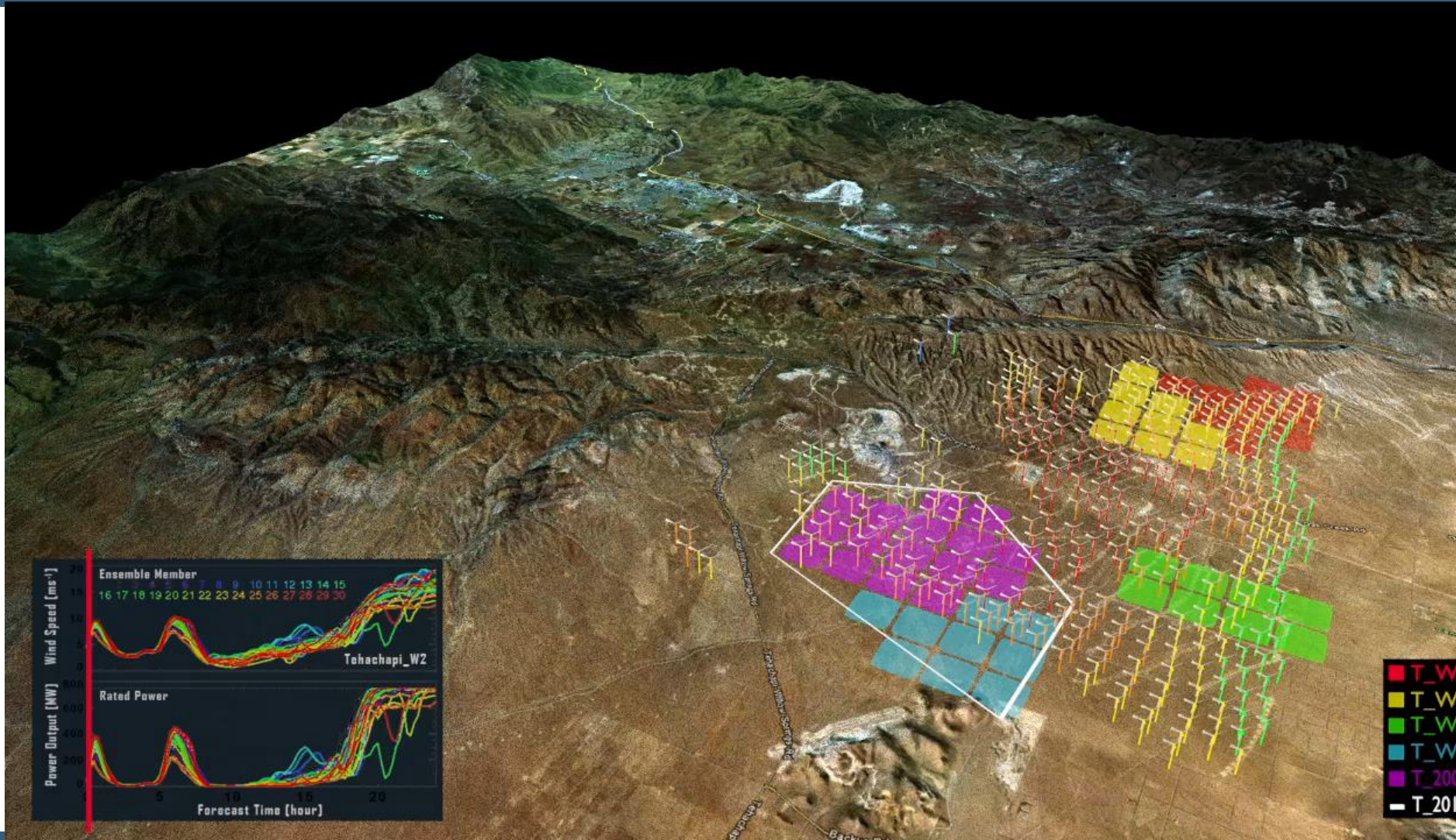


Leadership Climate Models

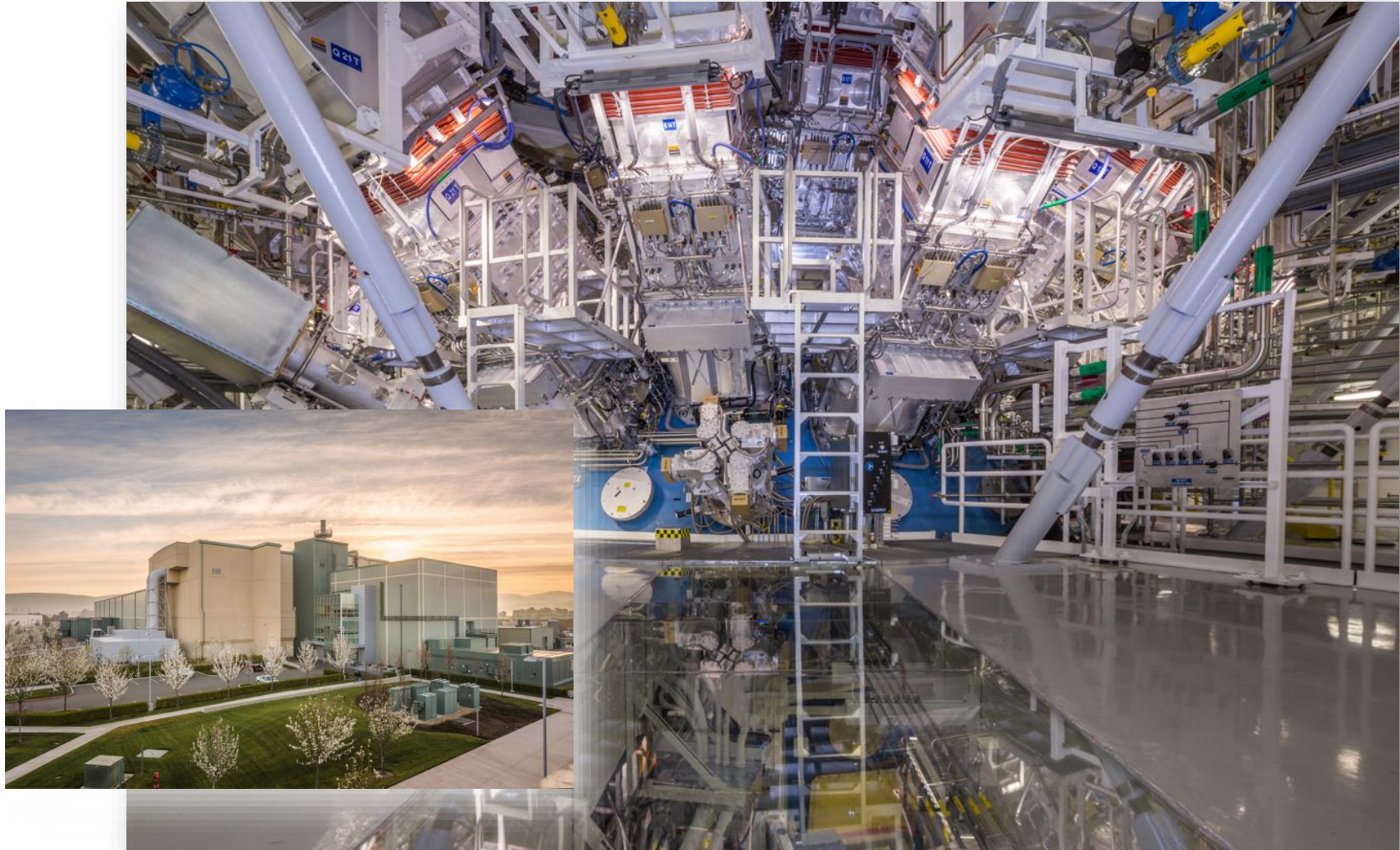


Dave Bader, Julie McClean, Art Mirin, Detelina Ivanova, Jim Boyle, John Dennis, Frank Bryan, Mariana Vertenstein, Nancy Norton, Tony Craig, Dave Bailey, Phil Jones, Mat Maltrud, Elizabeth Hunke, Rob Jacob, Pat Worley. Visualization: Rich Cook, Ross Gaunt

Modeling the Electric Grid



Bringing Star Power to Earth



What is the Common Theme?



Lawrence Livermore National Laboratory

Main Campus
(Livermore, Ca)

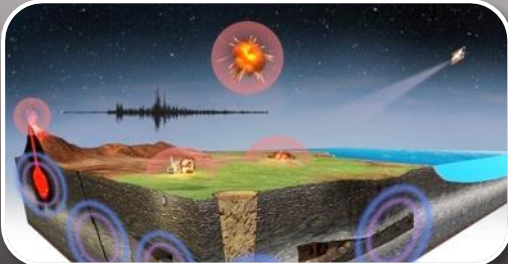
Remote Site
(Tracy, Ca)



Solving global security challenges for the nation

Multidisciplinary science, technology, and engineering

Strategic
Deterrence



Domestic and
International Security



Energy and
Environmental Security



Applied Science



Engineering

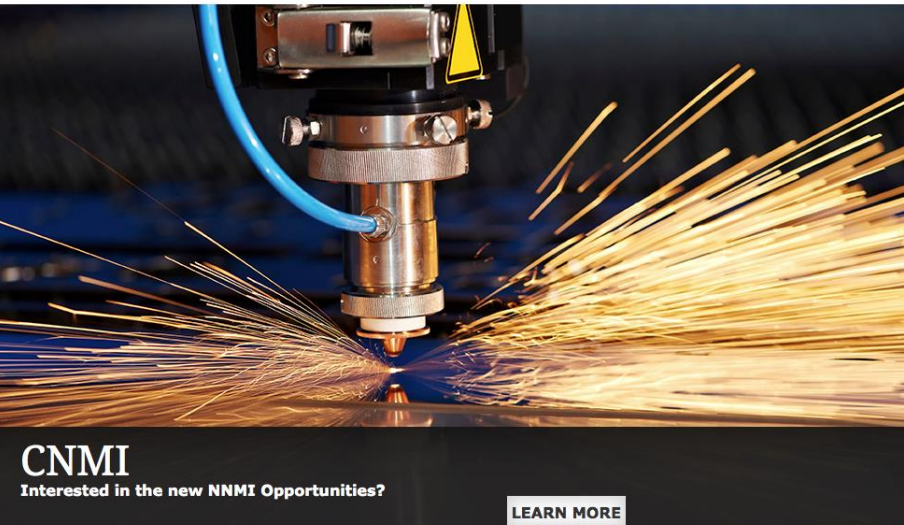


Computing

Partnerships

They are what help LLNL create
“Impact”

Manufacturing Partnerships

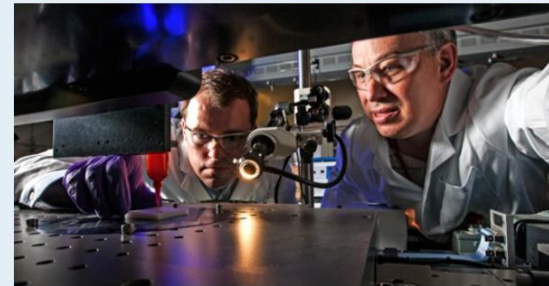
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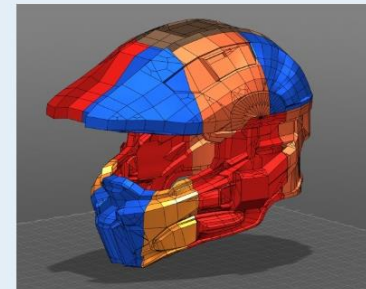
Autodesk teams with LLNL to design 3D printable objects (helmet) in next-gen materials

Aug 21, 2015 | By Alec



Lawrence Livermore National Laboratory (LLNL) engineers Eric Duoss (left) and Tom Wilson use an additive manufacturing process called direct ink writing to develop an engineered "foam" cushion. (Photo by George Ktirinos/LLNL)

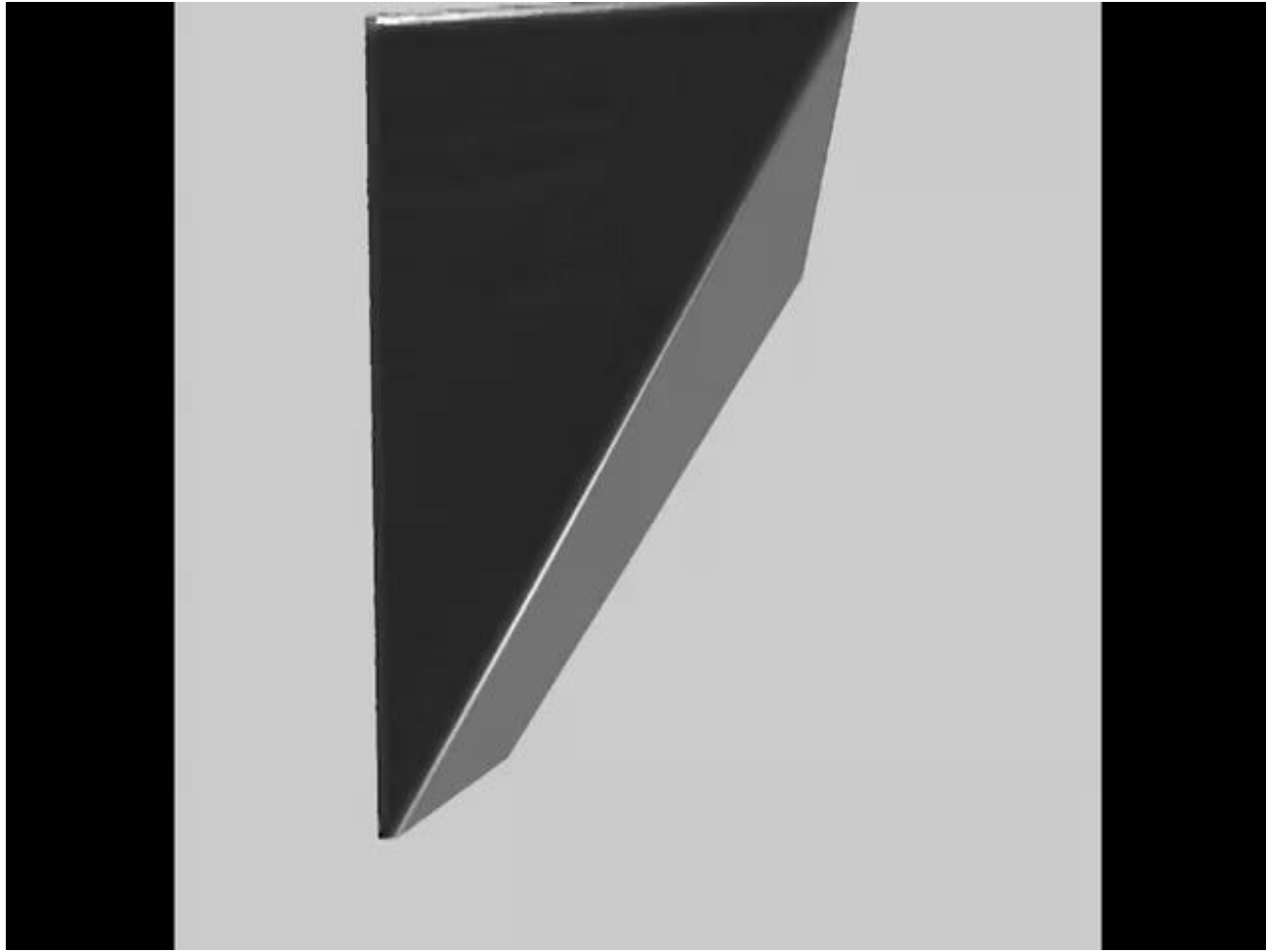
While you might think that software giants such as Autodesk are living in the golden years of their business, as demand for good design software has never been higher, they are rightly looking towards the future instead of resting on their laurels. That's why they have just announced a progressive collaboration with the [Lawrence Livermore National Laboratory](#) (LLNL) with the express purpose of using the latest software innovations to make 3D printable design of next generation materials possible. The first goal? To design and 3D print protective metamaterial helmets.



Lawrence Livermore National Laboratory



Manufacturing Partnerships



Climate Model Partnerships



*Program for Climate Model
Diagnosis and Intercomparison*



U.S. DEPARTMENT OF
ENERGY

Office of
Science



World Climate Research Programme



ICSU

International Council for Science

Earth System Grid
at NCAR

ipcc

INTERGOVERNMENTAL PANEL ON climate change



CES-21

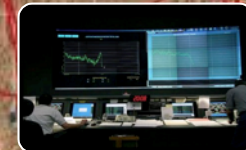
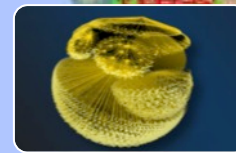
California Energy Systems for
the 21st Century

Enabling and accelerating the transition
to a clean energy economy

needs and innovation

- Renewable integration
- Increase in demand
- Operational complexity
- Aging infrastructure
- Electric transportation
- Cyber security
- Enormous flow of data
- Workforce development

unique capabilities

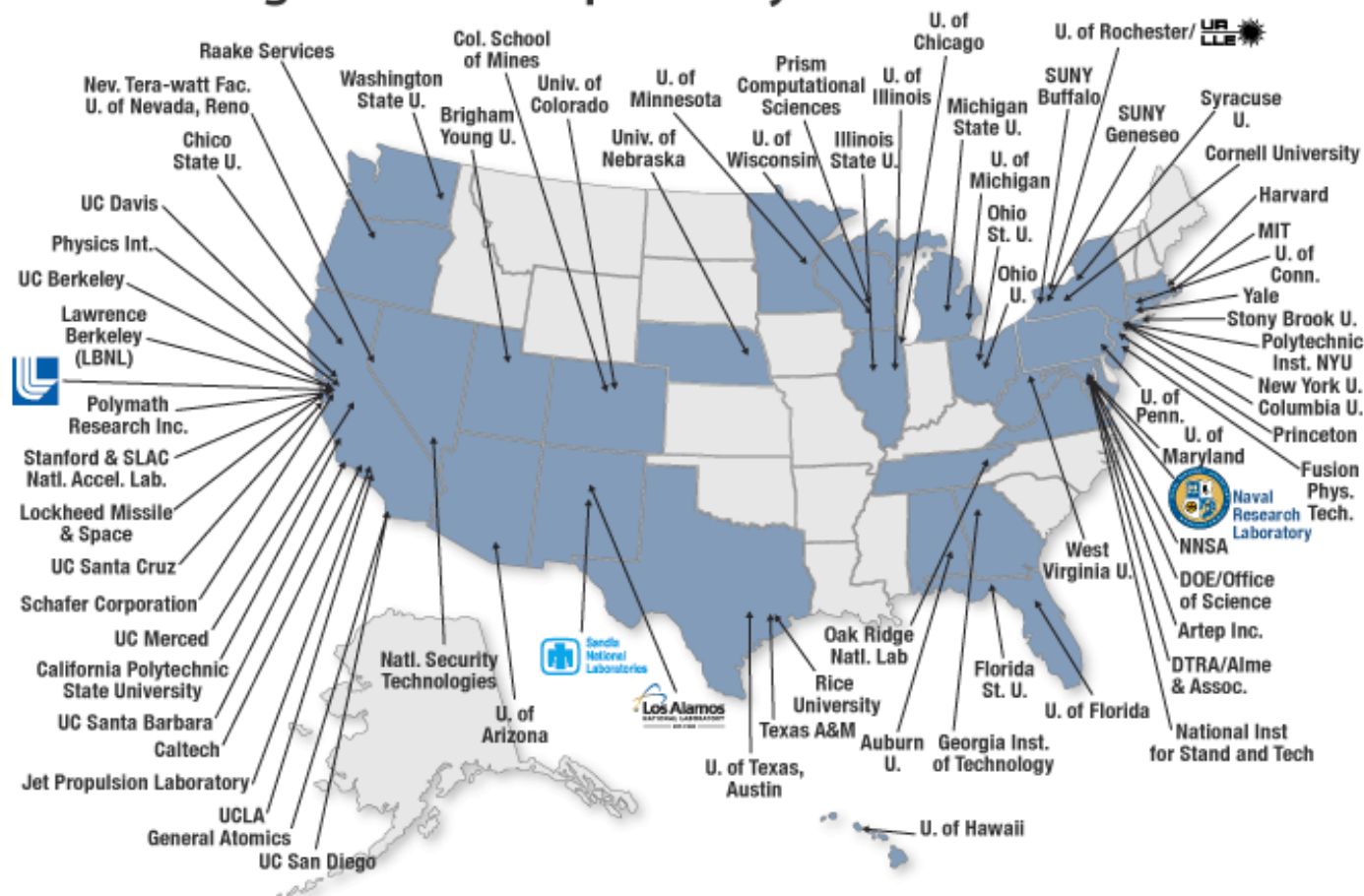


partnerships

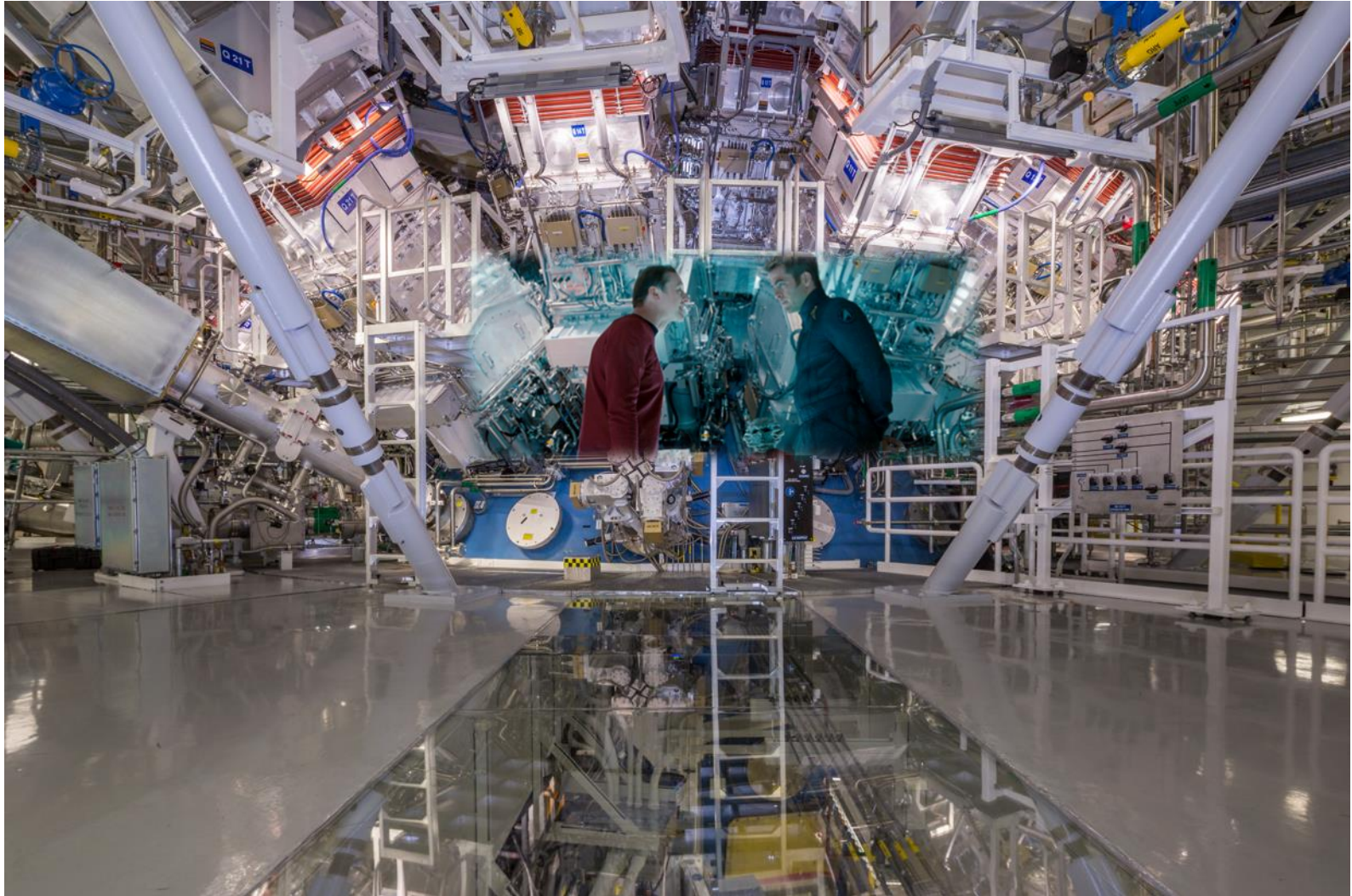


Bringing Star Power to Earth

Partnering to further exploratory science



Bringing Star Power to Earth



Partnerships

Considerations and Challenges

What to consider

- At what level do you approach a partner?
- Who do you approach first?
- Who will help you succeed and who will be a threat?
- What is the cost and does it justify the benefit?
- Are you willing to adjust your goals for the good of the partners?
- More...

Take away or callout



Challenges and Opportunities for Distributed Wind

- Challenges

- Technical
- Competition
- Political (local and State)

- Opportunities

- Generation Diversity
- Cost
- Partnership with ? ... Solar...
- Federal Support

Take away or callout

Who are the stakeholders?

- State (CPUC, CEC, Legislature)
- Municipal
- Utilities
- Other distributed generation (solar)
- Department of Energy
- Department of Commerce
- Department of Defense
- ?

...and how can they benefit from your success

