

2015 Accomplishments

Division 6000 | Organizations 6900, 0100, 4800

Institutional Transformation (IX)

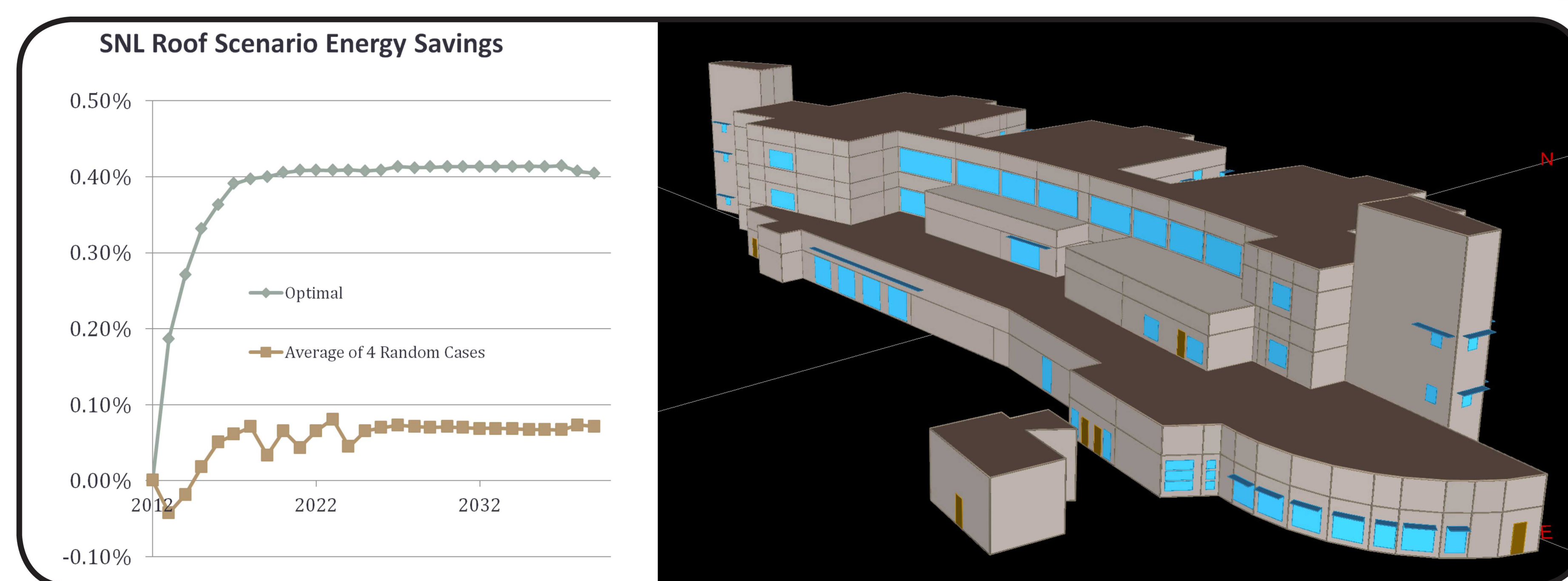
Researchers Daniel Villa, Howard Passell, Will Peplinski, Len Malczynski, Max Ottesen, and facilities managers Jack Mizner and Gerald Gallegos are utilizing Sandia's science and engineering expertise to reduce site-wide energy consumption. The resulting model, Institutional Transformation (IX), complements eQUEST, a DOE building modeling environment. Using customizable conservation methods and renewable energy options, IX quantifies energy savings for capital and operational investments across hundreds of buildings. Planners can experiment with different approaches across the entire institution and select the most energy-efficient strategies.

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Close estimates from the data of hundreds of building models (building 899 eQUEST model seen above) make a big difference in terms of energy savings, as seen in the graph above. The Institutional Transformation (IX) "optimal" case saves four times as much energy as the "random" case, which approximates the process of adding cool roofs and insulation with no knowledge of energy responses provided by IX.

SAND2015-#### #



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SNLSimMagic

Sandia developed SNLSimMagic, an augmented reality iOS application (app) that can be downloaded to an iPhone or iPad. If a user scans an image in the Sandia High Performance Computing Annual Report using SNLSimMagic, a movie clip of the relevant computer simulation will play on their device. This app, available through the Apple App Store, was recently demonstrated at Supercomputing 2014 in New Orleans.

Point of Contact: **Barbara Jennings**

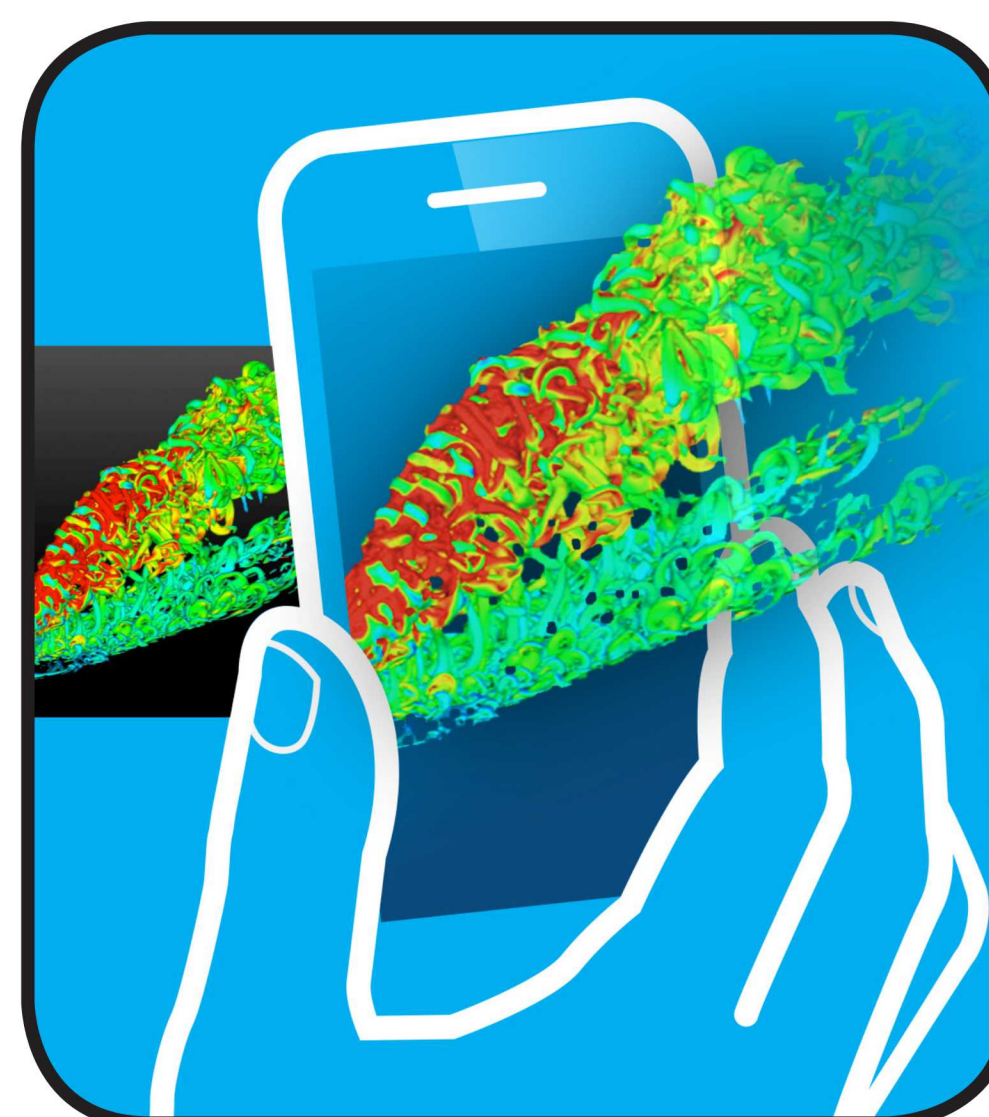
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Point of Contact: **Charles Snider**

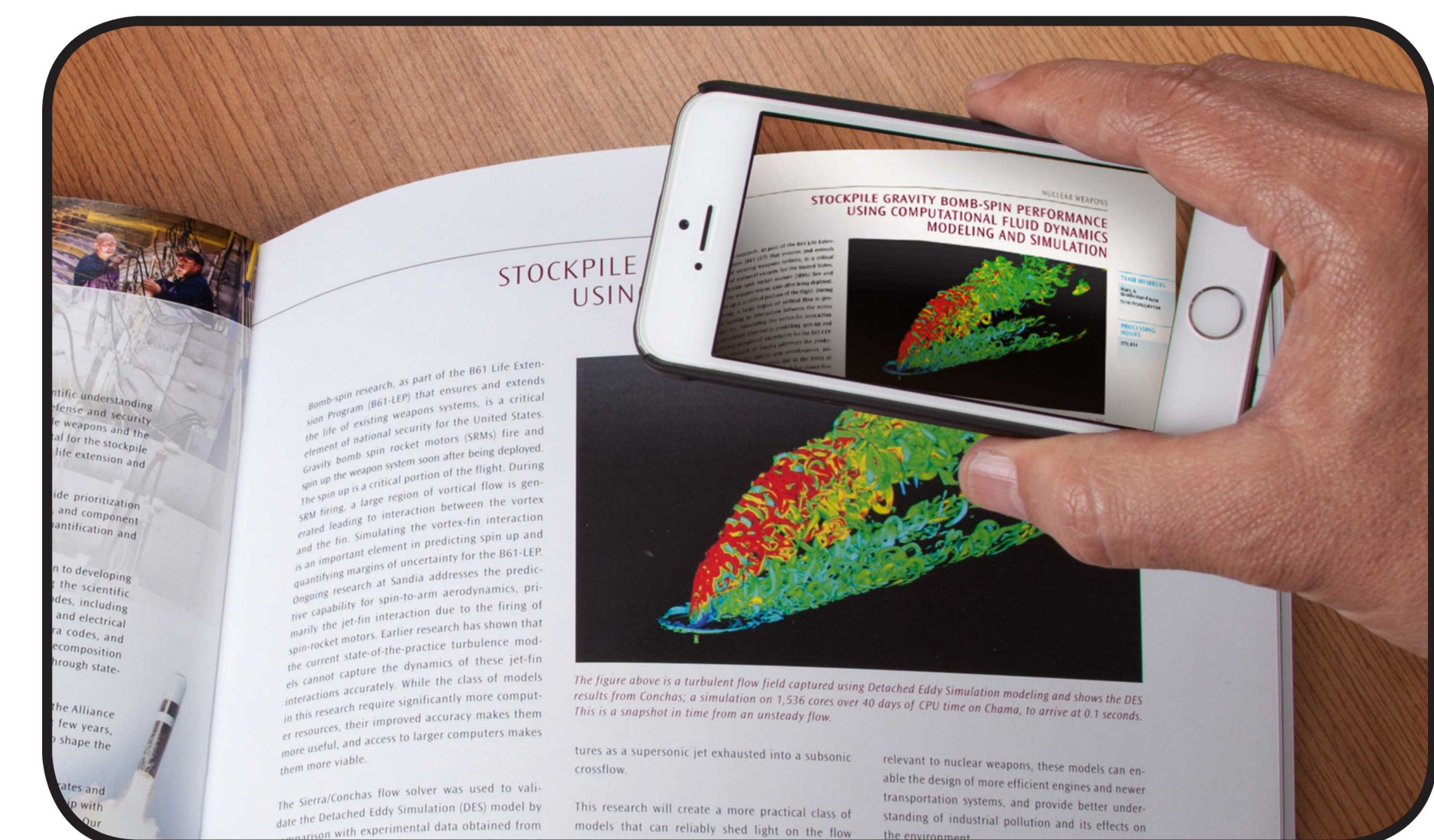
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SNLSimMagic is available as a free application from the Apple App Store.



Cartoon of the iOS icon.



SNLSimMagic recognizes an identified target and performs an associated action. For the 2015 High Performance Annual Report, a video-taped welcome introduction from Sandia management, as well as results from HPC computer-generated simulations, were delivered. There are many additional uses for this technology, including training and information exchange. The app's mobility greatly simplifies the technology that is typically needed to display the same information.

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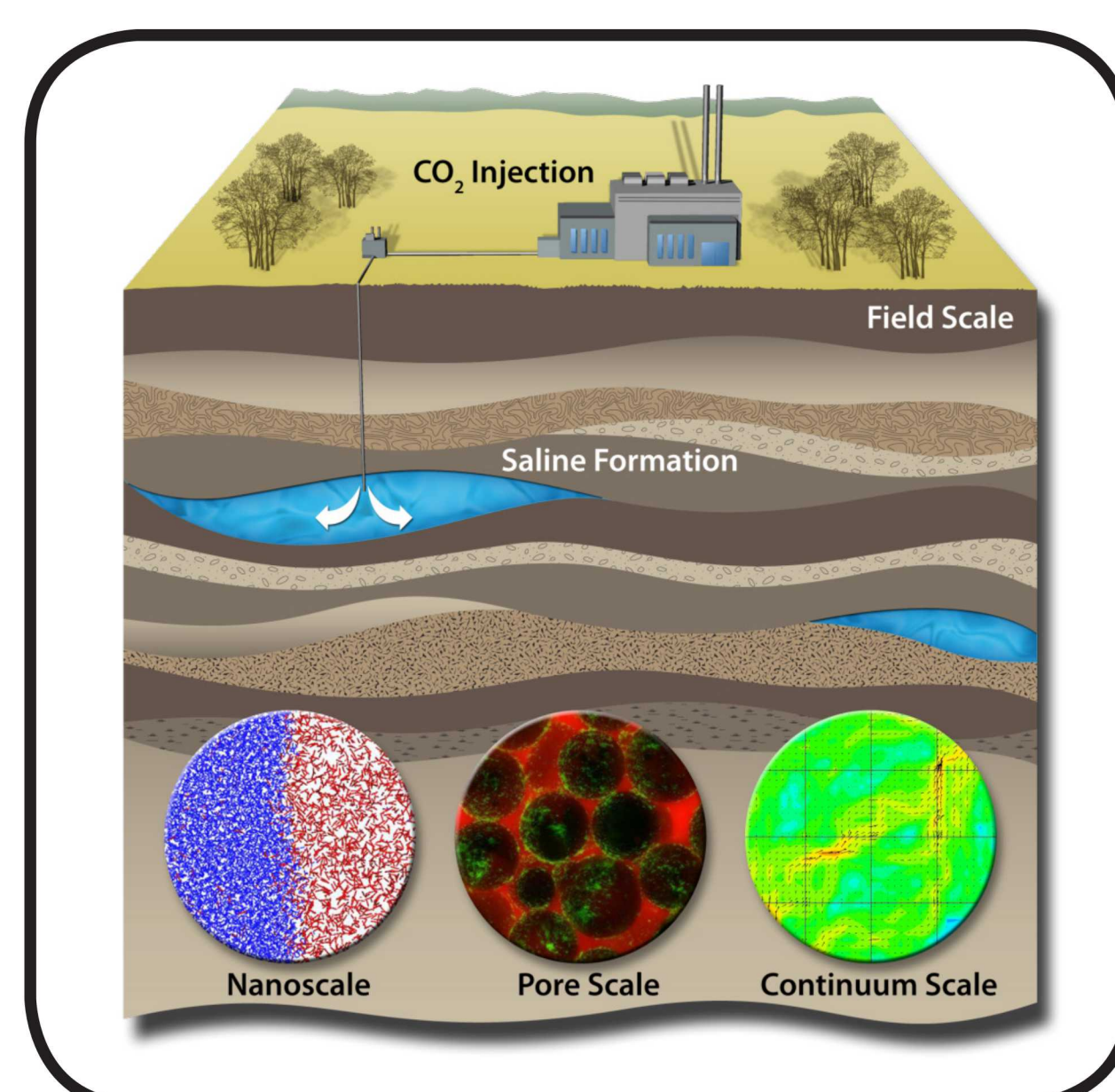
Division 6000 | Organizations 6900

Center for Frontiers of Subsurface Energy Security (CFSES)

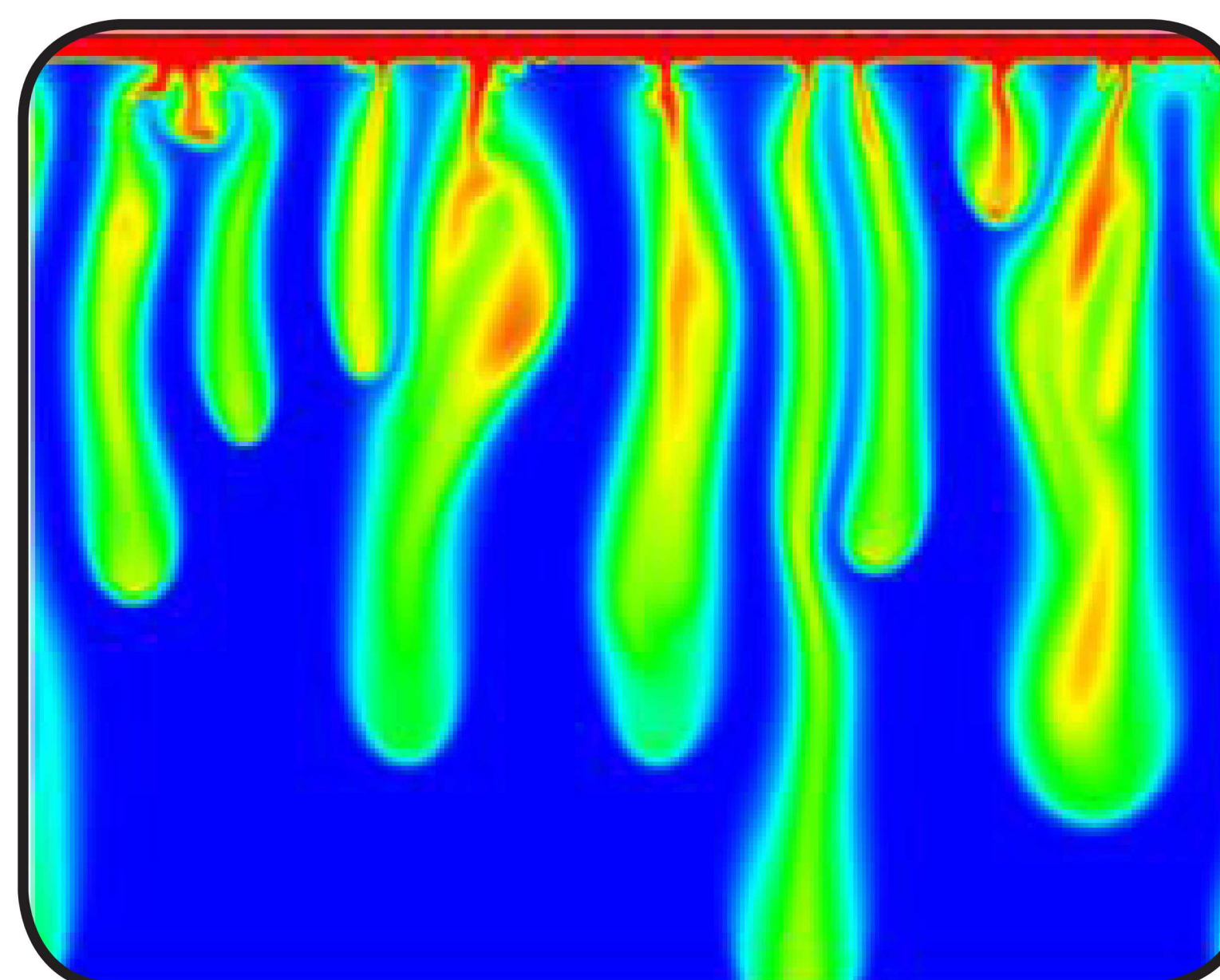
Susan Altman led a team of 11 Sandia scientists and engineers working with 19 faculty at the University of Texas at Austin to complete the five-year Center for Frontiers of Subsurface Energy Security (CFSES) Energy Frontier Research Center, which was funded by the DOE Office of Science. The Energy Frontier Research Center studies multiscale, multiphysics processes in carbon sequestration. Additionally, Susan spearheaded the crafting of the (successful) renewal proposal, which will continue the Center's operations for an additional four years. Seventy-two peer reviewed articles resulted from this work, including a cover article in the *Journal of Physical Chemistry*.

Point of Contact: **Geoff Freeze**

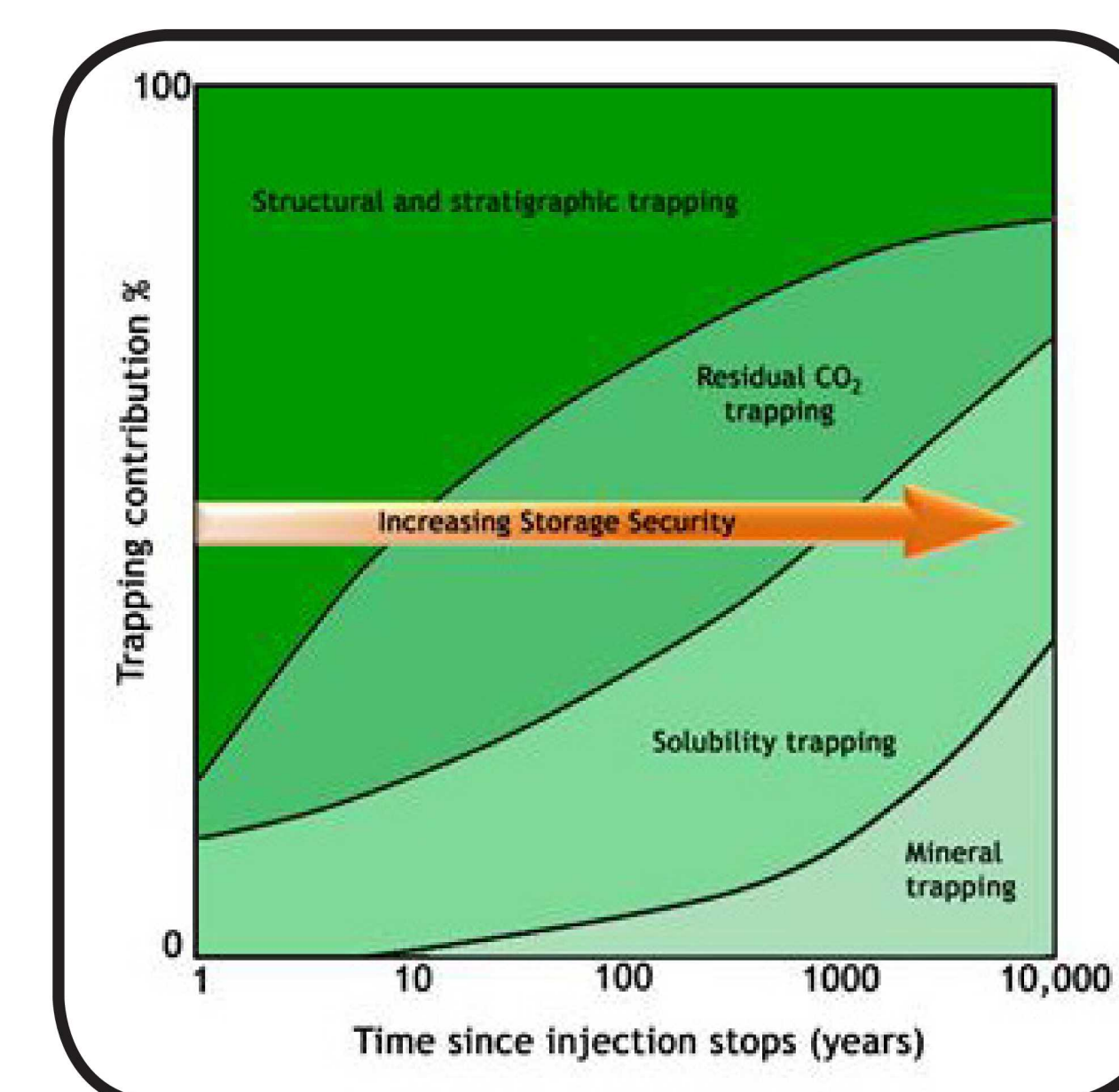
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Schematic representation of geologic sequestration of carbon dioxide (CO₂).



Two-phase simulation of CO₂ dissolution into brine.



Subsurface trapping contributions for injected carbon dioxide (CO₂).