

Project: Secure Model Repository Reference Pattern

INTRODUCTION

Project Description

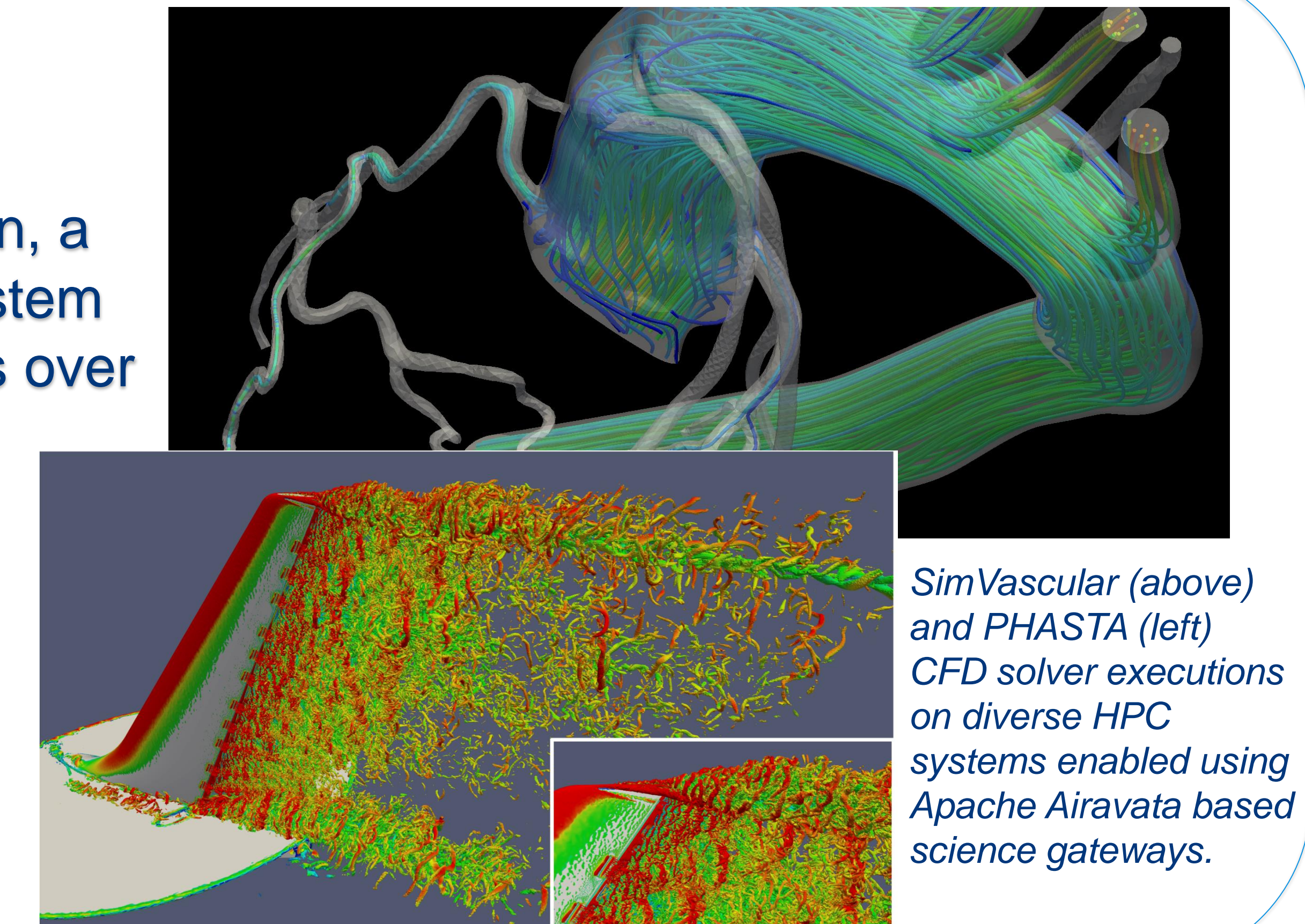
Construct and illustrate configured uses (across V4I Launch Projects) of the V4I Repository Pattern, a reusable MBSE reference pattern describing configurable stakeholder feature trade space and system requirements for model and pattern portfolio life cycle repositories and their integrated applications over model life cycles. Establish functional and operational requirements, produce preliminary designs and early prototypes of secure repositories of executable models that enable storing of models, replicability of model executions, secure sharing of models within and across organizational lines.

System of Interest

Product Design, Manufacturing Type Certification, and other V4I Launch Projects

Question being Answered

How can we create, execute, preserve, and share models and simulations securely?

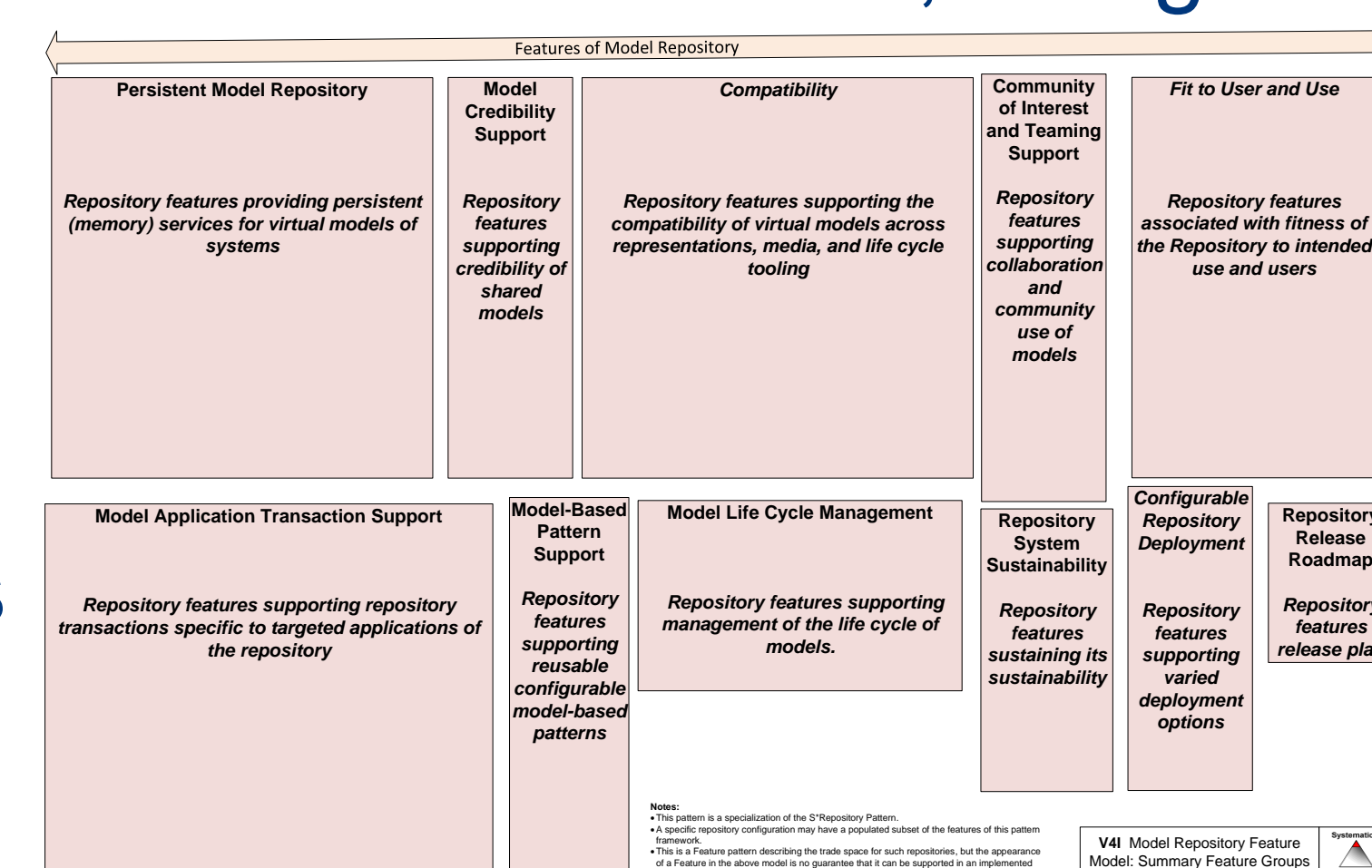


SimVascular (above) and PHASTA (left) CFD solver executions on diverse HPC systems enabled using Apache Airavata based science gateways.

EXPECTED BENEFITS OF THE PROJECT

Use Case: Enable creation, execution, sharing, and reproduction of executable models by non-HPC experts on HPC resources. Collaborate with HPC cloud providers to develop secure offsite access that can be used to simplify access to modeling and simulation tools within OEMs, along the supply chain, and across partnerships.

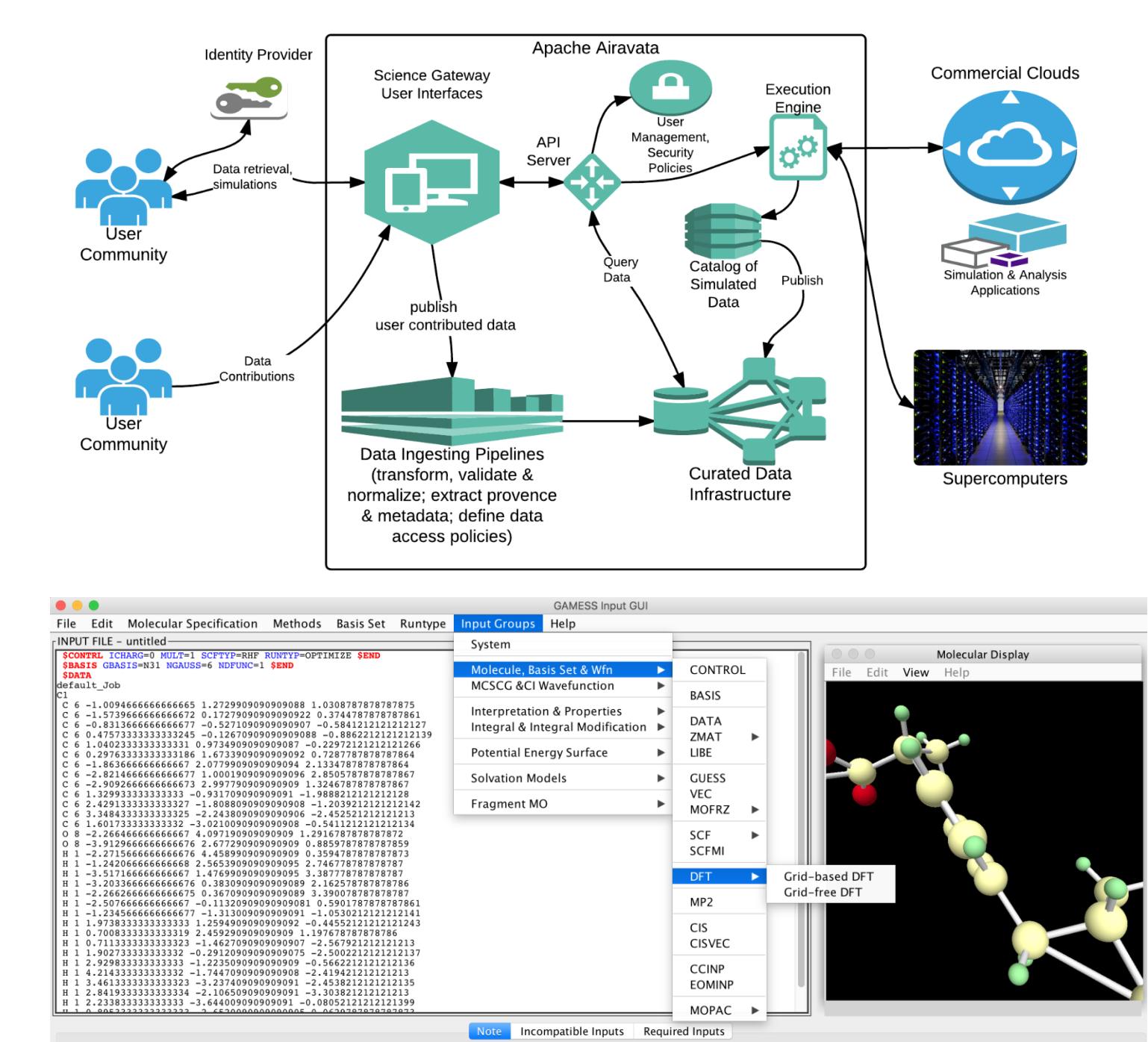
V4i: Establish a configurable model repository pattern that can be used to instantiate a range of model repositories suitable for diverse V4I requirements.



PROJECT APPROACH SUMMARY

- Establish requirements for model repositories with other launch projects
- Leverage NSF funded, open source Apache Airavata science gateway technology
- Integrate with HPC cloud environment to manage and store the executions of models
- Leverage IU's 2018 NSF Partnerships for Innovation award

Science gateway middleware (right, top) brokers access to HPC, cloud, storage, and other resources for diverse Web and desktop user environments (right, bottom)



FUTURE WORK

- Demonstrate V4i value by supporting repository requirements for multiple projects, multiple HPC providers through reconfigurable patterns.
- Support verification, validation, and uncertainty quantification through repositories of executable models.
- Integrate data driven and other advanced workflow execution scenarios.

PROJECT TEAM

- Pervasive Technology Institute, Indiana University
 - Marlon Pierce, Craig Stewart
- Microsoft (V4I membership pending)
- Rolls-Royce (NSF PFI-TT partner)