



INFIERI 2023





versatus

HPC

A success history in HPC and AI

INFIERI 2023

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I am HPC

I am AI

Why is that?



WHY I AM HERE?

**TO PROVIDE THE MOST ADJUSTABLE SOLUTIONS FOR
THE RESEACH WHICH NEED COMPUTER SIMULATIONS
AND MODELLING.**

NOW @ VERSATUS HPC, WORKING FOR

***EMPOWERING SCIENCE WITH
INTELLIGENCE***



versatus

HPC





100%

Focused in

HPC & AI

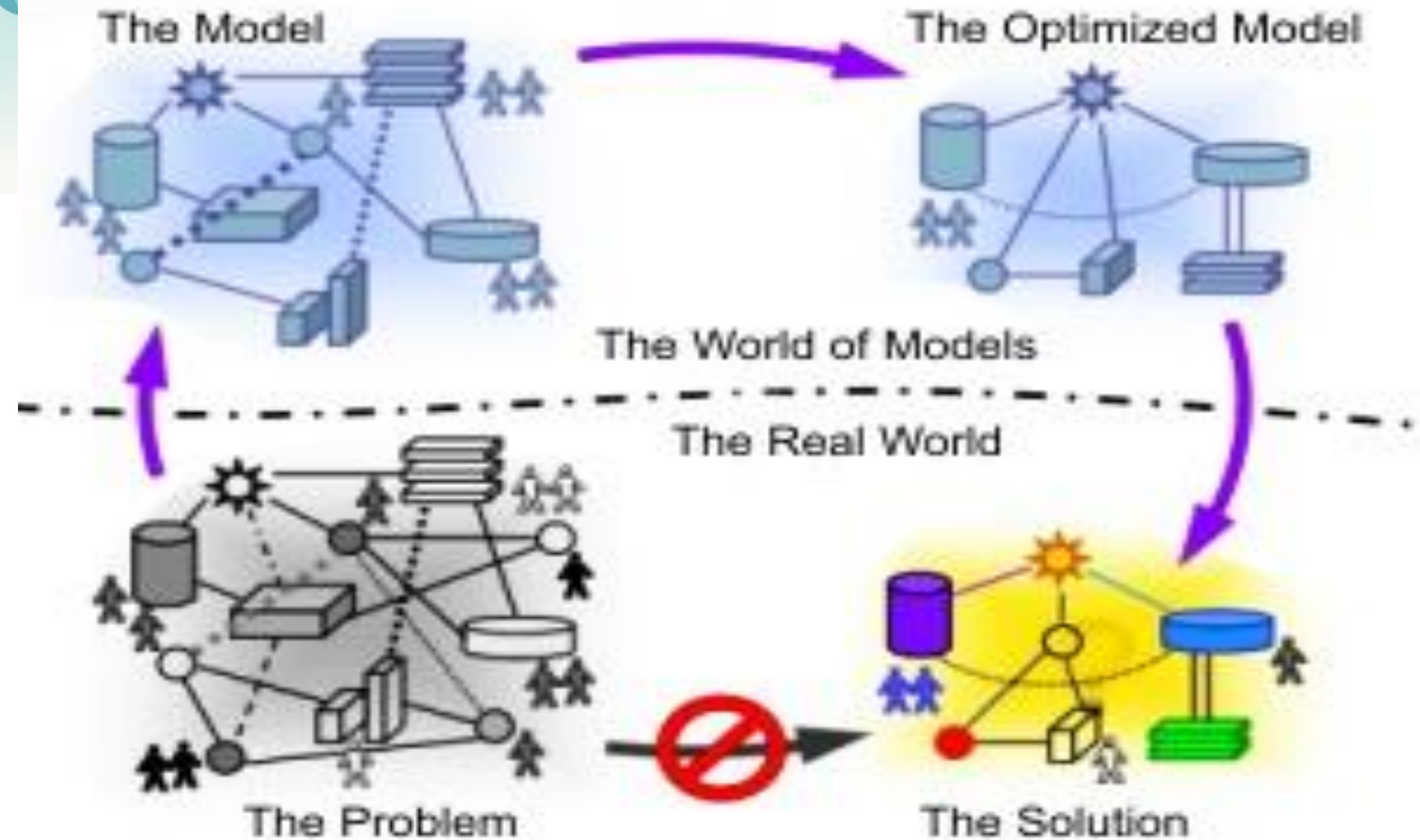
created in
Academia

To provide
projects to
**Academia and
Researchers**



Looking to sophisticated research targets, why use simulation and modeling??

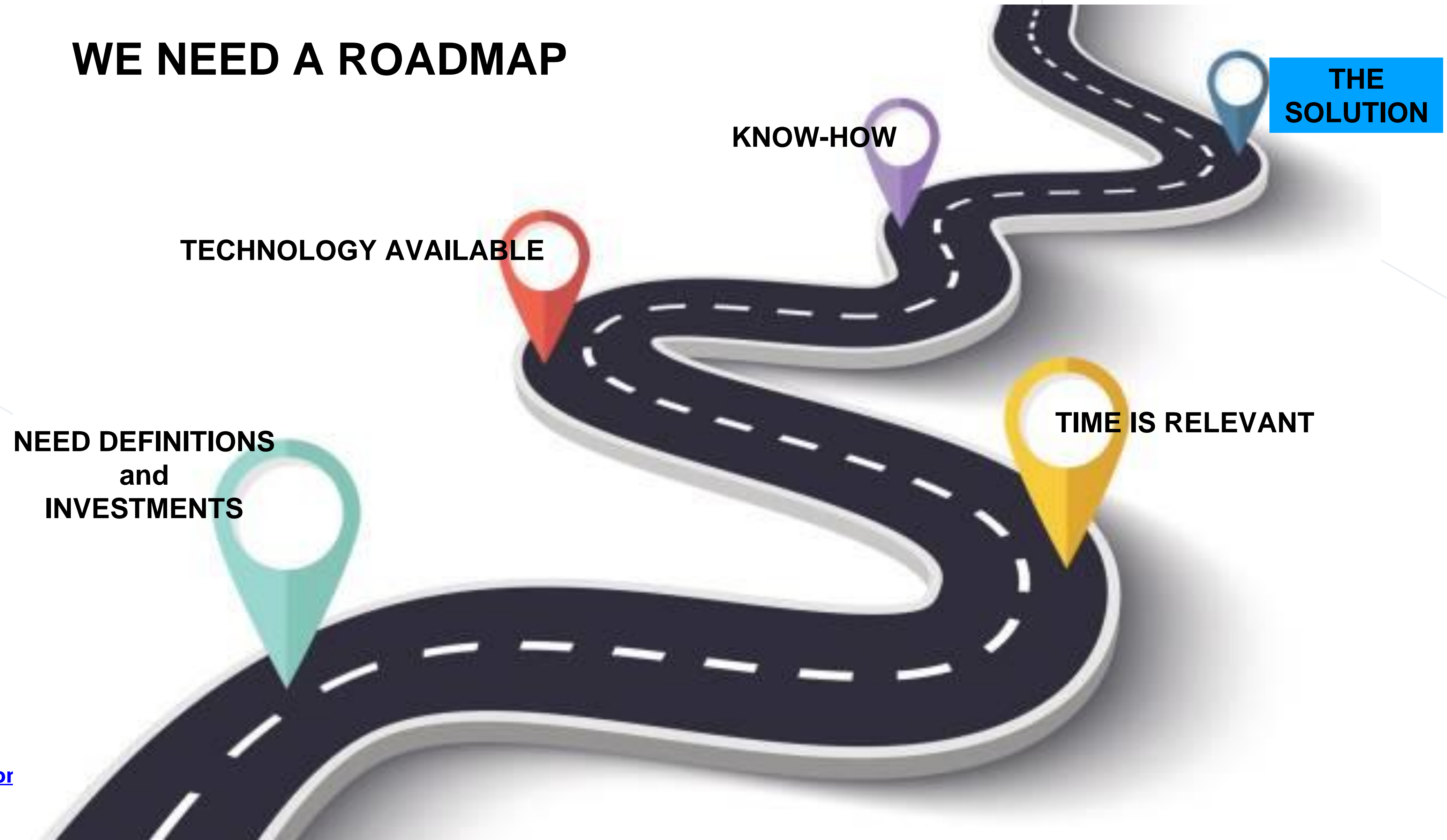
Because is cheaper and faster results are obtained to the current research





HOW TO GET THE SOLUTION

WE NEED A ROADMAP



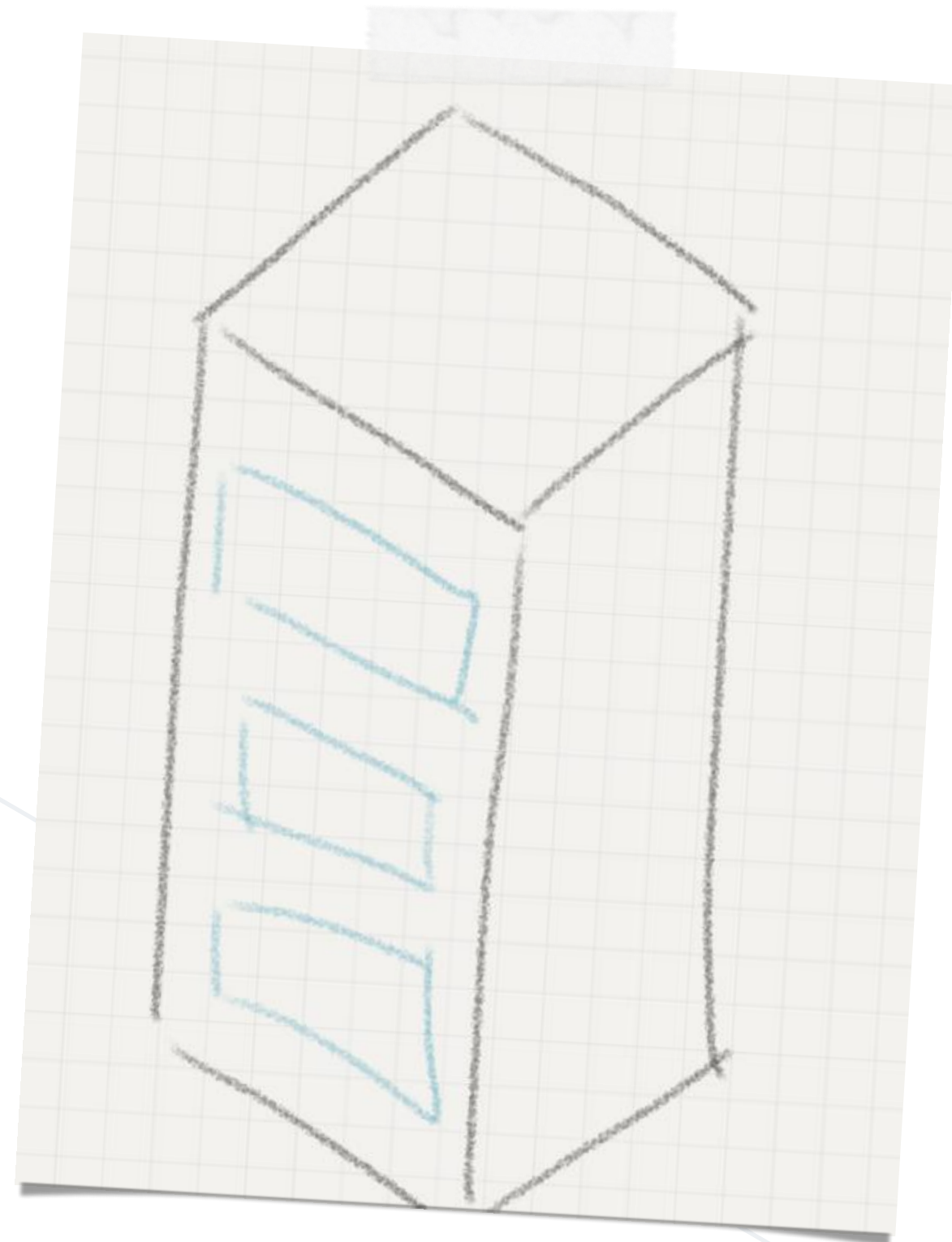


how we work



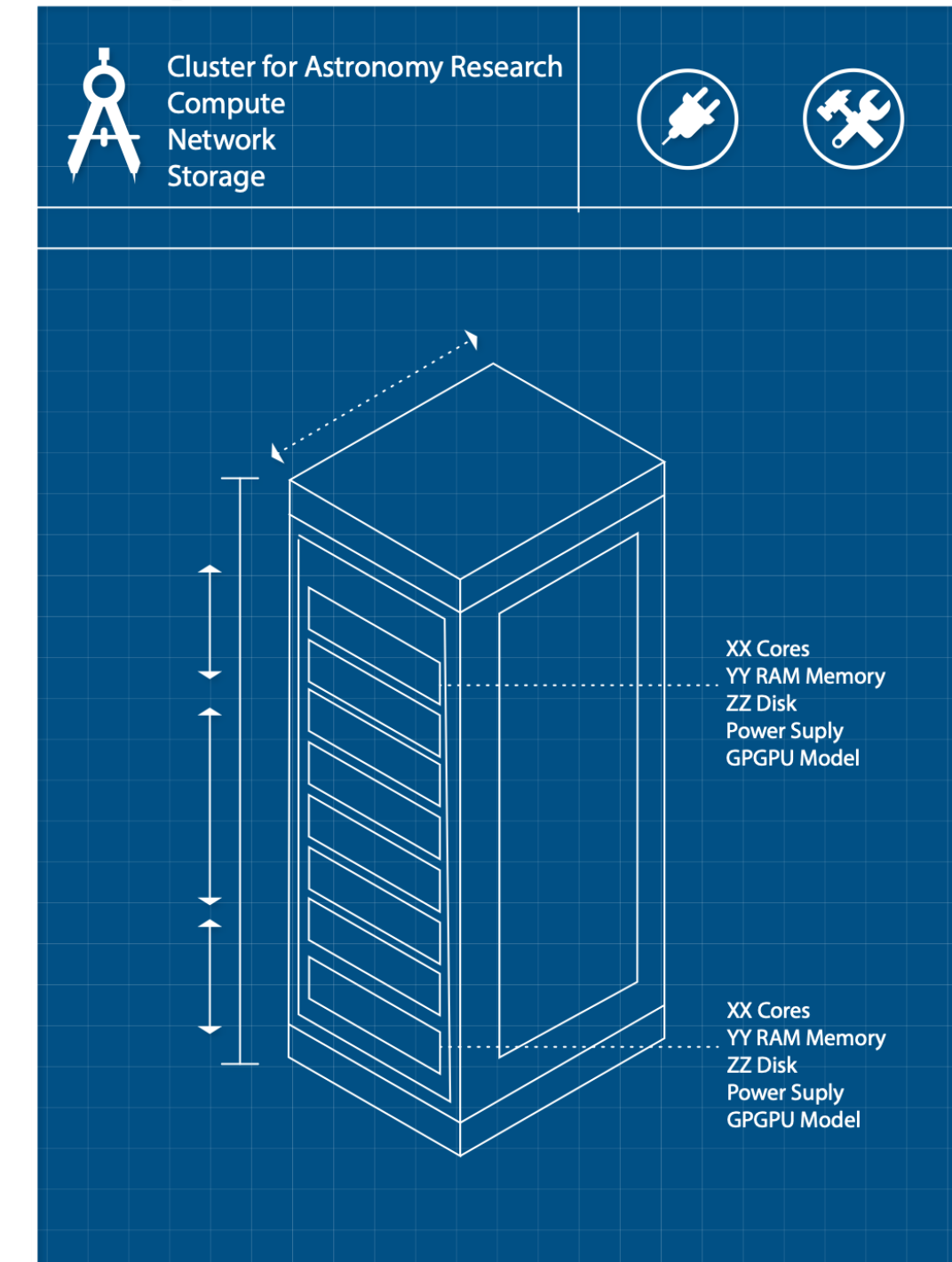
FIRST STEP

DESIGN AND ARCHITECTURE



1. We like to start working when the idea just became a research target.

2. We need to understand the research.

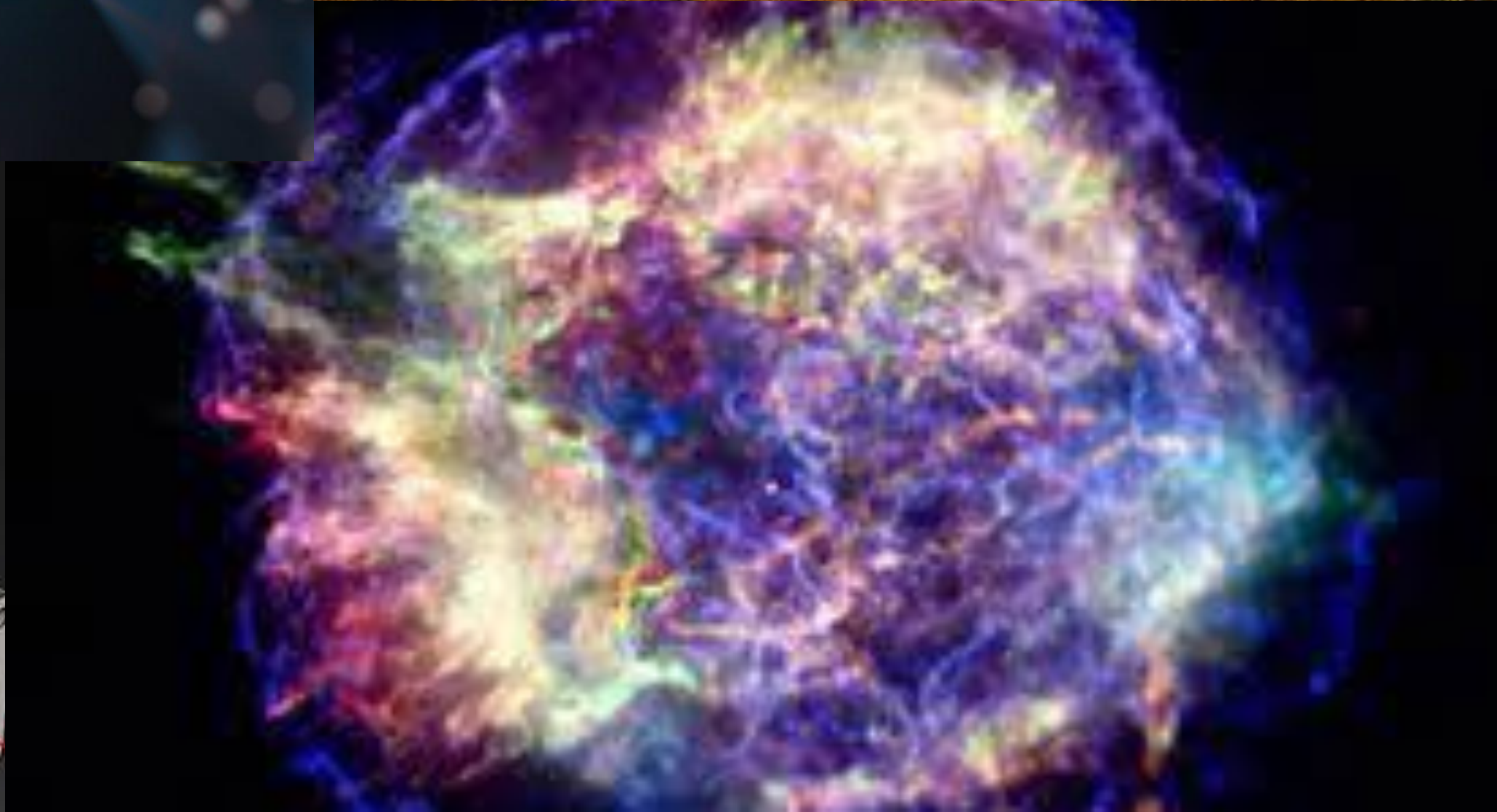
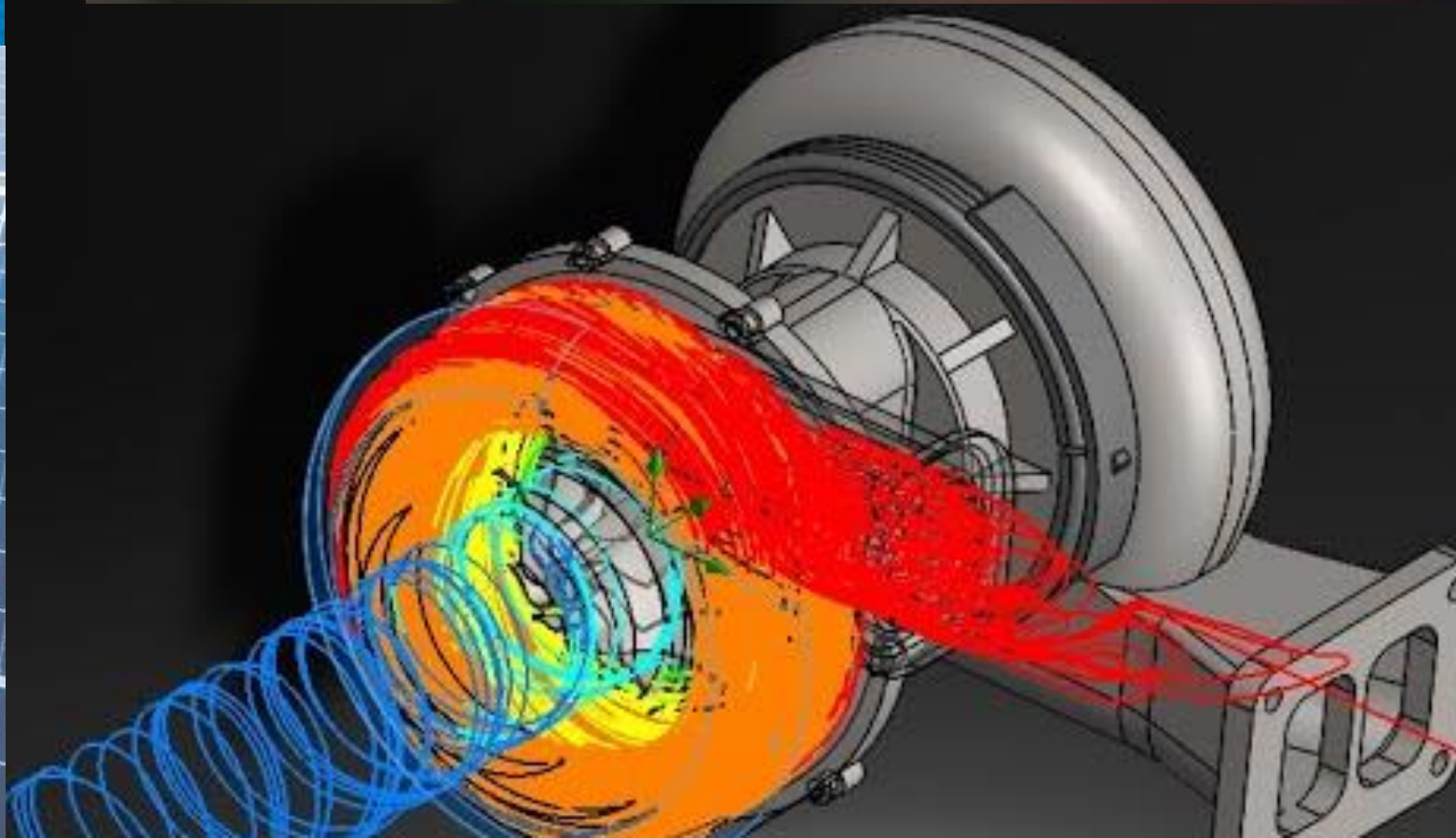
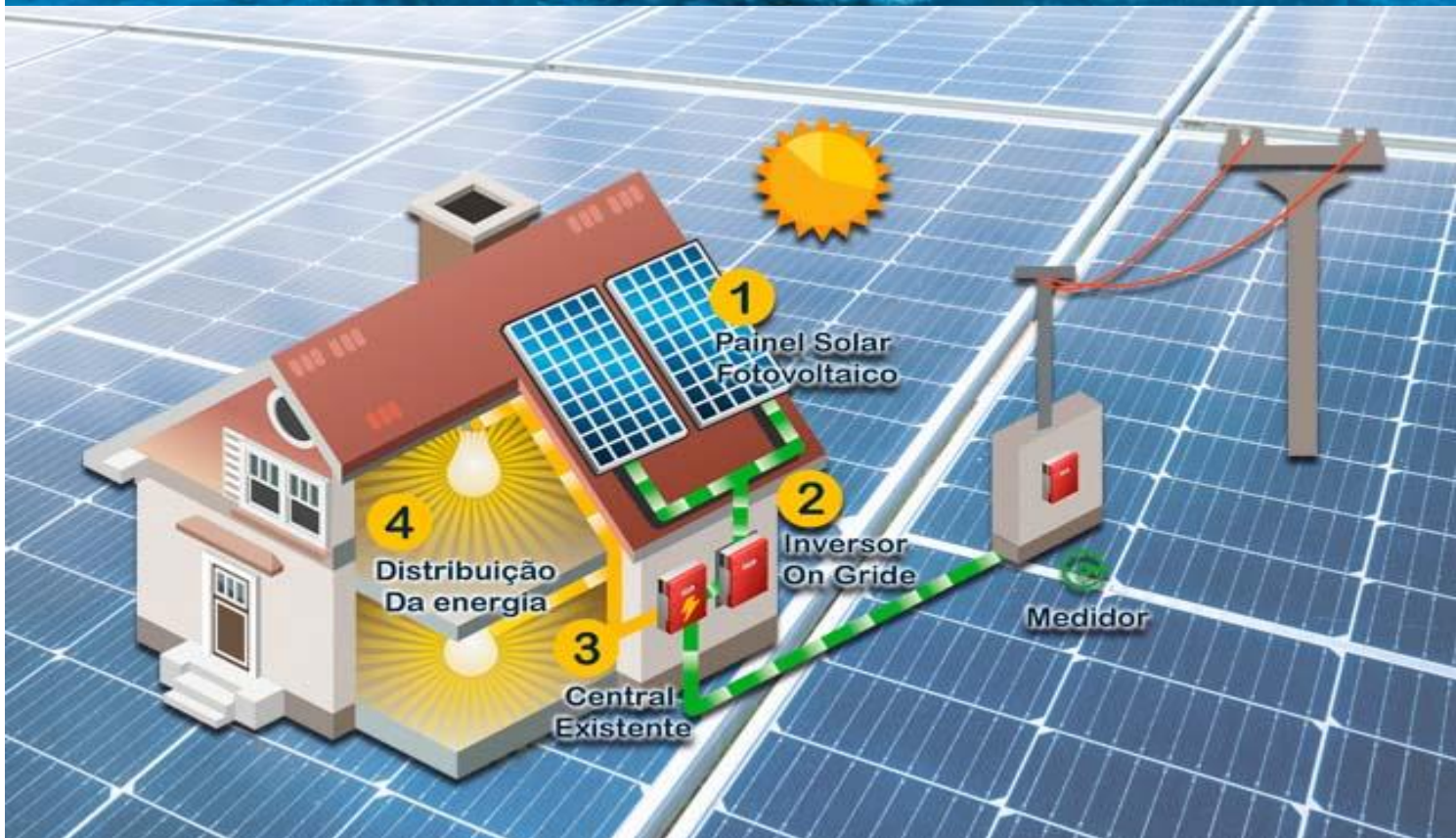
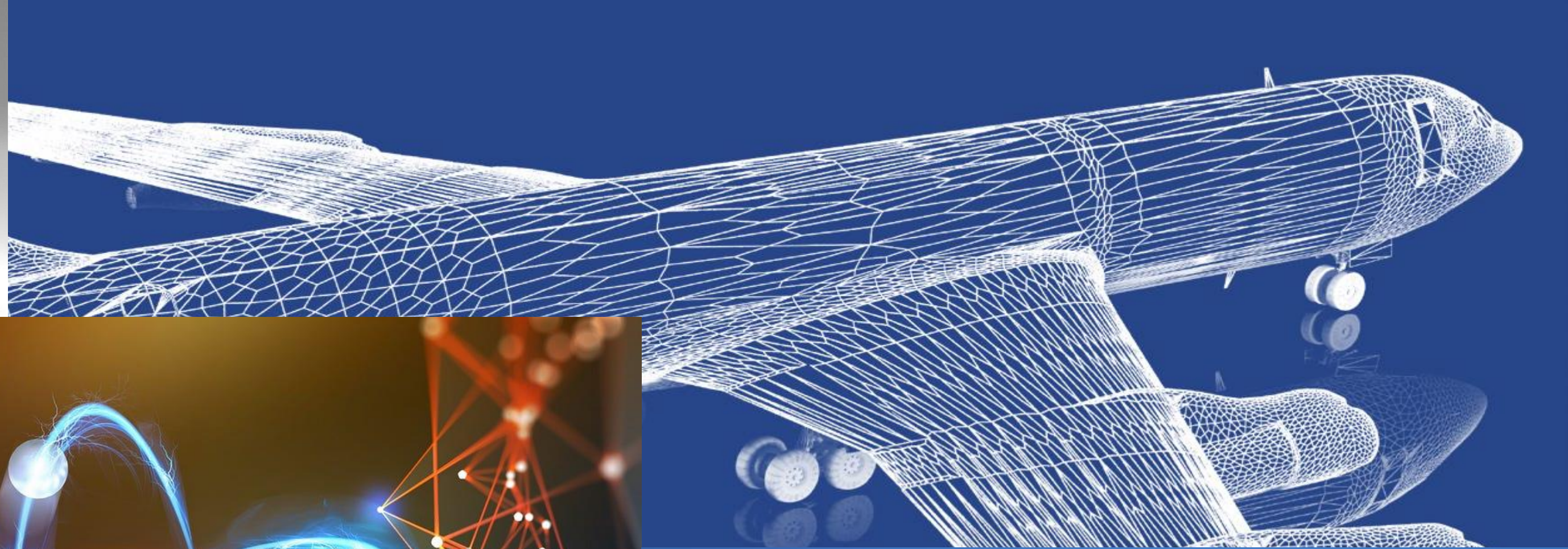




Why?



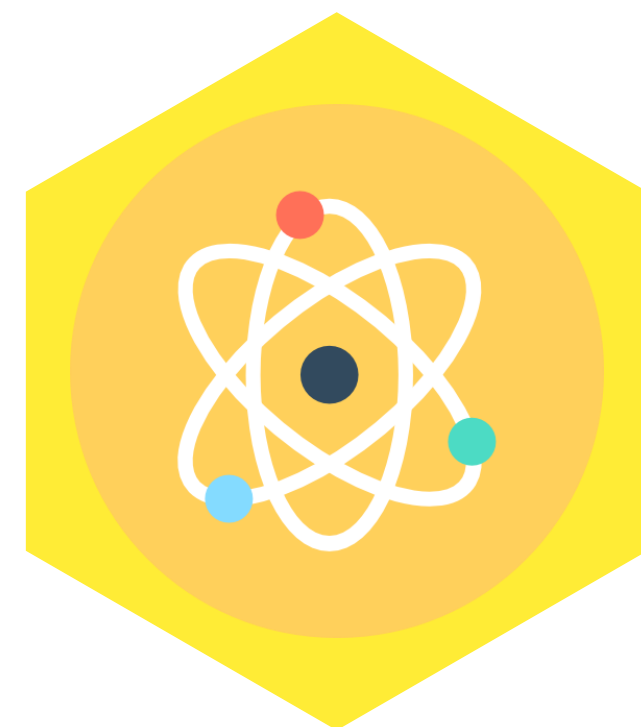
Image courtesy of BUGATTI.





Because is a key factor to produce an optimized cost-benefit solution for the investment available

and this direct us to the uptodated technological solution on a HPC or AI Project.





Engineering

Solutions

Libraries

Numerical Libraries
I/O Libraries
Message Passing
CUDA

Versatus Stack HPC

OS
File System
Provisioning
Console Management
Cluster Monitoring
Job Scheduling
Parallel File System
Compilers and Debugger

Cluster Architecture

Hardware configured for
Chemistry and Materials
softwares routines and
methods



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CFD

Altair AcuSolve	Convergent Science CONVERGE	Metacomp Technologies CFD++	3DS-Simulia Abaqus/CFD
Altair FEKO	ANSYS HFSS	ANSYS Fluent	AVL FIRE
CD-adapco STAR-CCM+	CD-adapco STAR-CD	ESI Group OpenFOAM	ESI Group PAM-FLOW
EXA PowerFLOW	NASA OVERFLOW	ANSYS FORTÉ	Software Cradle SC/Tetra

Structural Analysis

3DS-Simulia Abaqus/ Standard	3DS-Simulia Abaqus/ Explicit	Altair OptiStruct	Altair RADIOSS
LMS International SYSNOISE	AMLS CDH	ANSYS ANSYS Mechanical	INTES PERMAS
ESI Group PAM-CRASH	LSTC LS-DYNA	MSC Software Adams	MSC Software MSC Nastran
Sandia National Laboratories CTH	Siemens PLM Software NX Nastran	TASS International MADYMO	

Electromagnetic Simulation

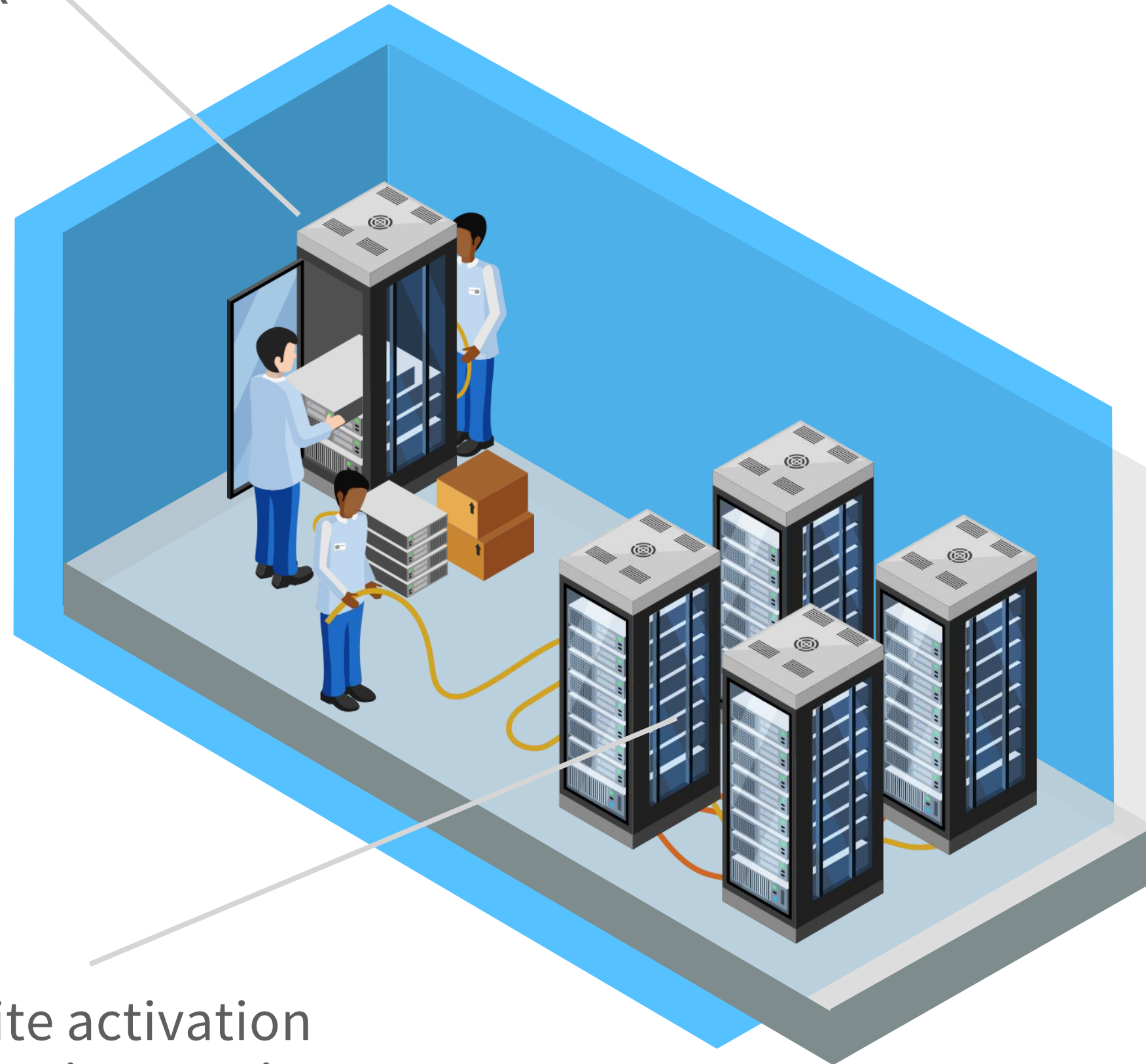
Altair FEKO	Altair JMAG
ANSYS HFSS	ESI Group CEM Solutions

Visualization

CEI EnSight	Intelligent Light FieldView
ANSYS CFD-Pos	

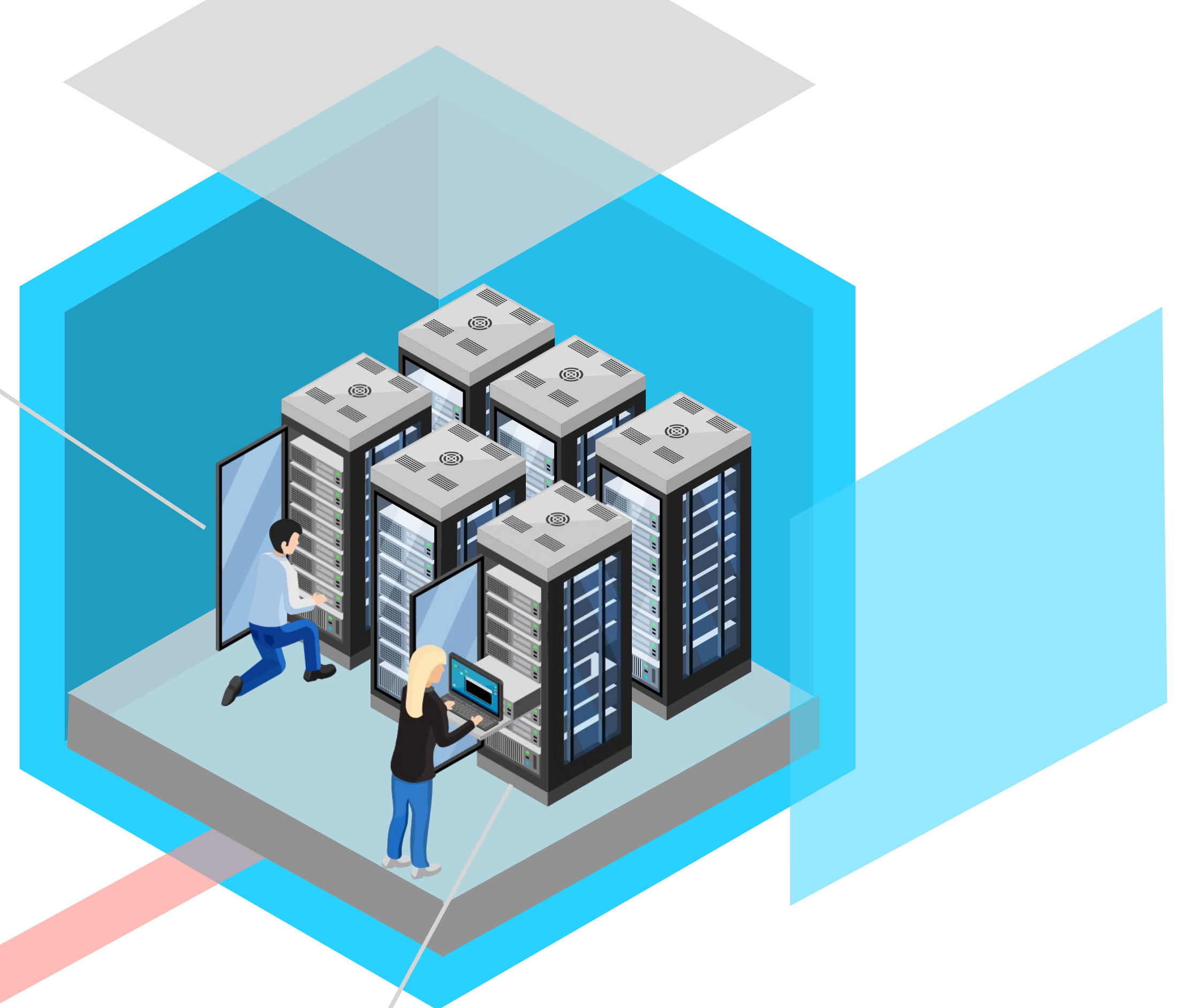
Services Deployment

Rack and
Stack



On-site activation
Cluster integration

Setup and
configuration



OS
Communication Libraries
Math Libraries and compilers

**Turn-key Solution,
Ready to use**



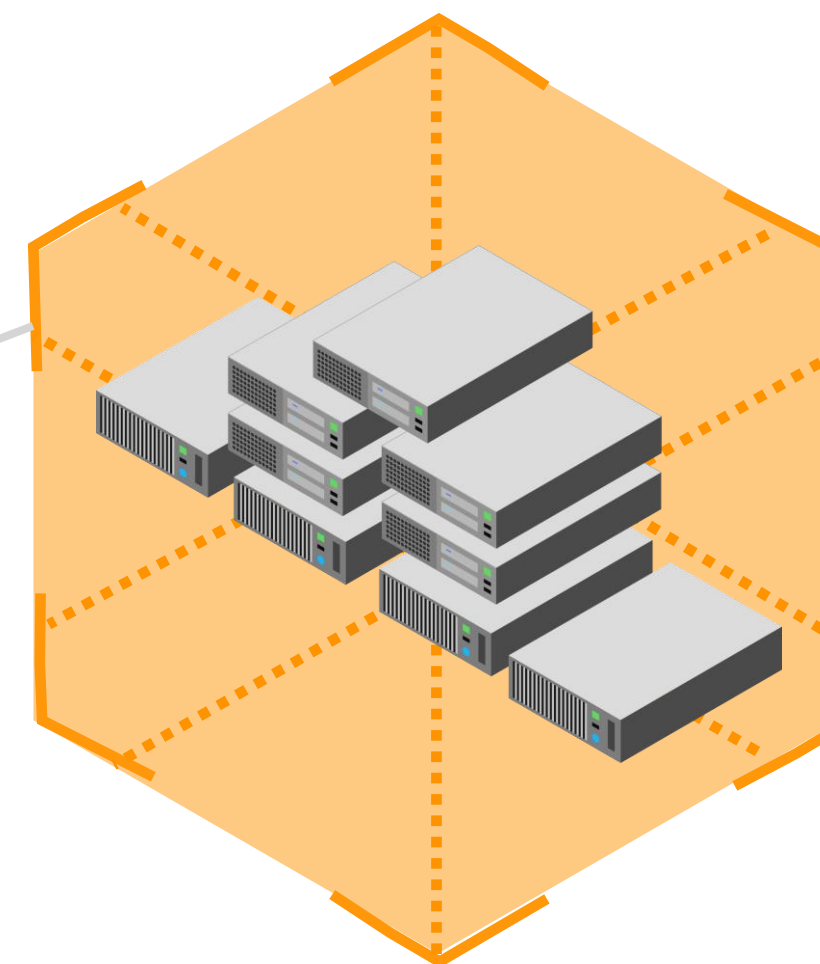
Services

Professional Services

Parallel File System Deployment

Lustre • GPFS • BeeGFS

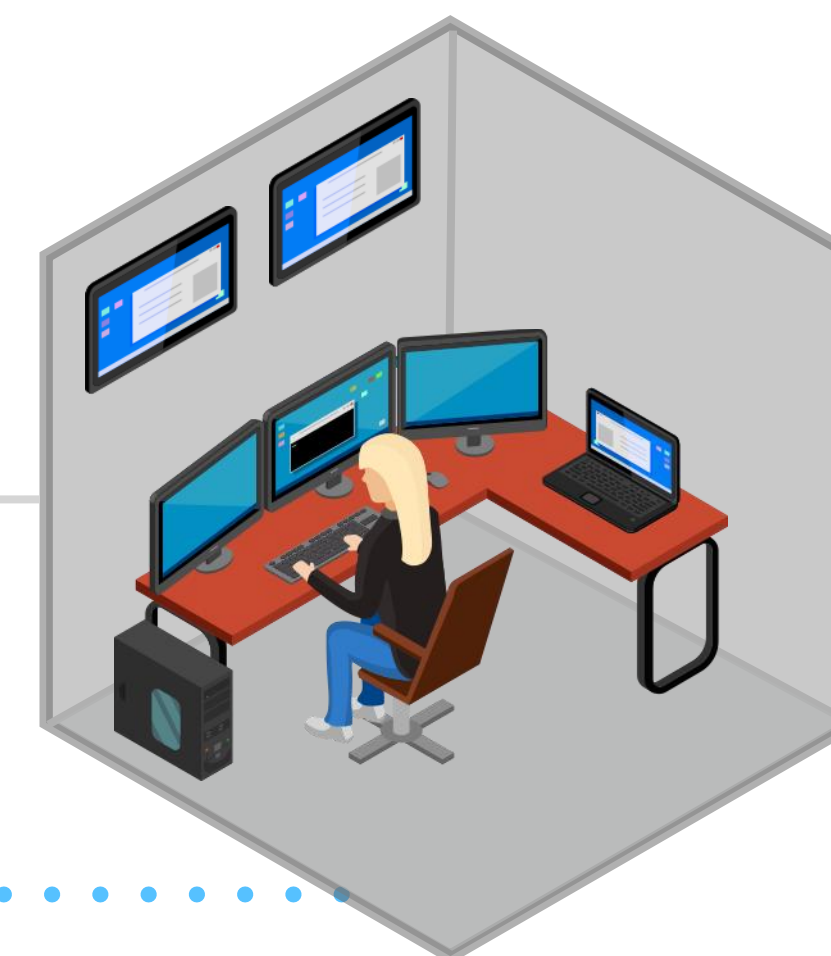
- Deployment
- Maintenance
- Tuning



Remote Administration Service

VHPC-RAS

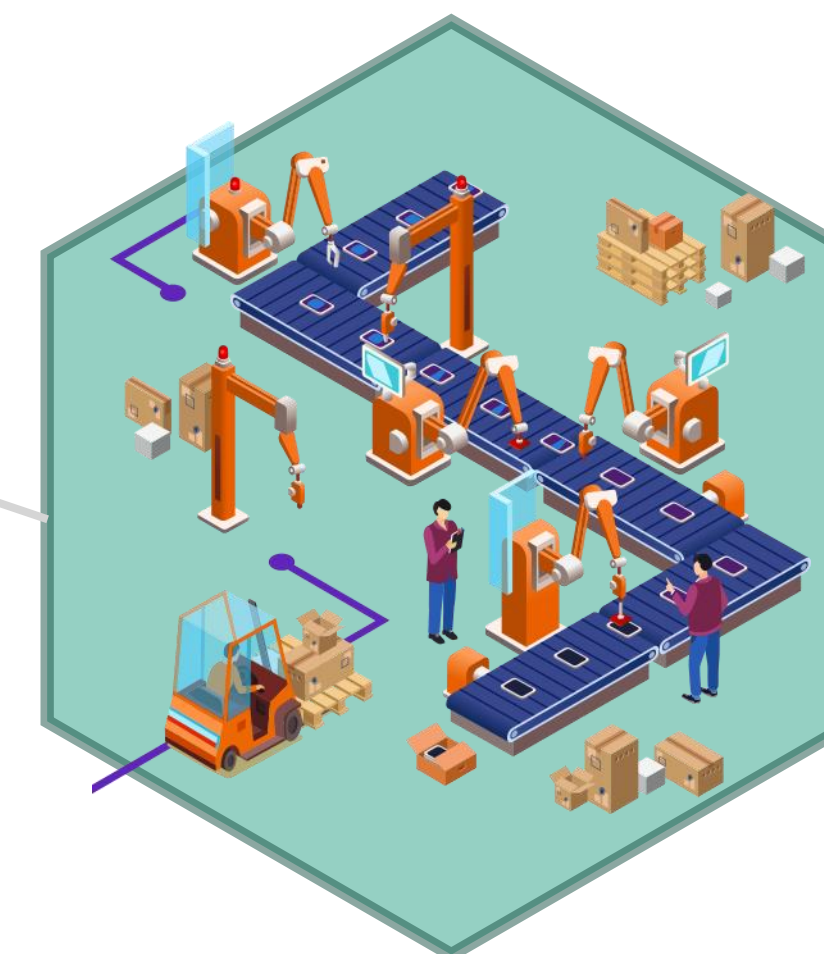
- Environmental Monitoring
- Management
- Software Installation
- User account administration
- Help Desk Service



Job Scheduler

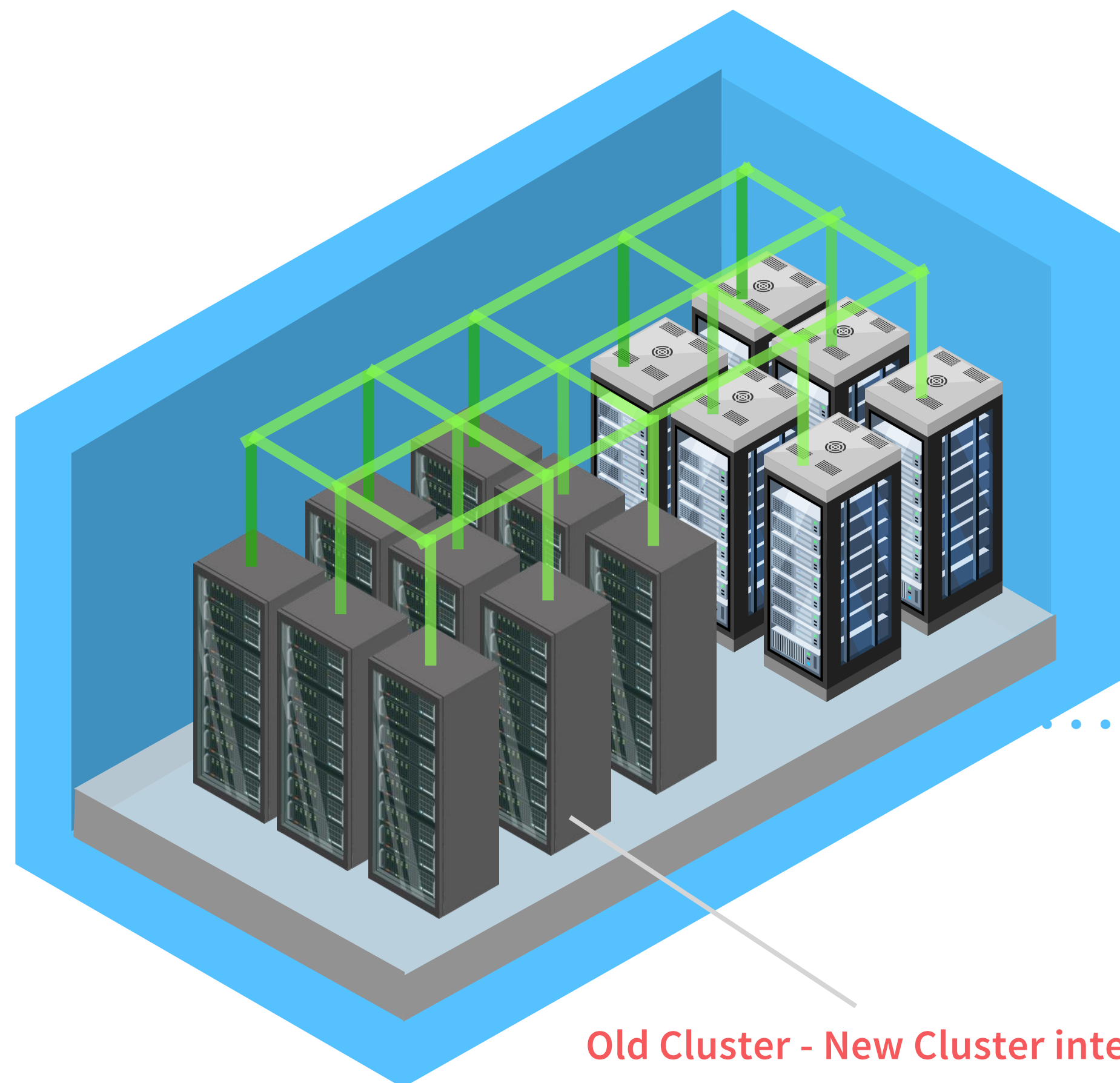
OpenPBS • SLURM • LSF

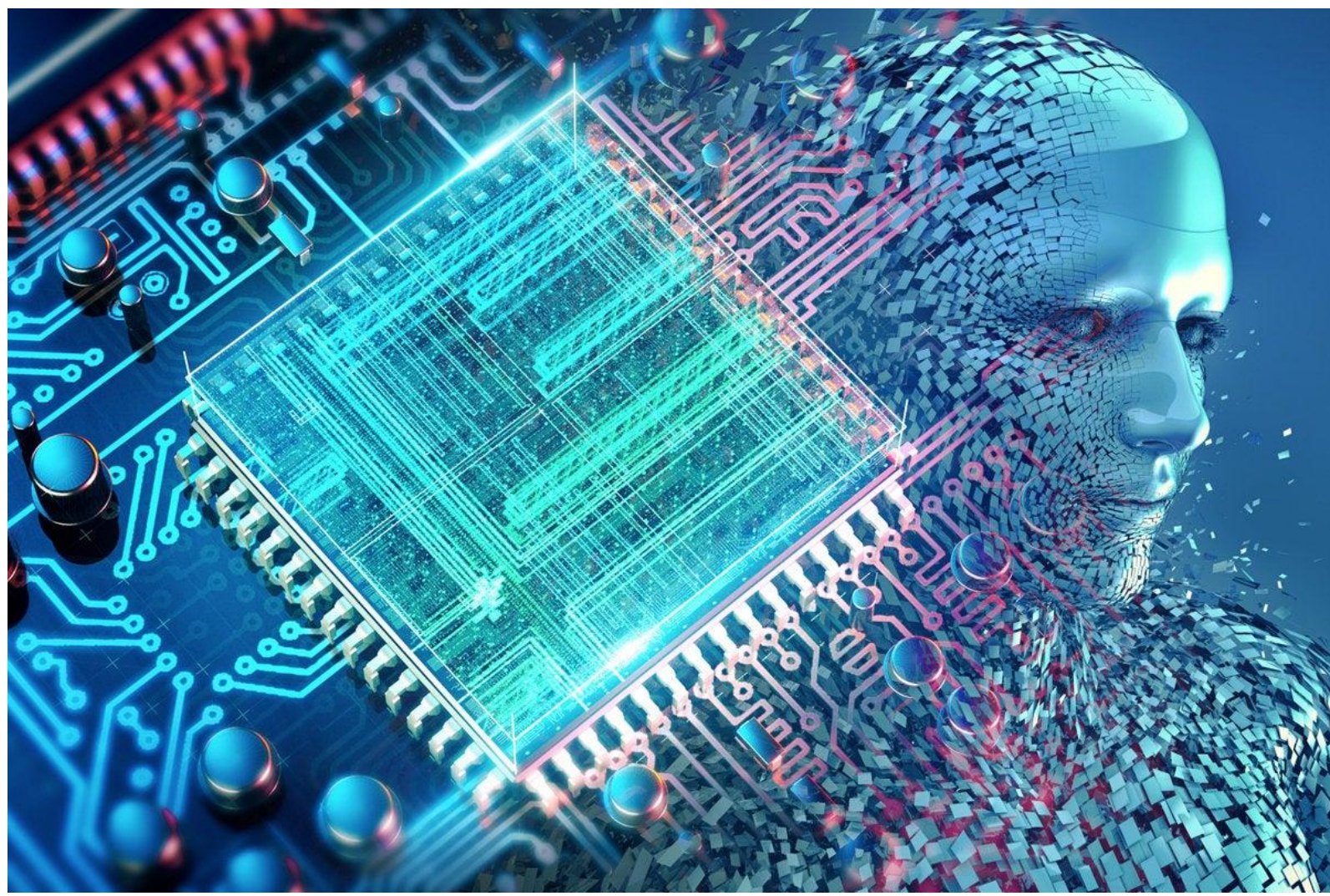
- Management -
- Tuning -
- Trouble-shooting -



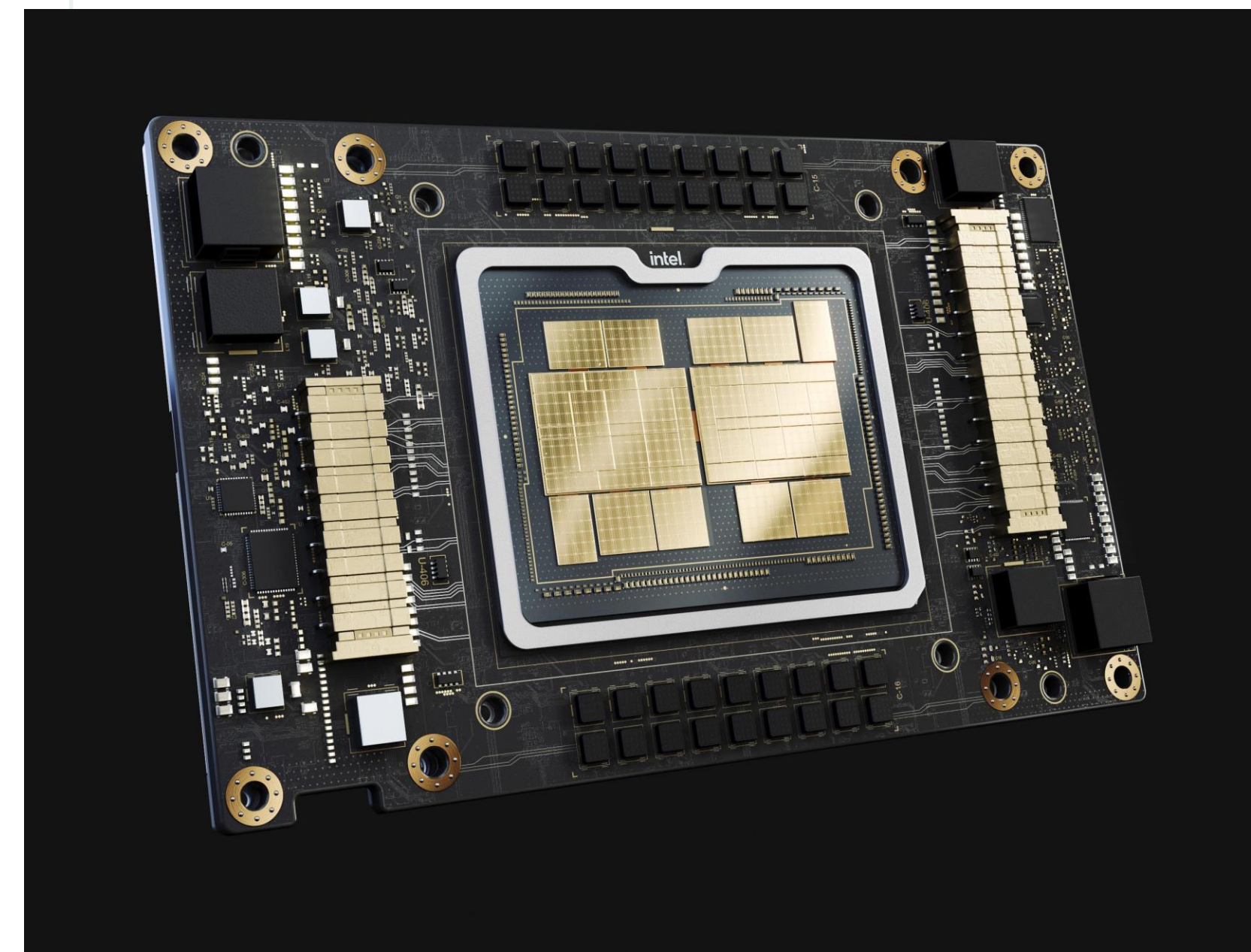
Old Cluster - New Cluster integration

- New systems can be appended to an already running cluster





Key words in HPC & AI



HEAT and LIQUIDCOOLING





Sucess projects in HPC and AI

1. Cluster Ada Lovelace - CENAPAD-SP - UNICAMP
2. Cluster Coaraci - CEPID - UNICAMP
3. Cluster Mintrop – USP – RCCGI
4. Cluster LAMCAD – UFG – Agencia de Inovação
5. Weather Forecast Clusters



Ada Lovelace

CENAPAD-SP - UNICAMP

8.320 Cores / 10x GPUs A100

- 65x Compute Nodes
 - 58x Compute Nodes CPU
 - 5x Compute Nodes GPU
 - 2x Fat Nodes
- 36,4 TB RAM Memory total
- InfiniBand HDR



Lovelace



Coaraci

CEPID IFGW - UNICAMP



Coaraci

13.008 Cores / 42x GPUs A30

270x Compute Nodes

36,6TB RAM Memory

InfiniBand HDR

Parallel Storage **BeeGFS** 1,2PB

Heterogeneous Multiplatform Cluster

736 Cores / 8x GPUs V100/ FPGA

18x Compute Nodes

4,4 TB RAM Memory

InfiniBand EDR

Intel, AMD e ARM Processors for tests in different architectures and technologies.



Mintrop



LAMCAD

UFG - Agencia de Inovação

1.752 Cores / 1x GPU V100, 2x K40

32 Compute Nodes

6,6 TB RAM Memory

InfiniBand EDR

Parallel Storage **BeeGFS**



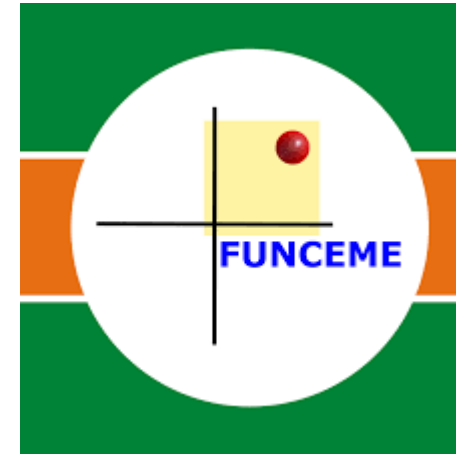
LAMCAD



WEATHER FORECASTING CLUSTERS



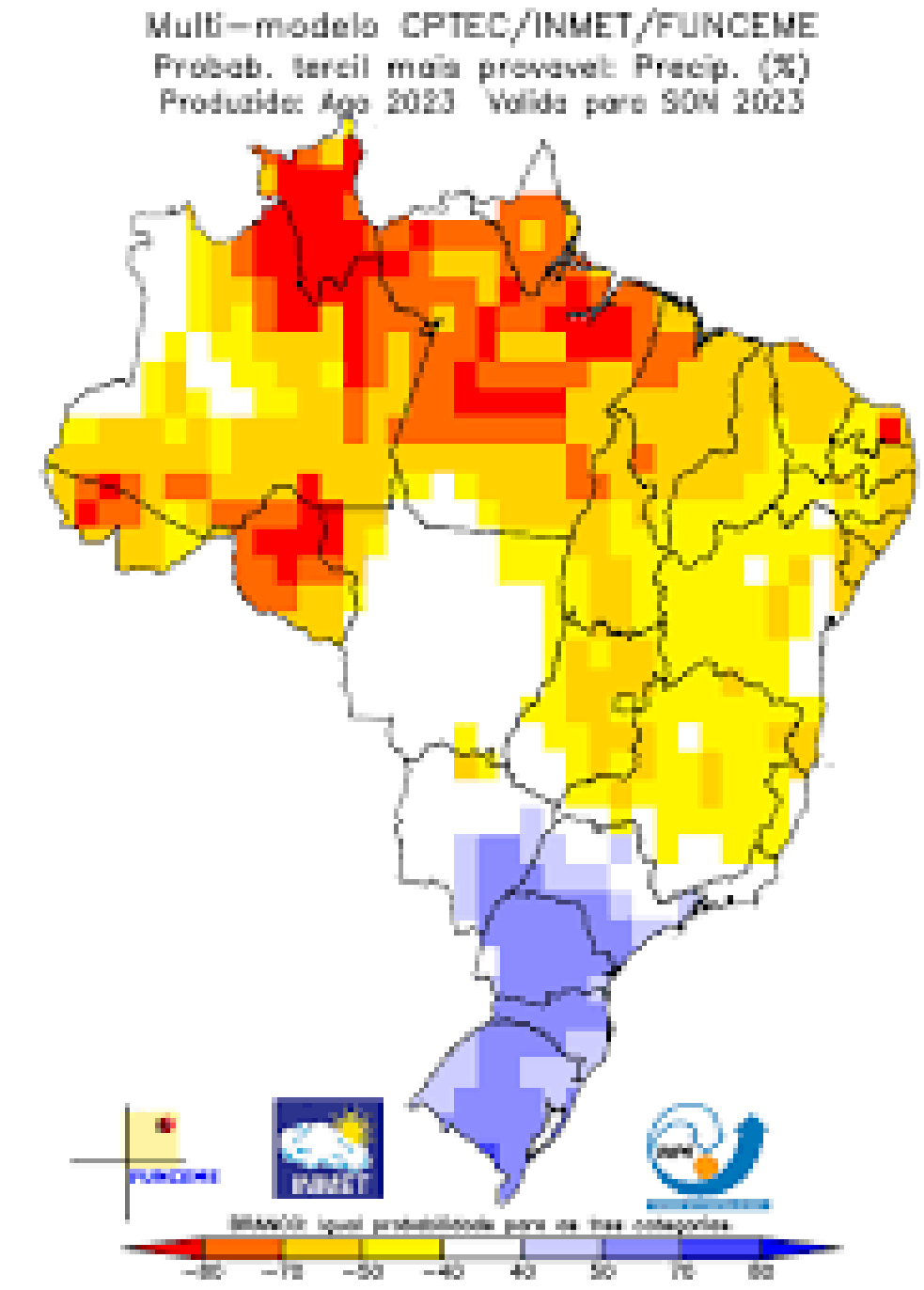
INPE EGEON



FUNCEME



CEMPA





HOW WE HONOR SCIENCE AND SCIENTISTS?



HPC Talks

www.hpctalks.com.br



HPC Spotlight

www.hpcspotlight.com.br



Negacionistas. Negação pela negação?
18 de junho

Quer saber o que os professores de diversas universidades brasileiras pensam sobre o movimento anticência que está se espalhando pelo mundo? Assista!



Pesquisa e Ciência no Brasil
24 de junho

Neste **primeiro episódio** oito pesquisadores dão um panorama sobre o que está acontecendo na área científica no país, contam suas histórias pessoais, falam sobre a importância dos investimentos em pesquisas e o efeito multiplicador da ciência.



Bioinformata por Amor
1 de julho

Prof. Dr. José Miguel Ortega
Instituto de Ciências Biológicas da UFMG

Conheça os estudos sobre a evolução dos fenômenos biológicos utilizando análise de genes que o Prof. José Miguel realiza com sua equipe. Assista ao vídeo!

A Universidade Federal de Goiás implementou recentemente o primeiro ambiente unificado de “supercomputadores” para a sua comunidade científica.

Neste vídeo, o Prof. Herbert de Castro Georg, coordenador Geral do Laboratório (LaMCAD) nos conta sobre como o laboratório foi viabilizado e implementado. Conheça também algumas das pesquisas que são processadas em seu data center, quais foram os principais desafios na implantação e os planos futuros.



UMA BREVE HISTÓRIA DA HPC

A Computação de Alto Desempenho (HPC) também chamada de Supercomputação está evoluindo a passos largos, assim como toda a tecnologia da informação. É incrível pensar que um smartwatch hoje tem mais capacidade de processamento que tinha o computador que levou o homem à lua em 1969.

Assista ao vídeo e conheça melhor a história da HPC, principais conquistas, evolução e, principalmente, o que vem aí no futuro. Embarque conosco nesta fascinante jornada!



Visão Computacional: Vigilância e Monitoramento
8 de julho

Prof. Dr. William Robson Schwartz e Doutorando Antonio Carlos de Nazaré Jr.



A Beleza da Estatística
15 de julho

Prof. Dr. Clécio da Silva Ferreira
Instituto de Ciências Exatas da UFJF



Em Busca do Diamante 2D
23 de julho

Prof. Dr. Matheus J. S. Matos
Departamento de Física da UFOP



Client
Talks

A Física Computacional
e o Enigma dos Vidros



Prof. Dr. Alessandro
Lacort





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HPC

Empowering science with intelligence

Thank you

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