Major Facilities on the Path to Demo: Missions, Requirements, and Risks

For Summary and Discussion

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ITER

To Demonstrate the Scientific and Technological Feasibility of Fusion Energy.
Q=10, 500 MW , 400 seconds, Q=5, 350 MW for 1000 to 3000 seconds

Construction

Requirements

- Large SC magnets
- H&CD systems
- Burning Plasma Diagnostics
- Tritium handling & fueling systems
- W-divertor
- Remote handling
- Test blanket modules

RISK: Schedule

1st plasma is a moving target?

Operation

Requirements

- All sub-systems must been fully functional on the schedule.
- A qualified & good central team
- Well planned research program
- Role of existing devices and modeling tools.

RISK:

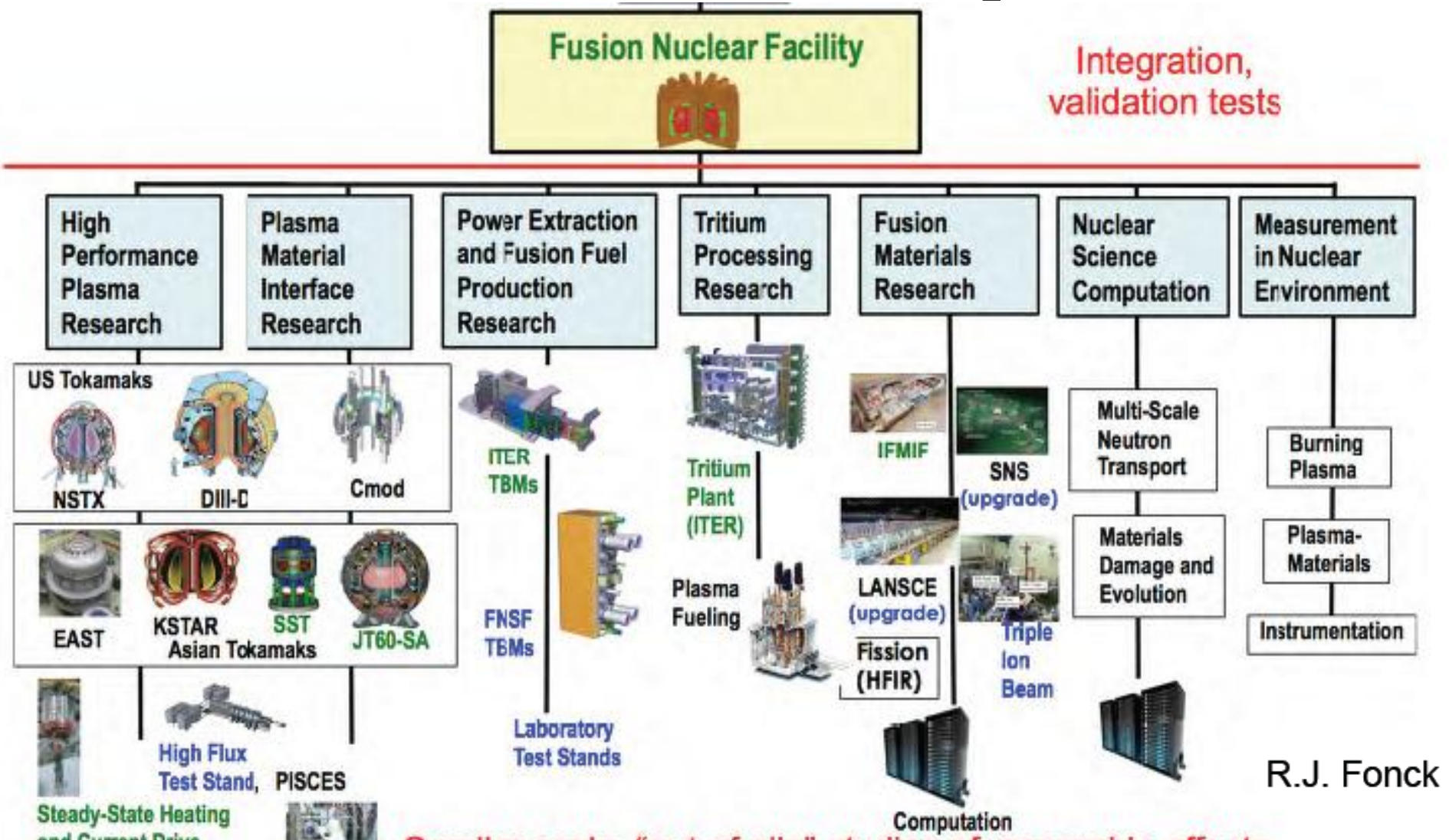
Disruption mitigation

Steady-state operation

It is essential for fusion to regain credibility

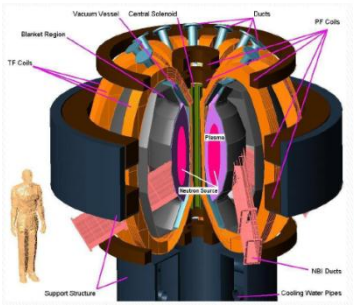
ITER must be successful!

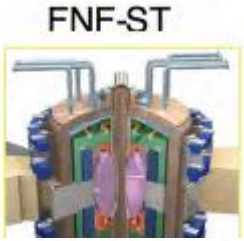
Fusion science, technology, engineering should be addressed in parallel

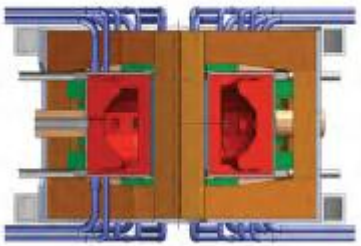


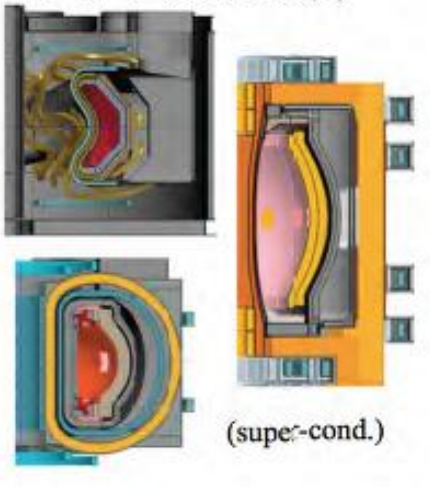
Next Fusion Nuclear Facility
Aiming start construction around 2020

- **SS operability of 100MW level fusion power**
- **Electricity generation.**
- **Complete T fuel cycle.**
- **Material &component Validation**
- **Power and particle handling.**
- **Necessary date for safety & licensing of power plant.**









CFETR (CH) , FNSF, SST-2 (

Fill the gaps in ITER and existing devices to support a early construction of DEMO

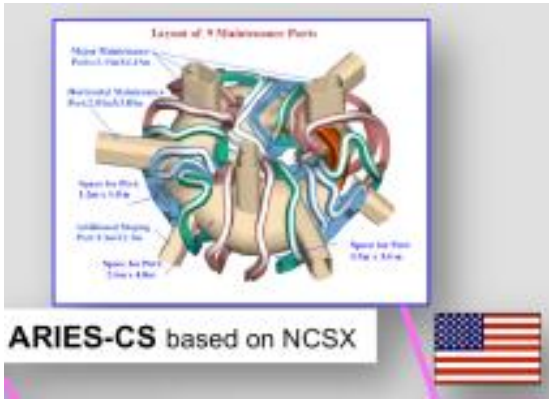
Can an FNF or Pilot Plant be staged? What are RISKS?

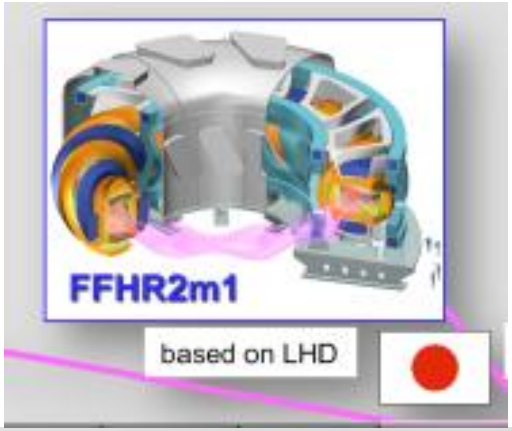
- Relation with ITER, speed up or delay ITER, Cost?
- - Pulsed and steady state operation?
- Qeng > 1 or not
- TBR > 1 and close T cycle
- Validating RAMI
- Commercial plant potential

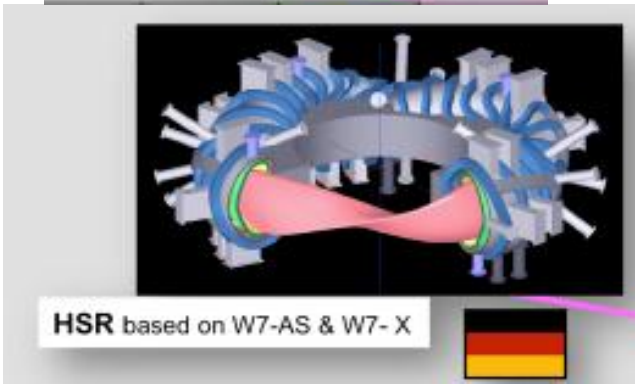
I f we can clearly define FNF (pilot plant, E-DEMO), we certainly can do it ~ 2020. One party dominated international program will be a better choice.

How important is the stellarator option

- Stellarator has advantages of disruption-free and SSO
- It will be an good option for future DEMO and FPP.
- It is essential to keep this option in parallel with ITER
- Simplify coil designs &blanket maintenance
- Demonstrate integrated high performance & Confinement predictability
- I become to love it.

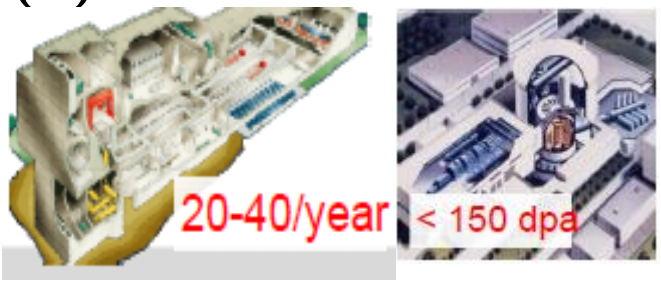






How essential is IFMIF, how urgent ?

- Qualification of candidate materials, in terms of generation of engineering data for design, licensing and safe operation of a fusion DEMO reactor, up to about full lifetime of anticipated use of DEMO.
- It is not essential to built IFMIF if a 10-20dpa FNF will be built.
- FNF can be used for the synergy to validate both material and component performance.
- IFMIF is necessary for licensing and safe operation of a DEMO reactor materials database (?)
- Risk is the cost!



Summary

- **It is essential for fusion to regain credibility by successfully construction and operation of ITER.**
- **Stellarator will be an good option for future DEMO and FPP. It is essential to keep this option in parallel with ITER.**
- **A bold approach should be taken with better international collaboration towards the early use of fusion energy. I f we can clearly define FNF, we certainly can do it around 2020.**
- **International task forces to focus on some specific problems should be strengthen. Most important is make next step forward quickly. Let's do it.**