



Test rig design for fusion development

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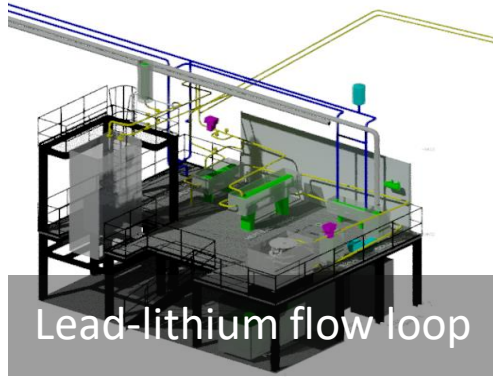
SYSTEMS • ENGINEERING • TECHNOLOGY

Test rig design

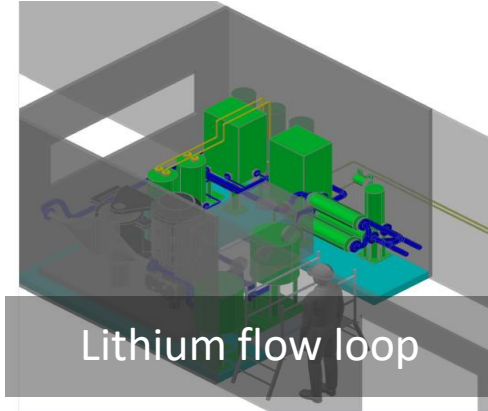
Test rig AKA: Test facility/machine/flow loop

Equipment and systems designed and used specifically to further the development of fusion reactors

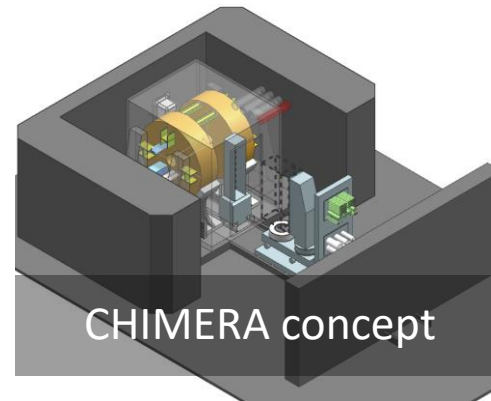
Frazer-Nash Experience



Lead-lithium flow loop



Lithium flow loop



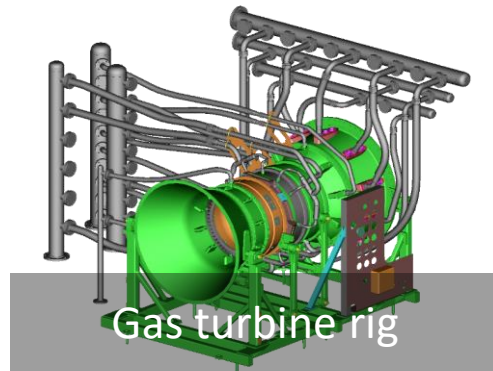
CHIMERA concept



PWR test rig



AGR thermal rig



Gas turbine rig



High speed seat shock and vibration rig



Helicopter landing rig

Why are they used?



Research

Understanding physical phenomena to allow design decisions e.g. corrosion



Verification

Demonstrating a design meets performance requirements e.g. heat removal from a diverter



Validation

Gaining results to confirm/augment modelling work e.g. liquid metal MHD



Experience

Learning how to operate and maintain fusion related systems

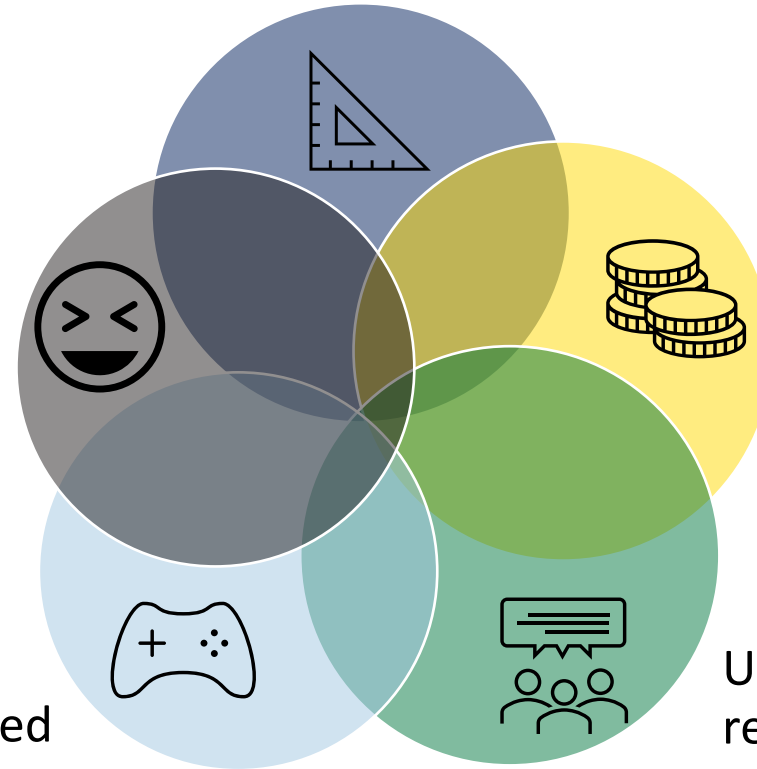
Test rig design characteristics

Small space

- Predefined in built building

Tenuous backronyms

- GLADIS, JUDITH, MAGPIE etc.



Tight budget & short timescales

- Results needed ASAP

Fiddling desired

- Scientists' modus operandi

Unclear and vast requirements

- Test the undesigned
- Multiple stakeholders, multiple demands

How to address?

Agile approach Rapid development, review and repeat – answer key questions quickly

Sprint 1

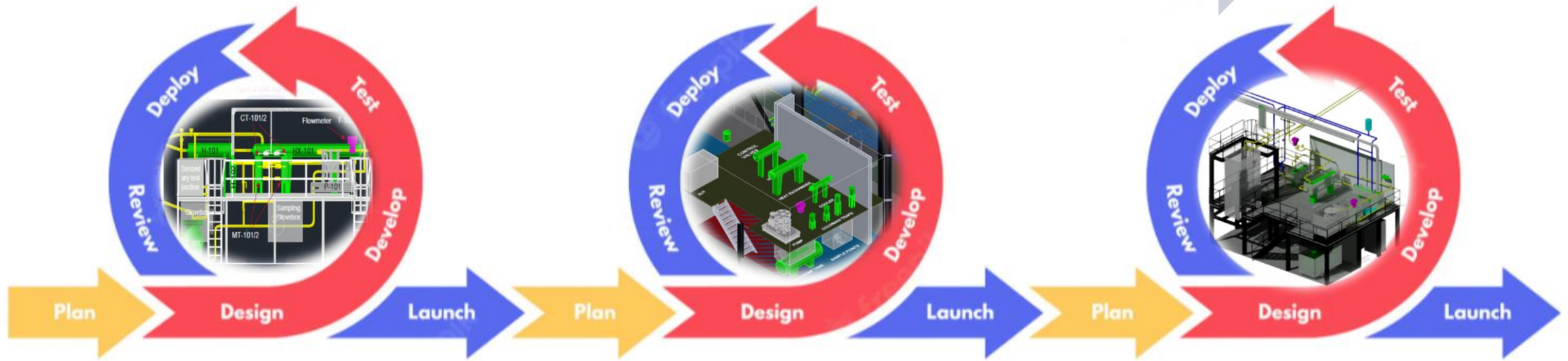
- How many tests can we do for our budget?

Sprint 2

- What equipment can fit in the space?

Sprint 3

- Can I safely change all parameters manually?





Efficient test rig design for rapid fusion development

Thank you

Ashley Strange