Accelerator and Physics requirements and design integration

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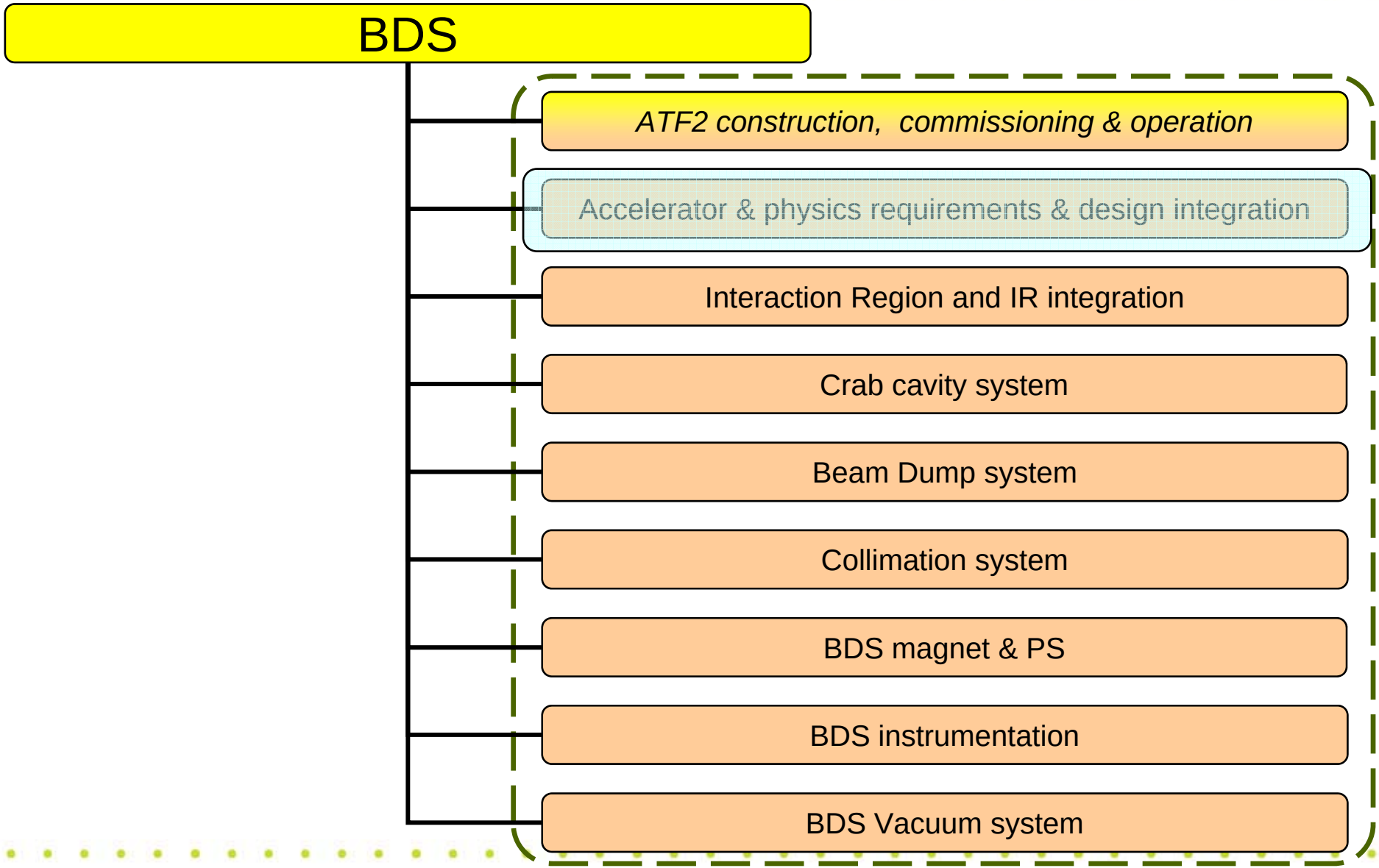
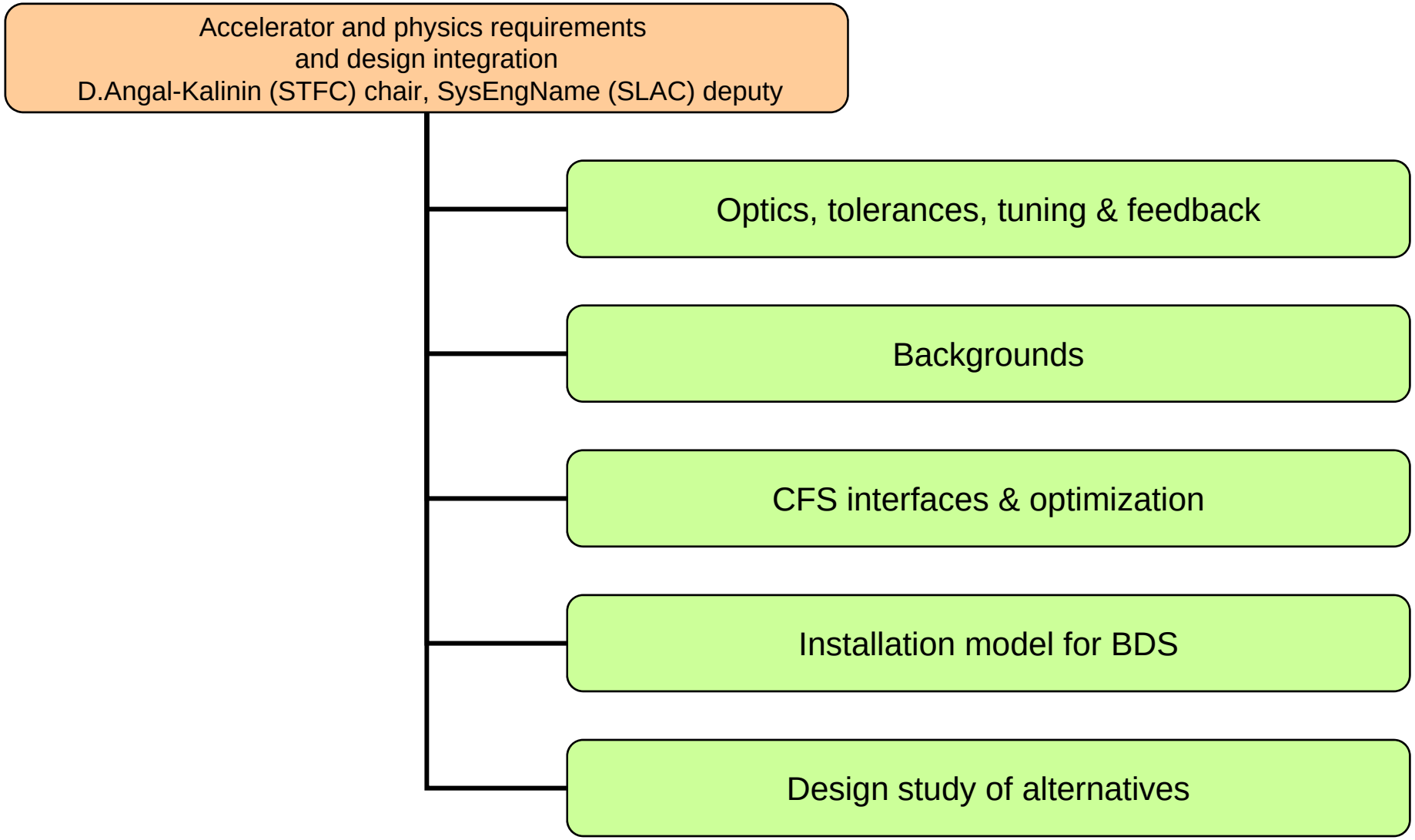

BDS
ATF2 construction, commissioning & operation
Accelerator & physics requirements & design integration
Interaction Region and IR integration
Crab cavity system
Beam Dump system
Collimation system
BDS magnet & PS
BDS instrumentation
BDS Vacuum system


Accelerator and physics requirements
and design integration
D.Angal-Kalinin (STFC) chair, SysEngName (SLAC) deputy
Optics, tolerances, tuning & feedback
Backgrounds
CFS interfaces & optimization
Installation model for BDS
Design study of alternatives

- The WP will concentrate on the system optimisation and interfaces to the CFS and the detector
- Design integration
  - Strong link to WP4-9
  - Integration as a separate task?
- Feedback from WP2(ATF2) to the BDS design and its link to this WP

- ‘Backgrounds’
- ‘Design study of alternatives’

} Discuss where they fit better

Optics, tolerances, tuning and feedback

- Document performance driven specs
- Study performance vs. optics length
- Study optics for magnet types standardization
- Study optics for aperture standardization
- Study High Lumi upgrade path
- Study 1TeV upgrade path for FD, PS, magnets
- Study commissioning needs (other FD, its support, shielding)
- Determine field, stability and other tolerances
- Different L* optics performance & tunability
- Study abnormal optics & MPS issues
- Study Z, 350, 1000 GeV CM performance
- Document site specific design features

CFS interfaces and optimisation

- Define air requirements for CFS
- Define water requirements for CFS
- Define stability requirements for CFS
- Define cranes and coverage requirements for CFS
- Define cavern size requirements for CFS
- Define & optimize beamline height
- Define specs for installation model by CFS
- Define BDS & IR rad safety rules
- Define alignment system requirements
- Define the requirements for the shallow site
- …….

Backgrounds

- Create data base of studies done so far, which codes used, people involved
- Create data base of detector tolerance requirements
- Validate beam halo assumptions
- Include beam & machine errors for all the estimates
- Connect the studies to different detector concepts
- …….

Installation model for BDS

- Optics design iterations with the magnet and power supply designers : define space requirements
- Decide girder sizes
- Decide beam height
- Define shafts requirements
- Elevators
- Detector & machine interfaces
- ……..

Design study of alternatives

Present alternatives fall in different categories and the urgency to be ready with these alternatives vary a lot.

- IR configuration
  - Head-on IR and extraction line
  - 2mrad IR and extraction line
- γ–γ, fixed-target : options for future but some information necessary for the CFS from the beginning.

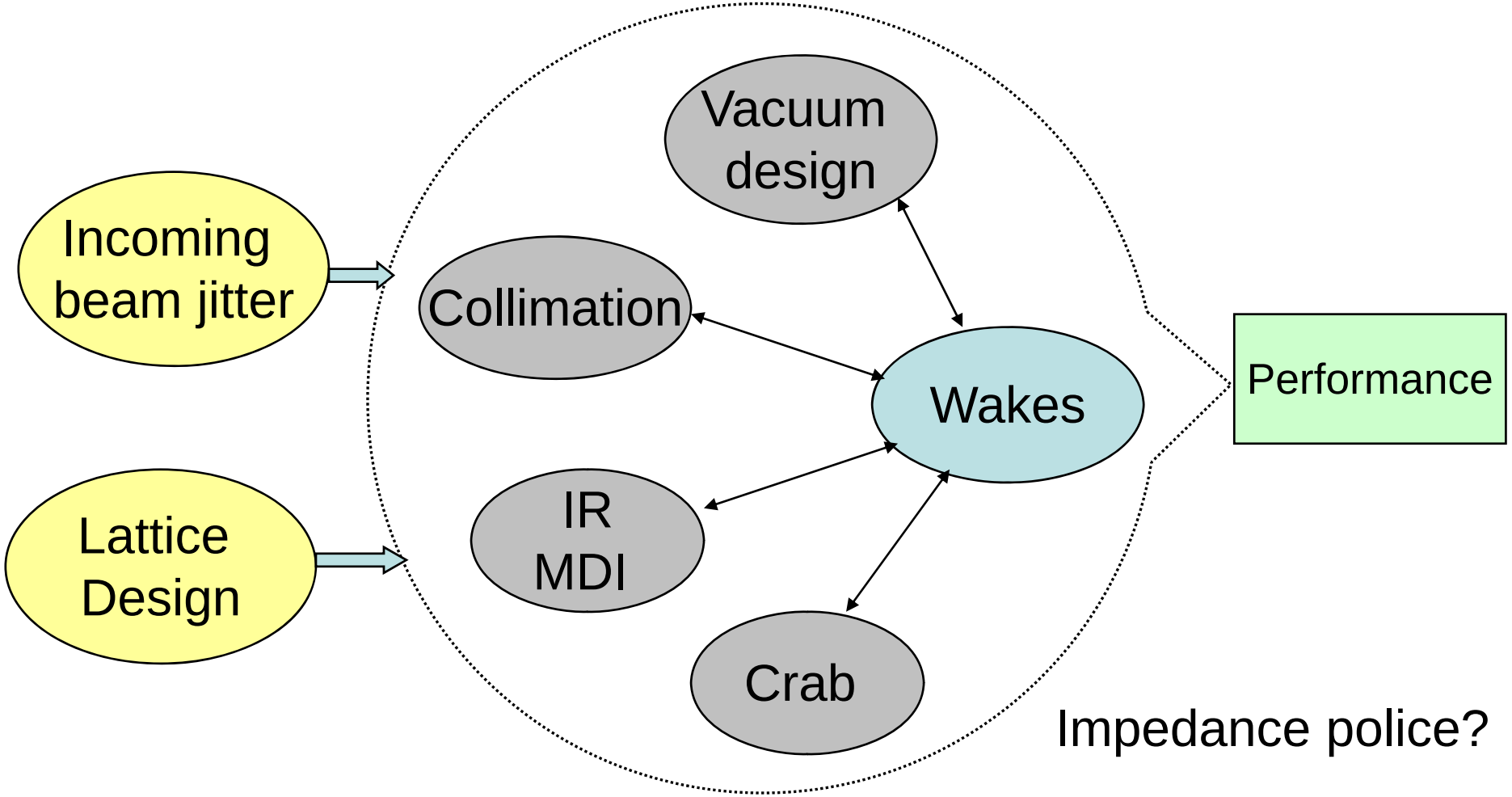
Other alternatives affecting configuration/performance

- Additional intra-train feedback loop at the entrance to BDS
- Consumable instead of survivable spoilers
- Distributed muon collars instead of localized muon walls
- Beam dump based on a km long pipe filled with noble gas
- Use of a Fabry-Perot cavity for the laser at the Compton IP at the polarimeter
- Use of adjustable permanent magnets for the final doublet
- Use of Compton backscattering for precise beam energy measurement

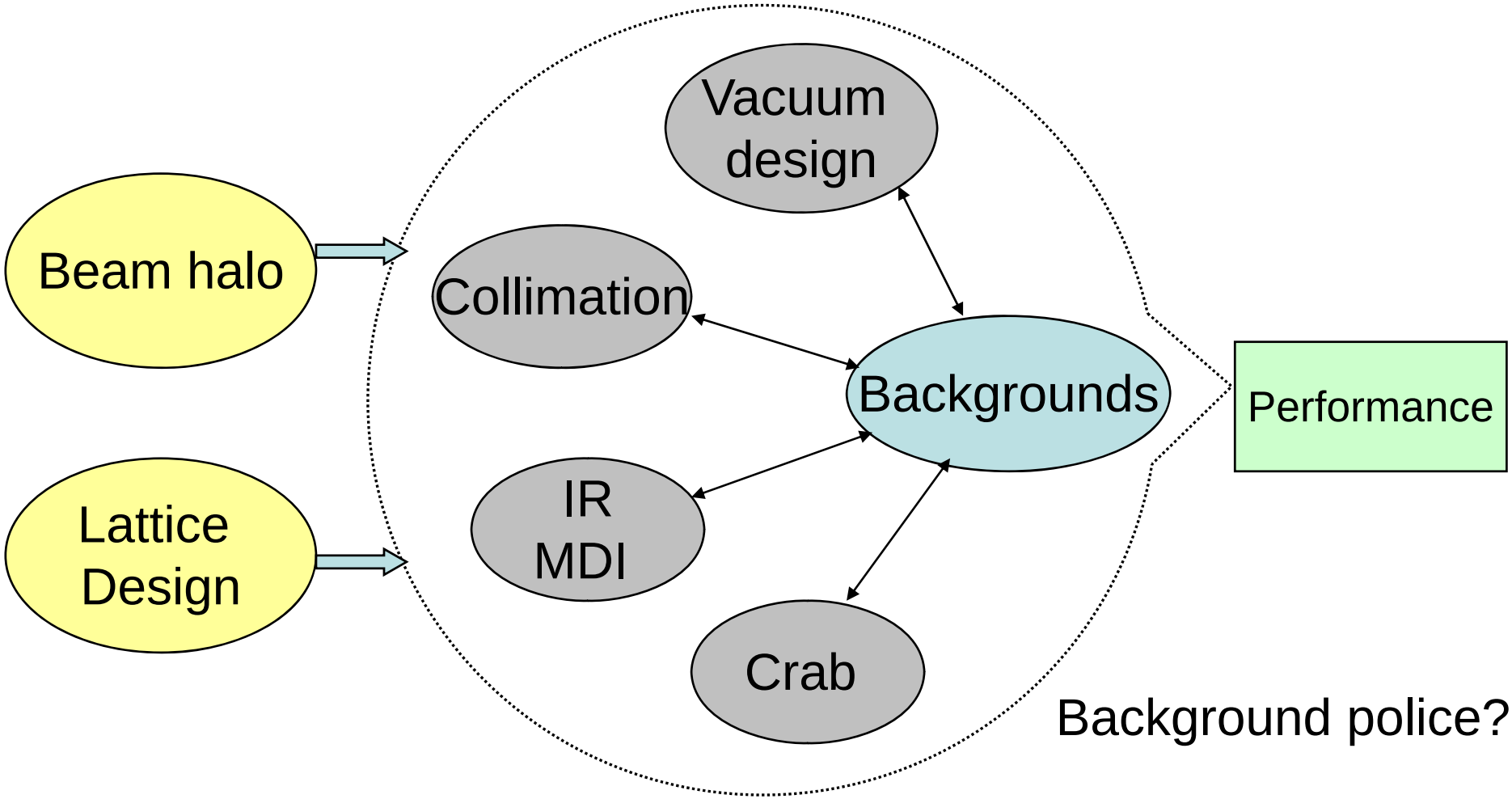
System integration

- Engineering layouts of all BDS and extraction lines consistent with full ILC design
- Component specifications
- Performance → Start to end simulations for the entire machine for the final EDR parameters including the details of the final two detector concepts in push-pull configuration

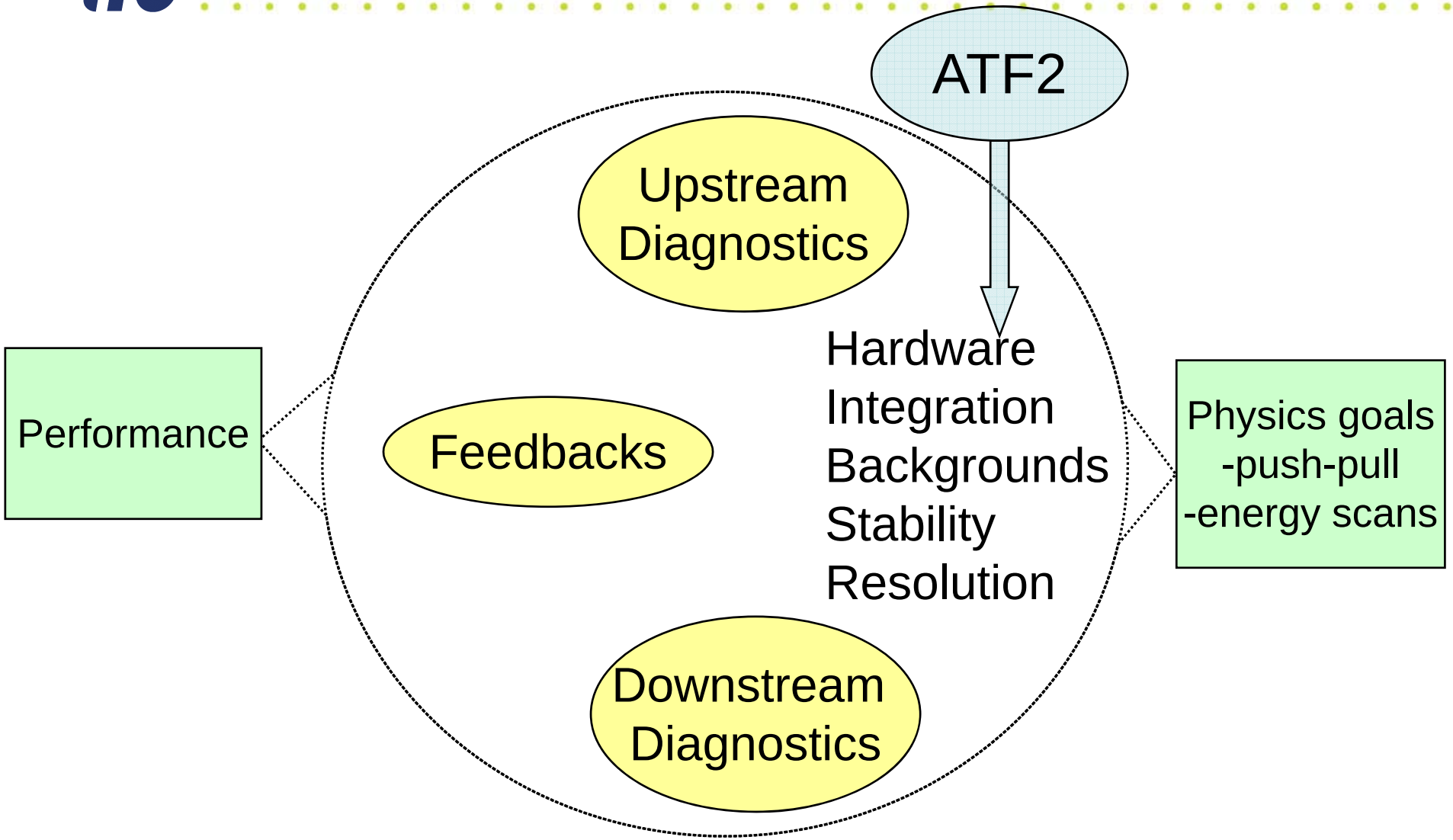
Evaluating the performance



Evaluating the performance



Achieving the performance



Design Changes

- We must work to reduce the cost whilst maintaining the performance (value engineering)
- Basic assumption of design upgrade to 1 TeV CM and <1% emittance growth : can we allow more emittance growth at 1 TeV?
- How much freedom do we have to explore/propose these changes?
- More details will be understood from the Detector concepts which may need some design changes

Upgrades

- 1 TeV energy upgrade
- $e^- e^-$
- gamma-gamma

- How much attention should we give them?
- Timelines?

Resources

- Mostly SLAC, FNAL and LC-ABD
- EOIs give combined number of FTEs for different WPs ; Need more details to understand the exact resources available at WP/task level
- Common resources BDS/ATF2 work (WP2)
- ART numbers available in more details
- Funding in the UK is subject to STFC review

- Details of tasks and sub-tasks, their time lines to be developed.
- Design of alternatives – single sub-WP for everything?
- Links to
  - ILC simulations
  - MPS
  - Availability
  - Alignment
  - Controls
  - MDI