# Work Package 12: Systems Integration and Availability

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# Overall Aims

- The principal aim and purpose of WP12 is to ensure that the designs for the various components and subsystems are:
  - **"internally" consistent within each subsystem (e.g. all the vacuum chambers connect to each other);**
  - **consistent between different subsystems (e.g. the magnets fit round the vacuum chamber);**
  - **as complete as possible.**
- WP12 should also aim to estimate the availability of the damping rings.

# Achieving the Aims

- The aims should be achieved by:
  - **Developing and maintaining comprehensive documentation of the specifications and design parameters (in EDMS/database);**
  - **Developing and maintaining an engineering (CAD) model of the damping rings;**
  - **Asking someone (Tom Himel or Janice Nelson) to run AvailSim (again) for the damping rings.**

# Deliverables

1. Comprehensive documentation for the specifications and design parameters (including cost?) of the damping rings.
2. An engineering (CAD) model showing the principal components in the damping ring beam lines, including:
   - **vacuum components (chambers, bellows, flanges, pumps…)**
   - **normal conducting magnets**
   - **wiggler cryostats**
   - **RF cryostats, (some section of) waveguide**
   - **principal diagnostics (BPMs)**
   - **supports**

   **(but maybe with placeholders in some – or many – cases)**
3. An estimate of the availability (based on stated MTBF, MTTR…)

# Interfaces

- WP12 has key connections with all those work packages concerned with technical designs of damping ring subsystems or components…

| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lattice design and acceptance | 1 | | op | ip | | op | op | op | | op | ip | io | io | op | io | op | op |
| 2 | Orbit, optics and coupling correction | 2 | ip | | | io | | | | | | | io | io | | | | |
| 3 | Damping wiggler design | 3 | op | | | | | | io | op | | | | io | io | | | op |
| 4 | Instrumentation, diagnostics and controls | 4 | | io | | | | | | | | | | io | io | | | |
| 5 | Impedance and impedance-driven instabilities | 5 | ip | | | | | op | | | | ip | | | ip | ip | | |
| 6 | Fast Instability Control Feedback | 6 | ip | | | | ip | | | | | ip | | | ip | ip | | |
| 7 | Electron cloud | 7 | ip | | io | | | | | | | | | | io | | | |
| 8 | Power systems | 8 | | | ip | | | | | | | | io | io | | | | op |
| 9 | Other collective effects | 9 | ip | | | | | | | | | | | | | | | |
| 10 | 650 MHz SRF cavity design | 10 | op | | | | op | op | | | | | | io | | | | op |
| 11 | Magnets and supports | 11 | io | io | | | | | | io | | | | io | io | io | | op |
| 12 | Systems integration and availability | 12 | io | io | io | io | | | | io | | io | io | | io | io | | io |
| 13 | Vacuum system | 13 | ip | | io | io | op | op | io | | | | io | io | | io | io | op |
| 14 | Injection and extraction systems | 14 | io | | | | op | op | | | | | io | io | io | | | |
| 15 | Ion effects | 15 | ip | | | | | | | | | | | | io | | | |
| 16 | Conventional facilities and cryogenics | 16 | ip | | ip | | | | | ip | | ip | ip | io | ip | | | |

- …CF&S will be a particularly important connection. (Can we agree on using the same CAD tools?)

# Resources

- The minimum requirement is:
  - **0.5 FTE Design Engineering**
  - **0.2 FTE Accelerator Physicist**

- Cockcroft Institute has volunteered to lead this Work Package and is working to provide the resources.