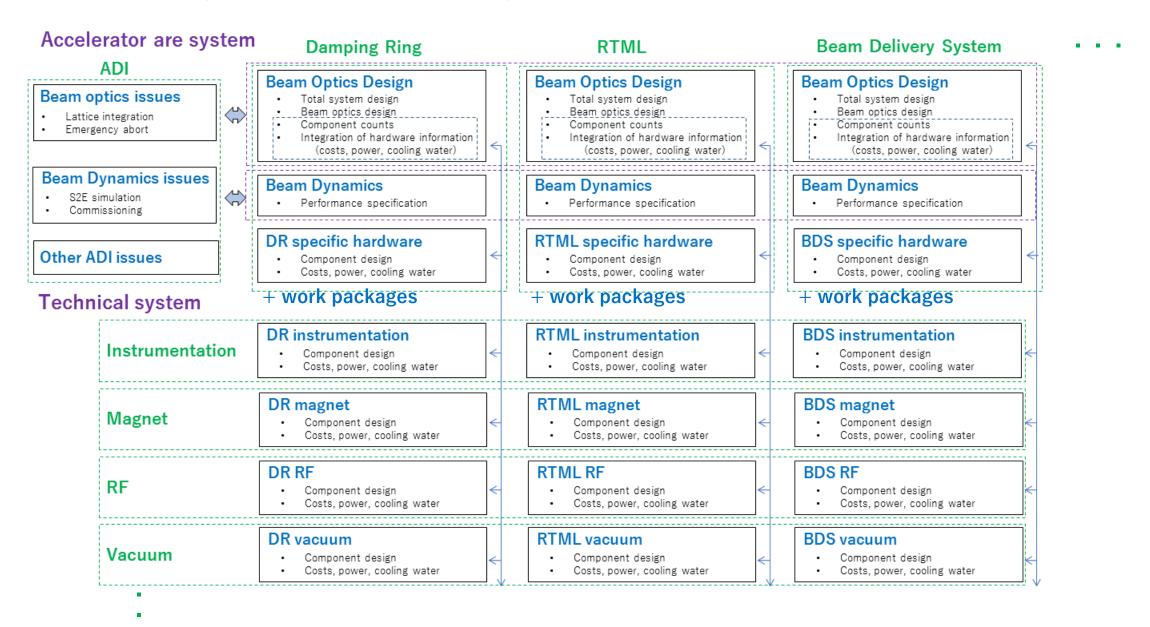
# Discussion of WBS for DR/RTML/BDS area systems

2021/04/28 T. Okugi IDT WG2 DR/BDS/DUMP group meeting

# Simple WBS in Pre-Lab period (to write the ILC EDR)



## Technical preparation document

Ver-5: 2021/Jan/26

### Technical Preparation and Work Packages (WPs) during ILC Pre-lab

IDT-WG2

## Engineering design document

#### **Engineering design documentation**

IDT-WG2

(Ver.2,2021-Jan-06)

#### Outline:

One of the main missions of the ILC Pre-lab on the engineering front is to complete an engineering design report (EDR), that is derived from the TDR published in 2013. The EDR will represent the "technical readiness" for the actual construction of the ILC and will also be expected to serve as a critical material to be evaluated in certain countries in the context of formal project approval. The EDR will include basic specifications and drawings for manufacturing and construction. Cost-estimate confirmation, scheduling, and preparation for mass production will also be included in this report.

#### Timeline:

1st year: Work on TDR-based cost-estimate confirmation that has been started by an international team centered at the Pre-lab.

2nd year: Complete the cost-estimate confirmation based on progress in technical preparation plans and conduct an internal review in the latter half of the 2nd year. The review will also report on the progress of resolving the technical problems encountered during the preparation period.

3<sup>rd</sup> year: Conduct an external review and complete the scrutiny of costs and risks; complete the draft of Engineering Design Report (EDR).

4th year: Publish the EDR (in the first half of the year), report on the progress in resolving the technical problems encountered, and prepare for starting each large bid.

#### Items:

- Engineering design and documentation based on WBS
- Cost-estimate confirmation/update, tender, and purchase preparation
- Plans for mass production and transportation, QA.
- Schedule follow-up and construction schedule preparation
- Resource follow-up and planning

#### Expected FTE:

| Contents (based on TDR Vols. 3-II)                   | Human Resources (FTE-yr) |
|--|--------------------------|
| Accelerator design                                   | 3                        |
| Main Linac and SCRF*                                 | 20                       |
| Sources  | 5                        |
| Damping ring   | 5                        |
| BDS  | 5                        |
| Beam dump  | 2                        |
| RTMI   | 2                        |
| Conventional facilities and siting                   | 5                        |
| Control  | 3                        |
| Construction schedule, commissioning, and operations | 3                        |

<sup>\*</sup> includes cryogenics, RF system (high-power and low-level RF)

The number of HR will be updated (by Shin at the last WG2 meeting.)

# Damping Ring

- List up all items for EDR related to DR
- Picked up the WP related items from the to-do-list of both area and technical systems and categorized.

## DR area system

- 3WPs
- Remaining items
   of original area systems

# Technical system

- Remaining items
   of original technical systems
- To be integrated the item of each technical category for all area systems

| Morle pooleogos                         | Items  | Deliverables   | Related area and technical systems   |
|---|--|--|--|
| Nork packages                           | DR cell design, based on present ILC optics (WP-12)  | Beam optics design   | DR(WP-12)  |
| . 0                                     | DR cell design (further small emittancs) (WP-12)   | Beam optics design   | DR(WP-12)  |
|   | Dynamic aperture survey (WP-12)  | Beam optics design; Performance specification  | DR(WP-12)  |
| WP-12                                   | SC wiggler magnets (WP-12)   | Component design; costing; power, cooling water  | DR(WP-12)/SCmagnet   |
| VV P-12                                 | Design of PM (WP-12)   | Component design; costing; power, cooling water  | DR(WP-12)/PMmagnet   |
|   | PM prototyping (WP-12)   | Performance specification  | DR(WP-12)/PMmagnet   |
|   | NC magnets (WP-12)   | Component design; costing; power, cooling water  | DR(WP-12)/Magnet   |
| 14/D 43                                 | Ion trapping and fast ion instability (WP-13)  | Performance specification  | DR(WP-13)  |
| WP-13                                   | Electron cloud instability (WP-13)   | Performance specification  | DR(WP-13)  |
|   | Fast FB system design (WP-13)  | System design; costing   | DR(WP-13)/Instrumentation  |
|   | Fast FB test (WP-13)   | Performance specification  | DR(WP-13)/Instrumentation  |
|   | Vacuum chambers to reduce SEY for positrin DR (WP-13)  | Performance specification  | DR(WP-13)/Vacuum (basic design was in TDI  |
| WP-14                                   | System design of fast injection/extraction system (WP-14)  | System design;   | DR(WP-14)  |
| VV P - 14                               | Fast kicker devices (WP-14)  | Component design; costing;   | DR(WP-14)  |
|   | Fast kicker power supplies (WP-14)   | Component design; costing; power, cooling water estimation   | DR(WP-14)  |
|   | System design of injection kicker for E-driven PS (WP-14)  | System design;   | DR(WP-14)  |
|   | Injection kicker device for E-driven PS (WP-14)  | Component design; costing;   | DR(WP-14)  |
|   | Injection kicker power supplies for E-driven PS (WP-14)  | Component design: costing: power, cooling water estimation   | DR(WP-14)/Source   |
|   | Items  | Deliverables   | Related area and technical systems   |
| rea system                              | DR cell design, based on present ILC optics (WP-12)  | Beam optics design   | DR(WP-12)  |
| ii ca systeiii                          | DR cell design (further small emittancs) (WP-12)   | Beam optics design   | DR(WP-12)  |
| -                                       | DR straight section optics design (for WP-14)  | Beam optics design   | DR   |
|   | System design of the beam diagnostics  | Beam optics design   | DR   |
| ptics design and                        | ILC lattice integration  | Beam optics design   | ADI/DR   |
| pulco ucoigii aiiu                      | Contact part with ADI for the beam optics issues   | Beam optics design   | DR/ADI   |
|   | Integration of the hardware components in DR   | Component counts; costing; power, cooling water estimation   | DR/TechnicalSystems  |
| ystem integration                       | System design of emergency abort   | System design  | ADI/BeamDump/CFS/DR  |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | Dynamic aperture survey (WP-12)  | Beam optics design; Performance specification  | DR(WP-12)  |
|   | Small emittance tuning   | Performance specification  | DR   |
|   | Tolerance evaluation for each device   | Performance specification  | DR   |
| oam dynamics                            | Ion trapping and fast ion instability (WP-13)  | Performance specification  | DR(WP-13)  |
| eam dynamics                            | Electron cloud instability (WP-13)   | Performance specification  | DR(WP-13)  |
|   | Spece charge effects   | Performance specification  | DR   |
| and tuning                              | Impedance driven instability   | Performance specification  | DR   |
| ina tariing                             | Tune shift by quadrupole wake for E-driven PS  | Performance specification  | DR/Source  |
|   | Contact part with ADI for the beam dynamics and tuning   | Performance specification  | DR/ADI   |
|   | System design of fast injection/extraction system (WP-14)  | System design;   | DR(WP-14)  |
| and Istalian                            | Fast kicker devices (WP-14)  | Component design; costing;   | DR(WP-14)  |
| ast kicker                              | Fast kicker power supplies (WP-14)   | Component design; costing; power, cooling water estimation   | DR(WP-14)  |
|   | System design of injection kicker for E-driven PS (WP-14)  | System design;   | DR(WP-14)  |
|   | Injection kicker device for E-driven PS (WP-14)  | Component design; costing;   | DR(WP-14)  |
|   | Injection kicker power supplies for E-driven PS (WP-14)  | Component design; costing; power, cooling water estimation   | DR(WP-14)/Source   |
|   | Items  | Deliverables   | Related area and technical systems   |
|   | Fast FB system design (WP-13)  | System design; costing   | DR(WP-13)/Instrumentation  |
| echnical system                         | Fast FB test (WP-13)   | Performance specification  | DR(WP-13)/Instrumentation  |
| cerimical system                        | Beam position monitors   | costing  | Instrumentation/DR   |
|   | Beam current monitor   | costing  | Instrumentation/DR   |
| Instrumentation                         | Tune monitor   | costing  | Instrumentation/DR   |
|   | Beam size/profile monitors   | costing  | Instrumentation/DR   |
|   | Slow orbit FB  | Component design; costing  | Instrumentation/DR   |
|   |  |  |  |
|   | Polarimeters   | Component design; costing  | Instrumentation/CFS/DR   |
|   | Cabling and monitor station  | Component design; costing<br>Component counts; costing; power, cooling water estimation  | Instrumentation/CFS/DR   |
| Magnet                                  | Cabling and monitor station SC cavities, cryostat, He transfer   | Component counts; costing; power, cooling water estimation<br>Component design; costing  | Instrumentation/CFS/DR<br>SCRF/DR  |
| Magnet                                  | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide  | Component counts; costing; power, cooling water estimation Component design; costing Component design; costing; power, cooling water estimation  | Instrumentation/CFS/DR<br>SCRF/DR<br>HLRF/DR   |
| Magnet                                  | Cabling and monitor station SC cavities, cryostat, He transfer   | Component counts; costing; power, cooling water estimation<br>Component design; costing  | Instrumentation/CFS/DR<br>SCRF/DR  |
| Magnet                                  | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SC wiggler magnets (WP-12)  | Component counts; costing; power, cooling water estimation Component design; costing Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR(WP-12)/SCmagnet  |
| Magnet                                  | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SS wiggler magnets (WP-12) Cryostat, He transfer  | Component counts; costing; power, cooling water estimation<br>Component design; costing;   | Instrumentation/CFS/DR<br>SCRF/DR<br>HLRF/DR<br>LLRF/DR<br>DR(WP-12)/SCmagnet<br>SCmagnet/DR   |
|   | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SC wiggler magnets (WP-12)  | Component counts; costing; power, cooling water estimation Component design; costing Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR(WP-12)/SCmagnet  |
| Magnet<br>RF                            | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SS wiggler magnets (WP-12) Cryostat, He transfer  | Component counts; costing; power, cooling water estimation<br>Component design; costing;   | Instrumentation/CFS/DR<br>SCRF/DR<br>HLRF/DR<br>LLRF/DR<br>DR(WP-12)/SCmagnet<br>SCmagnet/DR   |
|   | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12)  | Component counts; costing; power, cooling water estimation<br>Component design; costing;   | Instrumentation/CFS/DR<br>SCRF/DR<br>HLRF/DR<br>LLRF/DR<br>DR(WP-12)/SCmagnet<br>SCmagnet/DR   |
|   | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12)   | Component counts; costing; power, cooling water estimation Component design; costing Component design; costing Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DRWP-12)/SCmagnet SCmagnet/DR SCmagnet/DR DRWP-12)/PMmagnet DRWP-12)/PMmagnet DRWP-12)/PMmagnet   |
|   | Cabling and monitor station SC cavities, cryostat, He transfer RF source, waveguide LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12)  | Component counts; costing; power, cooling water estimation<br>Component design; costing;   | Instrumentation/CFS/DR<br>SCRF/DR<br>HLRF/DR<br>LLRF/DR<br>DR(WP-12)/SCmagnet<br>SCmagnet/DR   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF  SC wiggler magnets (WP-12)  Cryostat, He transfer  Power supplies, and cabling for SC magnet  Design of PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12) Power supplies, and cabling for NC magnet  Vacuum chambers to reduce SEY for position DR (WP-13)  | Component counts; costing; power, cooling water estimation Component design; costing; Component design; costing; Component design; costing; power, cooling water estimation Component design; costing; Component design; costing; Component design; costing; Component design; costing; Component counts; costing; Component design; Costing; Costing; Component design; Costing; Co | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DIVWP-12)/SCmagnet SCmagnet/DR SCMagnet/DR DIVWP-12)/PMmagnet DRWP-12)/PMmagnet DRWP-12/PMmagnet DRWP-12/PMmagnet DRWP-12/PMmagnet DRWP-12/PMmagnet DRWP-12/PMmagnet DRWP-12/PMmagnet   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wietper magnets (WP-12)  Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12)  PM prototyping (WP-12)  NG magnets (WP-12) Power supplies, and cabling for NC magnet Vacuum chambers to reduce SEY for positio DR (WP-13)  Regular vacuum components (pump etc.)  | Component counts; costing; power, cooling water estimation Component design; costing; Component design; costing; Component design; costing; Component design; costing Component design; costing Component design; costing Component design; costing Component design; costing; Component counts; Costing; Costing; Component counts; Costing; Co | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DRWP-12//SCmagnet SCmagnet/DR SCmagnet/DR SCMWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet Magnet/DR Magnet/DR  |
|   | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF  St. wiggler magnets (WP-12)  Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12)  PM prototyping (WP-12)  NC magnets (WP-12)  Power supplies, and cabling for NC magnet Vacuum chambers to reduce SEY for position DR (WP-13)  Regular vacuum components (pump etc.)  Impedance calculations  | Component countris; costing; power, cooling water estimation Component design; costing Component design; costing; power, cooling water estimation Component design; costing; c | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR(WF-12:/SCmagnet SCmagnet/DR SCmagnet/DR SCMagnet/DR DR(WF-12:/PMmagnet DR(WF- |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12) Power supplies, and cabling for NC magnet Vacuum chambers to reduce SEY for positrin DR (WP-13) Regular vacuum components (pump etc.) Impedance calculations Photon stopper from wigglers   | Component counts; costing; power, cooling water estimation Component design; costing; Cooling water estimation Component design; Costing; Cooling water estimation Component design; Costing; Cooling water estimation  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DRWP-12//SCmagnet SCmagnet/DR SCMagnet/DR ORWP-12//PMmagnet ORWP-12//PMmagnet ORWP-12//PMmagnet ORWP-12//PMmagnet ORWP-12//PMmagnet Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/DR   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wigster magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12) PM prototyping (WP-12) NC magnets (WP-12) POwer supplies, and cabling for NC magnet Vacuum chambers to reduce SEY for positrin DR (WP-13) Regular vacuum components (pump etc.) Impedance calculations Photon stopper from wigsters System design of DR alignment system   | Component counts; costing; power, cooling water estimation Component design; costing Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation Performance specification Component counts; costing; power, cooling water estimation Performance specification Component counts; costing; cooling water estimation Performance specification Component design; costing; cooling water estimation System design  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR/WP-12//SCmagnet SCmagnet/DR SCmagnet/DR OR(WP-12//PMmagnet DR/WP-12//Magnet Magnet/DR OR(WP-12//Magnet Magnet/DR OR(WP-12//Magnet Magnet/DR VAcuum/DR Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/CFS/DR Alignment/CFS/DR   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF  SC wiggler magnets (WP-12)  Cryostat, He transfer Power supplies, and cabling for SC magnet  Design of PM (WP-12)  PM prototyping (WP-12)  NC magnets (WP-12)  Power supplies, and cabling for NC magnet  Vacuum chambers to reduce SEY for positrin DR (WP-13)  Regular vacuum components (pump etc.)  Impedance calculations  Photon stopper from wigglers  System design of DR alignment system  Magnet support   | Component countris; costing; power, cooling water estimation Component design; costing; Component design; Costing; Cooling water estimation System design; System design; Costing   | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR/WP-12//SCmagnet SCmagnet/DR SCmagnet/DR SCMagnet/DR SCMagnet/DR DR/WP-12//PMmagnet DR/WP-12//PMm |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wingter magnets (WP-12)  Cryostat, He transfer Power supplies, and cabling for SC magnet  Design of PM (WP-12)  PM prototyping (WP-12)  HC magnets (WP-12)  Power supplies, and cabling for NC magnet  Vacuum chambers to reduce SEY for position DR (WP-13)  Regular vacuum components (pump etc.)  Impedance calculations Photon stopper from wigglers  System design of DR alignment system  Magnet support   | Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; Component design; costing; Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation Performance specification Component counts; costing; power, cooling water estimation Performance specification Performance specification Component counts; costing; cooling water estimation Performance specification Component design; costing; cooling water estimation Performance specification System design System design; costing; cooling water estimation System design; costing;  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DRWP-12//SCmagnet SCmagnet/DR SCmagnet/DR SCMagnet/DR DRWP-12//PMmagnet DRWP-12//PMmagnet Magnet/DR JOHNP-13//Adapnet Magnet/DR Vaccum/DR Vaccum/DR Vaccum/DR Alignment/Magnet/DR Alignment/Magnet/DR Alignment/Magnet/DR Alignment/Magnet/DR   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design or PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12) NC magnets (WP-12) Regular vacuum components (proposition of the components (WP-13) Regular vacuum components (pump etc.) Impedance calculations Photon stopper from wigglers System design of DR alignment system Magnet support Chamber support Chamber support   | Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation component design; costing; power, cooling water estimation erformance specification Component counts; costing; power, cooling water estimation Performance specification Component counts; costing; power, cooling water estimation Performance specification Component design; costing; cooling water estimation Component design; costing; cooling water estimation System design; costing; cooling water estimation System design; costing System design; costing; power, cooling water estimation   | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR(WP-12//SCmagnet SCmagnet/DR SCmagnet/DR DR(WP-12//PMmagnet DR(WP-12//PMmagnet DR(WP-12//Magnet DR(WP-12//Magn |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF  SC wiggler magnets (WP-12)  Cryostat, He transfer Power supplies, and cabling for SC magnet  Design of PM (WP-12)  PM prototyping (WP-12)  NC magnets (WP-12)  Power supplies, and cabling for NC magnet  Vacuum chambers to reduce SEY for positrin DR (WP-13)  Regular vacuum components (pump etc.)  Impedance calculations  Photon stopper from wigglers  System design of DR alignment system  Magnet support  Chamber support  Cryogenics  Cooling water system and distribution | Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing Component design; costing Component design; costing Component design; costing Component design; costing; Component design; costing; Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation Component counts; costing; power, cooling water estimation Performance specification Component counts; costing; cooling water estimation Performance specification Component counts; costing; cooling water estimation System design; costing; cooling water estimation System design; costing System design; costing System design; costing System design; costing; cooling water estimation  | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DRWP-12//SCmagnet SCmagnet/DR SCMagnet/DR ORWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet DRWP-12//PMmagnet Magnet/DR Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/DR Alignment/CFS/DR Alignment/CFS/DR Alignment/CFS/DR Alignment/ADI/CFS/DR Cryo/CFS/SCRF/SCmagnet/DR Cryo/CFS/SCRF/SCmagnet/DR Cryo/CFS/SCRF/SCmagnet/DR Cryo/CFS/SCRF/SCmagnet/DR Cryo/CFS/SCRF/SCmagnet/DR   |
| RF                                      | Cabling and monitor station  SC cavities, cryostat, He transfer RF source, waveguide  LLRF SC wiggler magnets (WP-12) Cryostat, He transfer Power supplies, and cabling for SC magnet Design or PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12) NC magnets (WP-12) Regular vacuum components (proposition of the components (WP-13) Regular vacuum components (pump etc.) Impedance calculations Photon stopper from wigglers System design of DR alignment system Magnet support Chamber support Chamber support   | Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; cooling water estimation Component design; costing; power, cooling water estimation Component design; costing; power, cooling water estimation component design; costing; power, cooling water estimation erformance specification Component counts; costing; power, cooling water estimation Performance specification Component counts; costing; power, cooling water estimation Performance specification Component design; costing; cooling water estimation Component design; costing; cooling water estimation System design; costing; cooling water estimation System design; costing System design; costing; power, cooling water estimation   | Instrumentation/CFS/DR SCRF/DR HLRF/DR LLRF/DR DR(WP-12)/SCreagnet SCmagnet/DR SCmagnet/DR DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet DR(WP-12)/Mag |

Resource of technical preparation

Resource of EDR

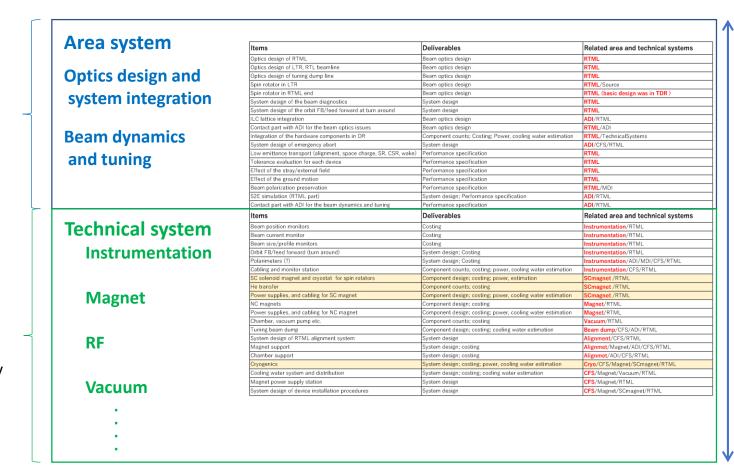
## RTML

List up all items for EDR related to RTML

## RTML area system

# Technical system

 To be integrated the item of each technical category for all area systems



Resource of EDR

# Beam Delivery System

- List up all items for EDR related to BDS
- Picked up the WP related items from the to-do-list of both area and technical systems and categorized.

## BDS area system

- 2WPs
- MDI related items
- Remaining items
   of original area systems

## Technical system

- Remaining items
   of original technical systems
- To be integrated the item of each technical category for all area systems

|   |   | In 11  |  | 7 |
|---|---|--|--|---|
| Work packages                           | Items   | Deliverables   | Related area and technical systems   | _ |
| vvork packages                          | Correction of higher order optics aberration (WP-15)  | Performance specification  | BDS(WP-15)   | - |
|   | Beam tuning study with machine learning technique (WP-15)  ATF3 beam test (WP-15)   | Performance specification Performance specification  | BDS(WP-15)<br>BDS(WP-15)   | 1 |
|   | Short range static wakefield effect (WP-15)   | Performance specification  | BDS(WP-15)   | 1 |
| WP-15                                   | Short range dynamic wakefield effect (WP-15)  | Performance specification  | BDS(WP-15)   | 1 |
| 44 L-12                                 | System desing of the intra-train orbit FB (WP-15)   | Performance specification  | BDS(WP-15)   | ] |
|   | Cavity BPMs (WP-15)   | Performance specification; Costing   | BDS(WP-15)/Instrumentation   | 1 |
| 141D 4.6                                | IP intra-train FB (WP-15) Upstream intra-train FB (WP-15)   | Performance specification; Costing Performance specification; Costing  | BDS(WP-15)/Instrumentation BDS(WP-15)/Instrumentation  | 1 |
| WP-16                                   | Wakefield minimization for vacuum components (WP-15)  | System design; Performance specification; Costing  | BDS(WP-15)/Vacuum  | 1 |
|   | QDO SC magnet and cryostat package (WP-16)  | Component design; Costing; Power estimation  | BDS(WP-16)/SCmagnet/MDI  | 1 |
|   | Service cryostat,a and He transfer to FD package (WP-16)  | Component design; Costing; Power estimation  | BDS(WP-16)/SCmagnet/MDI  | ] |
|   | QD0 vibration test (WP-16)  | Performance specification  | BDS(WP-16)/SCmagnet/MDI  | ļ |
|   | Polarimeters  | Performance specification; Costing   | BDS(MDI)/Instrumentation/ADI/MDI   | - |
| MDI                                     | Energy spectrometers Anti-DID (detector solenoid)   | Performance specification; Costing Component design  | BDS(MDI)/Instrumentation/ADI/MDI BDS(MDI)/Scmagnet/MDI   | 1 |
| IVIDI                                   | System design of push-pull scheme   | System design  | BDS(MDI)/CFS/ADI/MDI   | 1 |
|   | System design of Packman  | System design  | BDS(MDI)/CFS/ADI/MDI   | 1 |
|   | Items   | Deliverables   | Related area and technical systems   |   |
|   | Optics design of final focus beam line (for WP-15)  | Beam optics design   | BDS  | 1 |
| Area system                             | Optics design for QD0 package design (for WP-16)  | Beam optics design   | BDS/SC magnet/MDI  | 1 |
| / ii ca system                          | Optics design for QF1 package design (for WP-16)  | Beam optics design   | BDS/SC magnet/MDI  | ] |
|   | Optics design for Crab cavity (for WP-3)  | Beam optics design   | BDS/SCRF/MDI/ADI   |   |
| - · · · · · · · · · · · · · · · · · · · | Optics design of beam diagnostic system   | Beam optics design   | BDS  | - |
| Optics design and                       | Optics design of beam collimation system  Optics design of mail beam dump line  | Beam optics design Beam optics design  | BDS<br>BDS   | 1 |
| - L 1100 aco. D alla                    | Optics design of mail beam dump line Optics design of tuning beam dump line   | Beam optics design   | BDS  | 1 |
|   | System design of the beam diagnostics   | System design  | BDS  | 1 |
| system integration                      | System design of Muon collimation   | System design  | BDS/MDI/ADI  | 1 |
| ,                                       | ILC lattice integration   | Beam optics design   | ADI/BDS  |   |
|   | Contact part with ADI for the beam optics issues  | Beam optics design   | BDS/ADI  | - |
|   | Integration of the hardware components in DR<br>System design of emergency abort  | Component counts; Costing; Power, cooling water estimation<br>System design  | BDS/TechnicalSystems ADI/BeamDump/CFS/BDS  | - |
| Beam dynamics                           | L* and crossing angle   | System design<br>System design   | ADI/CFS/MDI/BDS  | 1 |
| Deam dynamics                           | Correction of higher order optics aberration (WP-15)  | Performance specification  | BDS(WP-15)   | 1 |
| The second second                       | Beam tuning study with machine learning technique (WP-15)   | Performance specification  | BDS(WP-15)   | 1 |
| and tuning                              | Tolerance evaluation for each device  | Performance specification  | BDS  |   |
| <b>31101 3311111</b>                    | Effect of the ground motion   | Performance specification  | BDS  | - |
|   | Long range static wakefield effect (resisitive wall)  Vacuum chamber diameter and magnet bore design  | Performance specification Performance specification  | BDS<br>BDS   | - |
|   | ATF3 beam test (WP-15)  | Performance specification  | BDS(WP-15)   |   |
|   | Short range static wakefield effect (WP-15)   | Performance specification  | BDS(WP-15)   | 1 |
|   | Short range dynamic wakefield effect (WP-15)  | Performance specification  | BDS(WP-15)   | 1 |
|   |   |  |  |   |
|   | System desing of the intra-train orbit FB (WP-15)   | Performance specification  | BDS(WP-15)   |   |
|   | System desing of the intra-train orbit FB (WP-15)  Collimation and detector background evaluation (incl. Muon)  | Performance specification Performance specification  | BDS(WP-15) BDS/MDI/ADI   |   |
|   | Radiation loss evaluation in dump line  | Performance specification; System design   | BDS/ADI/CFS  |   |
|   | Radiation loss evaluation in dump line<br>S2E simulation (BDS part)   | Performance specification; System design Performance specification; System design  |  |   |
|   | Radiation loss evaluation in dump line  S2E simulation (BDS part)  Contact part with ADI for the beam dynamics and tuning   | Performance specification; System design Performance specification; System design Performance specification  | BDS/ADI/CFS ADI/BDS ADI/BDS  |   |
|   | Radiation loss evaluation in dump line<br>S2E simulation (BDS part)   | Performance specification; System design Performance specification; System design  | BDS/ADI/CFS<br>ADI/BDS   |   |
|   | Radiation loss evaluation in dump line  S2E simulation (BDS part)  Contact part with ADI for the beam dynamics and tuning   | Performance specification; System design Performance specification; System design Performance specification  | BDS/ADI/CFS ADI/BDS ADI/BDS  |   |
|   | Radiation loss evaluation in dump line  S2E simulation (BDS part)  Contact part with ADI for the beam dynamics and tuning   | Performance specification; System design Performance specification; System design Performance specification  | BDS/ADI/CFS ADI/BDS ADI/BDS Related area and technical systems BDS.WP-157/instrumentation BDS.WP-157/instrumentation BDS.WP-157/instrumentation  |   |
| Table Call and a second                 | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Contract part with ADI for the beam dynamics and tuning Items Contract parts (NP-10) IP Intra-train FIS (NP-10) Uppresses una-train FIS (NP-15) Uppresses una-train FIS (NP-15) Beam current monitor   | Performance specification: System design Performance specification: System design Performance specification:  Deliverables  arformance specification: Costing Performance specification: Costing Performance specification: Costing Costing Costing  | BBS_ADVCFS ADVBDS ADVBDS Related area and technical systems ADVBDS ADVBDS Related area and technical systems ADS_ADVBDS ADS_ADVB |   |
| Technical system                        | Radiation loss evaluation in dump line SZE simulation (IDSD part) Contact part with ADI for the beam dynamics and tuning Heaving IPMs (WP-10) Partner train FB (WP-15) Upstream with carb of FB (WP-15)   | Performance specification; System design Performance specification; System design Performance specification  Deliverables  Serformance specification; Cesting Performance specification; Cesting Performance specification; Cesting Performance specification; Cesting   | BDS/ADI/CFS ADI/BDS ADI/BDS Related area and technical systems BDS.WP-157/instrumentation BDS.WP-157/instrumentation BDS.WP-157/instrumentation  |   |
| Technical system                        | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Contract part with ADI for the beam dynamics and tuning Items Contract parts (NP-10) IP Intra-train FIS (NP-10) Uppresses una-train FIS (NP-15) Uppresses una-train FIS (NP-15) Beam current monitor   | Performance specification: System design Performance specification: System design Performance specification:  Deliverables  arformance specification: Costing Performance specification: Costing Performance specification: Costing Costing Costing  | BBS_ADVCFS ADVBDS ADVBDS Related area and technical systems ADVBDS ADVBDS Related area and technical systems ADS_ADVBDS ADS_ADVB |   |
|   | Radiation loss evaluation in dump line SZE simulation (IDSD part) Contact part with ADI for the beam dynamics and tuning Hense Leaving BPMs (WP-10) Points train FB (WP-15) Beam current monitor Beam size (FG) ill monitors (Baserwire) rotationaries  | Performance specification; System design Performance specification; System design Performance specification  Deliverables  Performance specification; Conting Performance specification; Conting Performance specification; Conting Performance specification; Conting Costing Performance specification; Costing Information; Costing Performance specification; Costing Information; Systematication; Costing Information; Systematication; Costing Informatication; Costing Informat | BDS.ADI/CFS ADI/BDS ADI/BDS Related area and technical systems BDS.WP 18//seturmentation BDS.WP 18//seturmentation Instrumentation/BDS Instrumentation/BDS BDS.WD 18//seturmentation Instrumentation/BDS BDS.WD 18//seturmentation/BDS   |   |
| Technical system Instrumentation        | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Contract part with ADI for the beam dynamics and tuning Items Contract parts (NP-10) IP Intra-train FIS (NP-10) Uppresses una-train FIS (NP-15) Uppresses una-train FIS (NP-15) Beam current monitor   | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Performance specification: Costing Perfor | BBS.ADVCFS ADVBDS ADVBDS Related area and technical systems UDS.WP 1.50 / resources states UD |   |
|   | Radiation loss evaluation in dump line \$26 simulation (ISS) part) Contact part with AOI for the beam dynamics and tuning Items Conting IPMs (WF-10) Plants train FB (WF-15) Upstream later Area FB (WF-15) Beam current monitor Beam size /profile monitors (lasenvire) Upstream later Area FB (WF-15) Upstream later  | Performance specification; System design Performance specification; System design Performance specification  Deliverables  Performance specification; Conting Performance specification; Conting Performance specification; Conting Performance specification; Conting Costing Performance specification; Costing Information; Costing Performance specification; Costing Information; Systematication; Costing Information; Systematication; Costing Informatication; Costing Informat | BDS.ADI/CFS ADI/BDS ADI/BDS Related area and technical systems BDS.WP 18//seturmentation BDS.WP 18//seturmentation Instrumentation/BDS Instrumentation/BDS BDS.WD 18//seturmentation Instrumentation/BDS BDS.WD 18//seturmentation/BDS   |   |
|   | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items  Control part with ADI for the beam dynamics and tuning Items  Control parts (NP-10)  P Intro-train FB (NP-10)  P Intro-train FB (NP-10)  Beam current monitor  Beam size for fille monitors (laserwire) rotations are size for filled in the production of the control parts and the control parts are size for filled in the control parts are size for filled in the control parts are size for polarimeters and laser wire monitors  Cabiling and monitor station  Cabiling All FR (NP-3)  | Performance specification: System design Performance specification: System design Performance specification Deliverables Serformance specification Performance specification: Costing System design: Costing: Power, cooling water estimation Component counts: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation System design: Costing: Power estimation  | BBS_ADVCES ADVBDS ADVBDS Related area and technical systems BDS_WP_187 / securedates BDS_WDF_187 / sec |   |
|   | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with AOI for the beam dynamics and tuning  Items Cavity BPMs (WP-10) P into train PB (WP-15) Beam current monitor Beam shee/profile monitors (Baserwire) Cavity BPMs (WP-10) Cavity State of the Contact of the Conta | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Deliverables Performance specification: Coating Performance specification: Coating Performance specification: Coating Performance specification: Coating Coating Performance specification: Coating System design: Coating: Power, coaling water estimation Component counts: Coating: Power, coaling water estimation Component counts: Coating: Power, coaling water estimation Component counts: Coating: Power estimation System design: Coating: Power estimation   | BBS.ADI/CFS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1.50 / instrumentation DDS |   |
| Instrumentation                         | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items  Control part with ADI for the beam dynamics and tuning Items  Control parts (NP-10)  P Intro-train FB (NP-10)  P Intro-train FB (NP-10)  Beam current monitor  Beam size for fille monitors (laserwire) rotations are size for filled in the production of the control parts and the control parts are size for filled in the control parts are size for filled in the control parts are size for polarimeters and laser wire monitors  Cabiling and monitor station  Cabiling All FR (NP-3)  | Performance specification: System design Performance specification: System design Performance specification Deliverables Serformance specification Performance specification: Costing System design: Costing: Power, cooling water estimation Component counts: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation System design: Costing: Power estimation  | BBS_ADVCES ADVBDS ADVBDS Related area and technical systems BDS_WP_187 / securedates BDS_WDF_187 / sec |   |
| Instrumentation                         | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with AOI for the beam dynamics and tuning  Items Cavity BPMs (WP-10) P into train PB (WP-15) Beam current monitor Beam shee/profile monitors (Baserwire) Cavity BPMs (WP-10) Cavity State of the Contact of the Conta | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Deliverables Performance specification: Coating Performance specification: Coating Performance specification: Coating Performance specification: Coating Coating Performance specification: Coating System design: Coating: Power, coaling water estimation Component counts: Coating: Power, coaling water estimation Component counts: Coating: Power, coaling water estimation Component counts: Coating: Power estimation System design: Coating: Power estimation   | BBS.ADI/CFS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1.50 / instrumentation DDS |   |
|   | Radiation loss evaluation in dump line \$Z\$E simulation (BDS part) Contact part with ADI for the beam dynamics and tuning    Name  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Coating Performance specification Performance specific | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1-10 / instrumentation Instrumentation / BDS |   |
| Instrumentation                         | Radiation loss evaluation in dump line \$26 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Conting BPMs (WP-10) Plants train RB (WP-10) Plants train RB (WP-15) Beam current monitor Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Contact and the profile size (laserwire) Contact and the size (laserwire) Laser station for polarimeters and laser wire monitors Cabiling and monitor station Contact cavity (LIBE (WP-3)) He transfer for each conty RF source, waveguide for crab cavity (DD SC magnet and eyestat gas/sage (WP-16) CON deviates and He transfer for DP package (WP-16) (DD Warsten stat (WP-16) (DD SC PERS) (PF SC magnet and eyestat package (WP-16) (DD SC PERS) (PF SC magnet and eyestat package (WP-16) (DD SC PERS)  | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Costing Performance specification: Perform | BDS.ADVCES ADV8DS ADV8DS Related area and technical systems UDS.WP 1.50 Assessment states UDS.WP |   |
| Instrumentation                         | Radiation loss evaluation in dump line \$Z\$E simulation (BDS part) Contact part with ADI for the beam dynamics and tuning    Nems  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Cesting Power cooling water estimation Component design; Cesting; Power estimation   | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1.50 / instrumentations DDS.WP 1.50 / instrumentations DDS.WP 1.50 / instrumentations DDS.WP 1.50 / instrumentations Instrumentation / BDS Instrumentation / BDS Instrumentation / BDS Instrumentation / CFS / BDS / MDI Instrumentation / CFS / BDS / MDI Instrumentation / CFS / BDS SCRF (WP-37) / BDS SCRF (WP-37) / BDS ILLEFY SCRF (WP-33) / BDS ILLEFY SCRF (WP-33) / BDS ILLEFY SCRF (WP-33) / BDS SCREENED / BDS / MDI IDS.WP 1.50 / SCREENED / MDI IDS.WP 1.50 / MDI IDS.WP 1.50 / SCREENED / MDI IDS.WP 1.50 / MDI  |   |
| Instrumentation  Magnet                 | Radiation loss evaluation in dump line \$26 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Conting BPMs (WP-10) Plants train RB (WP-10) Plants train RB (WP-15) Beam current monitor Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Beam size/profile monitors (laserwire) Contact and the profile size (laserwire) Contact and the size (laserwire) Laser station for polarimeters and laser wire monitors Cabiling and monitor station Contact cavity (LIBE (WP-3)) He transfer for each conty RF source, waveguide for crab cavity (DD SC magnet and eyestat gas/sage (WP-16) CON deviates and He transfer for DP package (WP-16) (DD Warsten stat (WP-16) (DD SC PERS) (PF SC magnet and eyestat package (WP-16) (DD SC PERS) (PF SC magnet and eyestat package (WP-16) (DD SC PERS)  | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Costing Performance specification: Perform | BDS.ADVCES ADV8DS ADV8DS Related area and technical systems UDS.WP 1.50 Assessment states UDS.WP |   |
| Instrumentation  Magnet                 | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Herms Contract part with ADI for the beam dynamics and tuning Herms Contract part with ADI for the beam dynamics and tuning Herms University of the Contract part   | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Cesting Performance specification; Power, cooling water estimation Component design; Cesting; Power estimation Cesting; Power cesting; Power estimation Cesting; Power cesting; Power estimation   | BDS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / CFS / BDS / instrumentation / CFS / BDS / instrumentation / CFS / BDS  SCRF.WP -37 / SDS  SCRF.WP -37 / SDS  SCRF.WP -37 / SDS  SCRM.REF / SCRF.WP -30 / BDS  SCRM.REF / SCRF.WD -30 / BDS  SCRM.REF / SCRF.WD -30 / BDS  SCRM.REF / MO / BDS   |   |
| Instrumentation                         | Radiation loss evaluation in dump line \$25 simulation (BDS part) Contact part with ADI for the beam dynamics and tuning Items Coving BPAs (WP-10) Plates train FB (WP-10) Plates train FB (WP-10) Beam surrent resultor Geam stack/profile monitors (laserwise) Ferman stack/profile monitors (laserwise) Ferman stack/profile monitors (laserwise) Ferman spectrosisms Ferman | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Cesting Power cooling water estimation Component design; Cesting; Power estimation   | BDS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP - 15//instrumentation DDS.BDS.ADI/Instrumentation Instrumentation/BDS Instrumentation/BDS Instrumentation/BDS Instrumentation/CFS/BDS/MDI Instrumentation/CFS/BDS/MDI Instrumentation/CFS/BDS/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCHW-WP-3//LBF/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS SCMagnet/MDI/BDS  |   |
| Instrumentation  Magnet                 | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Herms Contract part with ADI for the beam dynamics and tuning Herms Contract part with ADI for the beam dynamics and tuning Herms University of the Contract part   | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Costing Power, cooling water estimation Component design: Costing: Power, cooling water estimation Power and Costing: Power estimation Power design: Costing: Power estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, estimation Component design: Costing: Power estimation Costing: Power, cooling: water estimation Costing: Power, cooling: water estimation  | BDS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation DDS.WP 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / BDS  DDS.WD 1.50 / instrumentation Instrumentation / CFS / BDS / instrumentation / CFS / BDS / instrumentation / CFS / BDS  SCRF.WP -37 / SDS  SCRF.WP -37 / SDS  SCRF.WP -37 / SDS  SCRM.REF / SCRF.WP -30 / BDS  SCRM.REF / SCRF.WD -30 / BDS  SCRM.REF / SCRF.WD -30 / BDS  SCRM.REF / MO / BDS   |   |
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| Instrumentation  Magnet                 | Radiation loss evaluation in dump line \$25E simulation (BDS part) Contact part with AOI for the beam dynamics and tuning  Items  Cavity BPMs (WP-10) P into train PB (WP-10) P into train PB (WP-10) Beam current monitor Beam size/profile monitors (Basenwire)  Beam size/profile monitors (Basenwire)  Laser station for polarimeters and laser wire monitors  Cabling and monitor station Cabling and monitor station Cabling and monitor station Cabling and monitor station (Cabling and monitor station (Cabling and monitor station) Cable cavity LLHF (WP-3) Carlo cavity LLHF (WP-3) Carlo cavity LLBF (WP-3) Carlo cavity LLBF (WP-3) GOO SC magnet and cryostat package (WP-16) GOS SC magnet and cryostat package He transfer for (WP-16) GELSC magnet and cryostat package He transfer for (WP-16) GELSC magnet and cryostat package He transfer for (MP-16) GOD siderations (WP-16) GELSC magnet and cryostat package He transfer for (MP-16) Fower supplies, and cabling for SC magnet Flower supplies, and cabling for NC magnet Flow | Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: System design Performance specification: Coating Performance specification: Coating Performance specification: Coating Performance specification: Coating Coating Performance specification: Coating System design: Coating: Power, cooling water estimation Component counts: Coating: Power, cooling water estimation Component coating: Coating: Power, cooling water estimation Component design: Coating: Power, cooling water estimation System design: Coating: Power, cooling water estimation Component design: Coating: Power, cooling water estimation Component design: Coating: Power, estimation Component design: Coating: Power, estimation Component design: Coating: Power estimation Component coating: Power, cooling water estimation Component counts: Coating: Power, cooling water estimation Consignment counts: Coating: Power, cooling water estimation Consignment counts: Coating: Power, cooling water estimation Component counts: Coating: Power, cooling water estimation   | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1-10 / instrumentation DDS.WP 1-10 / instrumenta |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Herms Contributed (ISS part) Planta train FB (IVP-10) Planta train FB (IVP-10) Planta train FB (IVP-10) Beam sub-profile monitors (Reservice) Colorism and Colorism Colorism (ISS part) Beam sub-profile monitors (Reservice) Colorism (ISS part) Colorism (ISS part) Laser station for polarimeters and laser wire monitors Colorism (ISS part) Colorism (ISS part) He trainfer for crob contry RF source, waveguide for crab contry (ISS part) Colorism (ISS  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing Performance specification; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Performance specification; Power estimation Component design; Costing; Power estimation Costing; Power, cooling water estimation Costing; Power, cooling; Power, cooling water estimation   | BBS.ADI/CFS ADI/BOS ADI/BOS ADI/BOS ADI/BOS ADI/BOS Related area and technical systems BDS.WP 18//astrumentation BDS.WD 18 |   |
| Instrumentation  Magnet                 | Radiation loss evaluation in dump line \$25E simulation (BDS part) Contact part with AOI for the beam dynamics and tuning  Items Contract part with AOI for the beam dynamics and tuning  Items Contract part with AOI for the beam dynamics and tuning  Items Contract part with AOI for the beam dynamics and tuning  Items Beam steep (profile monitors (Bosenwire)  Beam steep (profile monitors (Bosenwire)  Beam steep (profile monitors (Bosenwire)  Contract particulars  Laser station for polarimeters and laser wire monitors  Cabling and monitor station  Cabling and monitor station  Cabling and monitor station  Contract particulars  Laser station for polarimeters and laser wire monitors  Cabling and monitor station  Contract particular (UP-3)  Contract partic | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing System design; Costing; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation System design; Costing; Power, cooling water estimation Component design; Costing; Power, estimation Component design; Costing; Power estimation Component counts; Costing; Power, cooling water estimation Component design; Power power estimation Component counts; Power power estimation Component design; Power power estimation Costing; Power power power estimation Costing; Power power estimation Costing; Power power estimation Costing; Power power estimation Costing; Power  | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1-10 / instrumentation Instrumentation / BDS |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Herms Contributed (ISS part) Planta train FB (IVP-10) Planta train FB (IVP-10) Planta train FB (IVP-10) Beam sub-profile monitors (Reservice) Colorism and Colorism Colorism (ISS part) Beam sub-profile monitors (Reservice) Colorism (ISS part) Colorism (ISS part) Laser station for polarimeters and laser wire monitors Colorism (ISS part) Colorism (ISS part) He trainfer for crob contry RF source, waveguide for crab contry (ISS part) Colorism (ISS  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing Performance specification; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Performance specification; Power estimation Component design; Costing; Power estimation Costing; Power, cooling water estimation Costing; Power, cooling; Power, cooling water estimation   | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems BDS.WP 181/seturnentation BDS.WD 181/seturnentation ADI/ADI/BDS BDS.WD 181/seturnentation ADI/BDS BDS.WD 181/seturnentation ADI/BDS BDS.WD 181/seturnentation ADI/BDS BDS.WD 181/seturnentation BDS.WD 181/seturnentation BDS.WD 181/seturnentation BDS.CFS.WD 181/seturn |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Coving IPMs (WP-10) Planta train FB (WP-15) Planta train FB (WP-15) Beam current monitor Beam size (profile monitors (Baserwire) relationation (ISS) Cability and monitors station Cability (ISS) Cability (ISS) Lases station for polarimeters and laser wire monitors Cability (ISS) Cability (ISS) He trainfer for crab covity BF source, waveguide for crab covity COS Cability (ISS) COS cassives cryostat (ISS) COS cability (ISS) COS cassives cryostat (ISS) COS cability (ISS) COS cassives cryostat (ISS) COS cability (ISS) COS cassives and cryostat (ISS) COS cassives cryostat (ISS  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing Performance specification; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Performance specification; Power estimation Component design; Costing; Power estimation System design; Performance specification; Costing System design; Performance specification; Costing Component design; Costing; Costi | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1-10 / instrumentation Instrumentation / BDS |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line \$Z\$E simulation (BDS part) Contact part with ADI for the beam dynamics and tuning    Name  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Coating Performance specification Component design; Coating; Power estimation Component design; Coating; Power estimation Component design; Coating; Power estimation Component counts; Coating; Power cooling water estimation Component counts; Coating; Power, cooling water estimation Performance specification; Coating Component design; Coating; Coating; Coating water estimation Component design; Coating; Coating; Coating water estimation Component design; Coating; Coating; Coating water estimation Component design; Coating; Coating water estimation Component design; Coating; Coating; Coating water estimation | BBS.ADI/CFS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 1-19 / instrumentation Instrumentation / BDS |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Coving IPMs (WP-10) Planta train FB (WP-15) Planta train FB (WP-15) Beam current monitor Beam size (profile monitors (Baserwire) relationship (ISS) Beam current monitor Beam size (profile monitors (Baserwire) relationship (ISS) Cabiling and monitor station Craft cavities cryestal (WP-3) Cotto cavities cavities cavities cryestal) Prover supplies, and cabiling for NC magnet Wall (WP-3) Wall   | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Cesting System design; Cesting; Power, cooling water estimation Component design; Cesting; Power, cooling water estimation Component design; Cesting; Power, cooling water estimation Performance specification; Power, cooling water estimation Component design; Cesting; Power estimation Component counts; Cesting System design; Performance specification; Cesting System design; Performance specification; Cesting System design; Performance specification; Cesting System design; Cesting; Cesting; Water estimation Component design; Cesting; Cesting; Cesting water estimation Component design; Cesting; Cesting; Cesting; Cesting; Cesting; Cesting; System design; water estimation Component design; Cesting; Cesting; Cesting; Cesting; System design; water estimation Component design; Cesting; Cesting; Cesting; Cesting; Cesting; Cesting; System design; System design; Cesting; Cest | BDS.ADI/CES ADI/BDS ADI/BDS ADI/BDS Related area and technical systems aDI/SUP-18/Justicurrentation aDI |   |
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| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Coving BPMs (WP-10) Plants train FB (WP-15) Plants train FB (WP-15) Beam current monitor Beam star (profile monitors (laserwire) Indiamaters Continued to the Continued Con  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Design design Performance specification; Cesting System design; Cesting; Power, cooling water estimation Component design; Cesting; Power, cooling water estimation Component design; Cesting; Power estimation Conting Power, cooling water estimation Component design; Cesting; Cooling; Water estimation Component design; Cesting; Cesting; Cesting; Cesting System design; Cesting;  | BDS.ADI/CES ADI/BDS ADI/BDS Related area and technical systems biosym-19/instrumentation biosym- |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact port with ADI for the beam dynamics and tuning I Herms Centry BPMs (WP-10) Plants train FB (WP-15) Beam current monitor Beam size/profile monitors (Isserwire) Colorism of the Colorism of the Colorism   | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing Performance specification; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Component counts; Costing System design; Performance specification; Costing System design; Performance specification; Costing System design; Performance specification; Costing System design; Costing; Costing; Costing water estimation Component design; Costing; Costing; Costing water estimation System design; Performance specification; Costing System design; P | BBS.ADI/CES ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 181/instrumentation Instrumentation/BDS Instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS DDS.WD 181/instrumentation/DDS SCREWW-371/BDS UDS.WD 181/instrumentation/DDS SCREWW-371/BDS  |   |
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| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Covery BPAs (WP-10) Parties train FB (WP-15) Parties train FB (WP-15) Beam current monitor Beam star (profile monitors (laserwire) Following training trainin  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing Performance specification; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Component counts; Costing System design; Performance specification; Costing System design; Performance specification; Costing System design; Performance specification; Costing System design; Costing; Costing; Costing water estimation Component design; Costing; Costing; Costing water estimation System design; Performance specification; Costing System design; P | BBS.ADI/CES ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 181/instrumentation Instrumentation/BDS Instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS DDS.WD 181/instrumentation/DDS SCREWW-371/BDS UDS.WD 181/instrumentation/DDS SCREWW-371/BDS  |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Coving BPMs (WP-10) Planta train FB (WP-15) Planta train FB (WP-15) Beam current monitor Beam star (For ill monitors (laserwire) Indiamaters Laser station for (WP-15) Cability and monitor station Corb cavity LIPF (WP-13) He transfer for crab covity RF source, weequide for crab covity ODD SC magnetis and crassist package (WP-18) ODD Sc magnetis   | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Cesting Power cooling water estimation Component design; Cesting; Power, cooling water estimation Component design; Cesting; Power estimation Component design; Cesting; Power, cooling water estimation System design; Performance specification; Cesting System design; Cesting; Power, cooling water estimation Component design; Cesting; Power, cooli | BBS.ADI/CES ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP 181/instrumentation Instrumentation/BDS  Instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS DDS.WD 181/instrumentation/CFS/BDS SCREW-371/BDS  SCREW-371/BDS  SCREW-371/BDS UDS.WD 181/instrumentation DDS.WD 181/instrumentation |   |
| Instrumentation  Magnet  RF             | Radiation loss evaluation in dump line SZE simulation (ISS part) Contact part with ADI for the beam dynamics and tuning Hems Covery BPAs (WP-10) Parties train FB (WP-15) Parties train FB (WP-15) Beam current monitor Beam star (profile monitors (laserwire) Following training trainin  | Performance specification; System design Performance specification; System design Performance specification; System design Performance specification; Costing System design; Costing; Power, cooling water estimation Component design; Costing; Power estimation Performance specification; Costing; Power estimation Component design; Costing; Power estimation Component counts; Costing; Power estimation Component counts; Costing; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component design; Costing; Power, cooling water estimation System design; Costing; Costing | BBS.ADI/CES ADI/BDS ADI/BDS ADI/BDS ADI/BDS Related area and technical systems DDS.WP - 150 / instrumentation DDS.WP - 150 / |   |

Resource of technical preparation

Resource of EDR

# WBS of DR area system in the Pre-Lab period

### (A) Workpackage oriented

Easy to manage the resources in Pre-Lab period.

#### (B) Work item oriented (all WP items belong to area system)

- Some items in are/technical systems are moved to the WP groups.
   (Works for SC wiggler/cryostat/PS are in same group.)
- Representative of WPs will cover some group leaders in area system.
- Easy to manage the design work in Pre-Lab period.

#### (C) Work item oriented (some WP items will do technical system)

- All of magnet design will be done in the technical system, not area system.
- The resource of WP-12 will be managed by area system, and divided to magnet group in the technical system.
- Easy to manage the design work of the technical system.

#### (B) Work item oriented (all WP items belong to area system)

Damping Ring Area System

| em cordinator            | (Area systems)                          | Items   | Deliverables   | Resource |
|--------------------------|---|---|--|----------|
| Group Leader             | System design                           | System design of the beam diagnostics                     | Beam optics design   | EDR      |
| -                        | Beam tuning                             | ILC lattice integration                                   | Beam optics design   | EDR      |
|                          | System integration                      | Small emittance tuning                                    | Performance specification                                  | EDR      |
|                          | l' "                                    | Tolerance evaluation for each device                      | Performance specification                                  | EDR      |
|                          |   | System design of emergency abort                          | System design  | EDR      |
|                          |   | Integration of the hardware components in DR              | Component counts; costing; power, cooling water estimation | EDR      |
|                          |   | Contact part with ADI for the beam optics issues          | Beam optics design   | EDR      |
|                          |   | Contact part with ADI for the beam dynamics and tuning    | Performance specification                                  | EDR      |
| Representative for WP-12 | WP-12                                   | DR cell design, based on present ILC optics (WP-12)       | Beam optics design   | TP-WP12  |
| Group Leader             | Optics design                           | DR cell design (further small emittancs) (WP-12)          | Beam optics design   | TP-WP12  |
|                          | DR magnets (Hardware)                   | DR straight section optics design (for WP-14)             | Beam optics design   | EDR      |
|                          | , | Dynamic aperture survey (WP-12)                           | Beam optics design; Performance specification              | TP-WP12  |
|                          |   | SC wiggler magnets (WP-12)                                | Component design; costing; power, cooling water            | TP-WP12  |
|                          |   | Cryostat, He transfer                                     | Component design; costing                                  | EDR      |
|                          |   | Power supplies, and cabling for SC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                          |   | Design of PM (WP-12)                                      | Component design; costing; power, cooling water            | TP-WP12  |
|                          |   | PM prototyping (WP-12)                                    | Performance specification                                  | TP-WP12  |
|                          |   | NC magnets (WP-12)  | Component design; costing; power, cooling water            | TP-WP12  |
|                          |   | Power supplies, and cabling for NC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                          |   | Magnet support  | System design; costing                                     | EDR      |
| Representative for WP-13 | WP-13                                   | Ion trapping and fast ion instability (WP-13)             | Performance specification                                  | TP-WP13  |
| Group Leader             | Beam dynamics                           | Electron cloud instability (WP-13)                        | Performance specification                                  | TP-WP13  |
| -                        |   | Fast FB system design (WP-13)                             | System design; costing                                     | TP-WP13  |
|                          |   | Fast FB test (WP-13)                                      | Performance specification                                  | TP-WP13  |
|                          |   | Vacuum chambers to reduce SEY for positrin DR (WP-13)     | Performance specification                                  | TP-WP13  |
|                          |   | Spece charge effects                                      | Performance specification                                  | EDR      |
|                          |   | Impedance driven instability                              | Performance specification                                  | EDR      |
|                          |   | Tune shift by quadrupole wake for E-driven PS             | Performance specification                                  | EDR      |
| Representative for WP-14 | WP-14                                   | System design of fast injection/extraction system (WP-14) | System design;   | TP-WP14  |
| •                        | I                                       | Fast kicker devices (WP-14)                               | Component design; costing;                                 | TP-WP14  |
|                          |   | Fast kicker power supplies (WP-14)                        | Component design; costing; power, cooling water estimation | TP-WP14  |
|                          | 1                                       | System design of injection kicker for E-driven PS (WP-14) | System design;   | TP-WP14  |
|                          | 1                                       | Injection kicker device for E-driven PS (WP-14)           | Component design; costing;                                 | TP-WP14  |
|                          | 1                                       | Injection kicker power supplies for E-driven PS (WP-14)   | Component design; costing; power, cooling water estimation | TP-WP14  |
| (Technical syste         | (Technical systems)                     | Items   | Deliverables   | Resource |

### (A) Workpackage oriented

| tem cordinator (Area systems) |                       | Items   | Deliverables   | Resource |
|-------------------------------|-----------------------|---|--|----------|
| Group Leader                  | Optics design         | DR straight section optics design (for WP-14)             | Beam optics design   | EDR      |
|                               | System design         | System design of the beam diagnostics                     | Beam optics design   | EDR      |
| 1                             | Beam dynamics         | ILC lattice integration                                   | Beam optics design   | EDR      |
| 1                             | Beam tuning           | Small emittance tuning                                    | Performance specification                                  | EDR      |
| 1                             | System integration    | Tolerance evaluation for each device                      | Performance specification                                  | EDR      |
| 1                             |                       | Spece charge effects                                      | Performance specification                                  | EDR      |
| 1                             |                       | Impedance driven instability                              | Performance specification                                  | EDR      |
| 1                             |                       | Tune shift by quadrupole wake for E-driven PS             | Performance specification                                  | EDR      |
| 1                             |                       | Integration of the hardware components in DR              | Component counts; costing; power, cooling water estimation | EDR      |
| 1                             |                       | Contact part with ADI for the beam optics issues          | Beam optics design   | EDR      |
|                               |                       | Contact part with ADI for the beam dynamics and tuning    | Performance specification                                  | EDR      |
| Representative for WP-12      | WP-12                 | DR cell design, based on present ILC optics (WP-12)       | Beam optics design   | TP-WP12  |
| 1                             |                       | DR cell design (further small emittancs) (WP-12)          | Beam optics design   | TP-WP12  |
| 1                             |                       | Dynamic aperture survey (WP-12)                           | Beam optics design; Performance specification              | TP-WP12  |
| 1                             |                       | SC wiggler magnets (WP-12)                                | Component design; costing; power, cooling water            | TP-WP12  |
| 1                             |                       | Design of PM (WP-12)                                      | Component design; costing; power, cooling water            | TP-WP12  |
| 1                             |                       | PM prototyping (WP-12)                                    | Performance specification                                  | TP-WP12  |
|                               |                       | NC magnets (WP-12)  | Component design; costing; power, cooling water            | TP-WP12  |
| Representative for WP-13      | WP-13                 | Ion trapping and fast ion instability (WP-13)             | Performance specification                                  | TP-WP13  |
| 1                             |                       | Electron cloud instability (WP-13)                        | Performance specification                                  | TP-WP13  |
| 1                             | 1                     | Fast FB system design (WP-13)                             | System design; costing                                     | TP-WP13  |
| 1                             | 1                     | Fast FB test (WP-13)                                      | Performance specification                                  | TP-WP13  |
|                               |                       | Vacuum chambers to reduce SEY for positrin DR (WP-13)     | Performance specification                                  | TP-WP13  |
| Representative for WP-14      | WP-14                 | System design of fast injection/extraction system (WP-14) | System design;   | TP-WP14  |
| 1                             |                       | Fast kicker devices (WP-14)                               | Component design; costing;                                 | TP-WP14  |
| 1                             |                       | Fast kicker power supplies (WP-14)                        | Component design; costing; power, cooling water estimation | TP-WP14  |
| 1                             |                       | System design of injection kicker for E-driven PS (WP-14) | System design;   | TP-WP14  |
| 1                             |                       | Injection kicker device for E-driven PS (WP-14)           | Component design; costing;                                 | TP-WP14  |
|                               |                       | Injection kicker power supplies for E-driven PS (WP-14)   | Component design; costing; power, cooling water estimation | TP-WP14  |
|                               | (Technical systems)   | Items   | Deliverables   | Resource |
|                               | DR magnets (Hardware) | Cryostat, He transfer                                     | Component design; costing                                  | EDR      |
|                               |                       | Power supplies, and cabling for SC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                               |                       | Power supplies, and cabling for NC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                               | 1                     | Magnet support  | System design; costing                                     | EDR      |

### (C) Work item oriented (some WP items in technical system)

Damping Ring Area System

| em cordinator            | (Area systems)        | Items   | Deliverables   | Resource |
|--------------------------|-----------------------|---|--|----------|
| Group Leader             | System design         | System design of the beam diagnostics                     | Beam optics design   | EDR      |
|                          | Beam tuning           | ILC lattice integration                                   | Beam optics design   | EDR      |
|                          | System integration    | Small emittance tuning                                    | Performance specification                                  | EDR      |
|                          |                       | Tolerance evaluation for each device                      | Performance specification                                  | EDR      |
|                          |                       | System design of emergency abort                          | System design  | EDR      |
|                          |                       | Integration of the hardware components in DR              | Component counts; costing; power, cooling water estimation | EDR      |
|                          | 1                     | Contact part with ADI for the beam optics issues          | Beam optics design   | EDR      |
|                          |                       | Contact part with ADI for the beam dynamics and tuning    | Performance specification                                  | EDR      |
| Representative for WP-12 | WP-12                 | DR cell design, based on present ILC optics (WP-12)       | Beam optics design   | TP-WP12  |
| Group Leader             | Optics design         | DR cell design (further small emittancs) (WP-12)          | Beam optics design   | TP-WP12  |
|                          | DR magnets (Hardware) | DR straight section optics design (for WP-14)             | Beam optics design   | EDR      |
|                          |                       | Dynamic aperture survey (WP-12)                           | Beam optics design; Performance specification              | TP-WP12  |
| Representative for WP-13 | WP-13                 | Ion trapping and fast ion instability (WP-13)             | Performance specification                                  | TP-WP13  |
| Group Leader             | Beam dynamics         | Electron cloud instability (WP-13)                        | Performance specification                                  | TP-WP13  |
|                          | 1 '                   | Fast FB system design (WP-13)                             | System design; costing                                     | TP-WP13  |
|                          | 1                     | Fast FB test (WP-13)                                      | Performance specification                                  | TP-WP13  |
|                          |                       | Vacuum chambers to reduce SEY for positrin DR (WP-13)     | Performance specification                                  | TP-WP13  |
|                          |                       | Spece charge effects                                      | Performance specification                                  | EDR      |
|                          |                       | Impedance driven instability                              | Performance specification                                  | EDR      |
|                          |                       | Tune shift by quadrupole wake for E-driven PS             | Performance specification                                  | EDR      |
| Representative for WP-14 | WP-14                 | System design of fast injection/extraction system (WP-14) | System design;   | TP-WP14  |
|                          |                       | Fast kicker devices (WP-14)                               | Component design; costing;                                 | TP-WP14  |
|                          | 1                     | Fast kicker power supplies (WP-14)                        | Component design; costing; power, cooling water estimation | TP-WP14  |
|                          |                       | System design of injection kicker for E-driven PS (WP-14) | System design;   | TP-WP14  |
|                          |                       | Injection kicker device for E-driven PS (WP-14)           | Component design; costing;                                 | TP-WP14  |
|                          |                       | Injection kicker power supplies for E-driven PS (WP-14)   | Component design; costing; power, cooling water estimation | TP-WP14  |
|                          | (Technical systems)   | Items   | Deliverables   | Resource |
|                          | DR magnets (Hardware) | SC wiggler magnets (WP-12)                                | Component design; costing; power, cooling water            | TP-WP12  |
|                          |                       | Cryostat, He transfer                                     | Component design; costing                                  | EDR      |
|                          |                       | Power supplies, and cabling for SC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                          |                       | Design of PM (WP-12)                                      | Component design; costing; power, cooling water            | TP-WP12  |
|                          |                       | PM prototyping (WP-12)                                    | Performance specification                                  | TP-WP12  |
|                          |                       | NC magnets (WP-12)  | Component design; costing; power, cooling water            | TP-WP12  |
|                          |                       | Power supplies, and cabling for NC magnet                 | Component counts; costing; power, cooling water estimation | EDR      |
|                          |                       | Magnet support  | System design; costing                                     | EDR      |





# **Opinion of Andy Lankford**

- Any of the three structures is manageable during the Pre-lab phase.
- I think that one of the work item oriented structures (B) or (C) will work best. I believe that the
  decision between (B) and (C) needs to be consistent with how the division between area
  systems and technical systems for other area systems.
- If the DR magnets are going to be designed by the magnet technical system to DR area system specification, then I would think that (C) is better than (B).
- Also, if the SC wiggler magnet design, cryostat design, and wiggler power supply design are split among technical systems, then I believe that the coordination of these designs should probably live in the DR area system (or possibly the magnet technical system).
- Another consideration is how the RTL WBS is defined. I think that there should be a consistent philosophy to the structure for both DR and RTL (and probably BDS as well).

# WBS of BDS area system in the Pre-Lab period

#### (A) Workpackage oriented

Easy to manage the resources in Pre-Lab period.

#### (B) Work item oriented (all WP items belong to area system)

- Representative of WPs will cover some group leaders in area system.
- Easy to manage the design work in Pre-Lab period.

### (A) Workpackage oriented

#### Beam Delivery System Area System

| em cordinator            | (Area systems)          | Items   | Deliverables   | Resource |
|--------------------------|-------------------------|---|--|----------|
| Group Leader             | System design           | Optics design of final focus beam line (for WP-15)          | Beam optics design   | EDR      |
|                          | System integration      | Optics design for QD0 package design (for WP-16)            | Beam optics design   | EDR      |
|                          |                         | Optics design for QF1 package design (for WP-16)            | Beam optics design   | EDR      |
|                          |                         | Optics design for Crab cavity (for WP-3)                    | Beam optics design   | EDR      |
|                          |                         | Optics design of beam diagnostic system                     | Beam optics design   | EDR      |
|                          | 1                       | Optics design of beam collimation system                    | Beam optics design   | EDR      |
|                          |                         | Optics design of mail beam dump line                        | Beam optics design   | EDR      |
|                          | 1                       | Optics design of tuning beam dump line                      | Beam optics design   | EDR      |
|                          | 1                       | System design of the beam diagnostics                       | System design  | EDR      |
|                          | 1                       | System design of Muon collimation                           | System design  | EDR      |
|                          |                         | ILC lattice integration                                     | Beam optics design   | EDR      |
|                          |                         | Integration of the hardware components in DR                | Component counts; Costing; Power, cooling water estimation | EDR      |
|                          | 1                       | System design of emergency abort                            | System design  | EDR      |
|                          |                         | L* and crossing angle                                       | System design  | EDR      |
|                          |                         | Contact part with ADI for the beam optics issues            | Beam optics design   | EDR      |
| Group Leader             | Beam dynamics           | Tolerance evaluation for each device                        | Performance specification                                  | EDR      |
| aroup Loudor             |                         | Effect of the ground motion                                 | Performance specification                                  | EDR      |
|                          |                         | Long range static wakefield effect (resisitive wall)        | Performance specification                                  | EDR      |
|                          | 1                       | Vacuum chamber diameter and magnet bore design              | Performance specification                                  | EDR      |
|                          |                         | Collimation and detector background evaluation (incl. Muon) | Performance specification                                  | EDR      |
|                          |                         | Radiation loss evaluation in dump line                      | Performance specification; System design                   | EDR      |
|                          | 1                       | S2E simulation (BDS part)                                   | Performance specification; System design                   | EDR      |
|                          |                         | Contact part with ADI for the beam dynamics and tuning      | Performance specification                                  | EDR      |
| Representative for WP-15 | WP-15                   | Correction of higher order optics aberration (WP-15)        | Performance specification                                  | TP-WP1   |
| ,                        | I 15                    | Beam tuning study with machine learning technique (WP-15)   | Performance specification                                  | TP-WP1   |
|                          |                         | ATF3 beam test (WP-15)                                      | Performance specification                                  | TP-WP15  |
|                          | 1                       | Short range static wakefield effect (WP-15)                 | Performance specification                                  | TP-WP15  |
|                          |                         | Short range dynamic wakefield effect (WP-15)                | Performance specification                                  | TP-WP15  |
|                          | 1                       | System desing of the intra-train orbit FB (WP-15)           | Performance specification                                  | TP-WP15  |
|                          |                         | Cavity BPMs (WP-15)   | Performance specification; Costing                         | TP-WP15  |
|                          |                         | IP intra-train FB (WP-15)                                   | Performance specification; Costing                         | TP-WP15  |
|                          | 1                       | Upstream intra-train FB (WP-15)                             | Performance specification; Costing                         | TP-WP15  |
|                          |                         | Wakefield minimization for vacuum components (WP-15)        | System design; Performance specification; Costing          | TP-WP15  |
| Representative for WP-16 | WP-16                   | QDO SC magnet and cryostat package (WP-16)                  | Component design; Costing; Power estimation                | TP-WP16  |
| nepresentative for Wi-10 | ML-10                   | Service cryostat, and He transfer to FD package (WP-16)     | Component design; Costing; Power estimation                | TP-WP16  |
|                          |                         | QD0 vibration test (WP-16)                                  | Performance specification                                  | TP-WP16  |
| Group Leader             | MDI                     | Polarimeters  | Performance specification; Costing                         | EDR      |
| Group Leader             | IMDI                    | Energy spectrometers  | Performance specification; Costing                         | EDR      |
|                          |                         | Anti-DID (detector solenoid)                                | Component design   | EDR      |
|                          |                         | System design of push-pull scheme                           | System design  | EDR      |
|                          |                         | System design of Packman                                    | System design  | EDR      |
|                          | (Technical systems)     | Items   | Deliverables   | Resourc  |
|                          | BDS magnets (Hardware)  | QF1 SC magnet and cryostat package                          | Component design; Costing; Power estimation                | EDR      |
|                          | DD3 magnets (nartware)  | He transfer line ( from cryogenics to service cryostat)     | Component design; Costing; Power estimation                | EDR      |
|                          |                         | Power supplies, and cabling for SC magnet                   | Costing: Power, cooling water estimation                   | EDR      |
|                          |                         | NC magnets  | Costing: Power, cooling water estimation                   | EDR      |
|                          |                         | Power supplies, and cabling for NC magnet                   | Component counts; Costing; Power, cooling water estimation | EDR      |
|                          |                         |   |  |          |
|                          | BDS Dump and collimator | BDS Collimater (spoiler, absorber)                          | System design; Performance specification; Costing          | EDR      |
|                          |                         | MPS collimators   | System design; Performance specification; Costing          | EDR      |
|                          |                         | Muon spoiler and muon wall                                  | Component design; Costing; Cooling water estimation        | EDR      |
|                          |                         | Beam sweeper for dump, cabling and PS                       | Component design; Costing; Power, cooling water estimation | EDR      |

### (B) Work item oriented

#### Beam Delivery System Area System

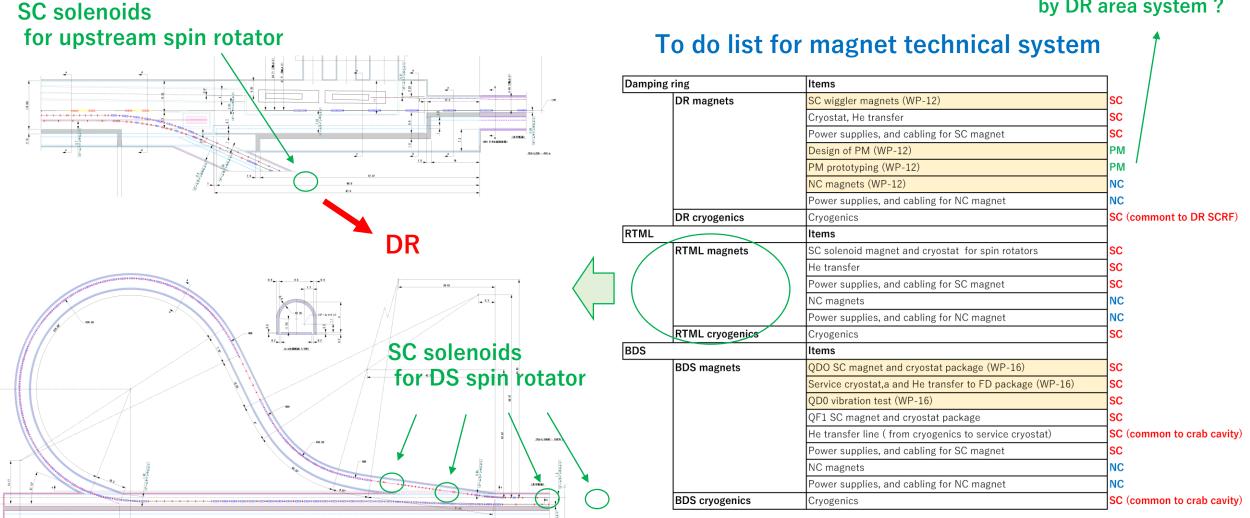
| m cordinator             | (Area systems)          | Items   | Deliverables   | Resou |
|--------------------------|-------------------------|---|--|-------|
| Group Leader             | System design           | Optics design of final focus beam line (for WP-15)          | Beam optics design   | EC    |
|                          | Optics design           | Optics design for QD0 package design (for WP-16)            | Beam optics design   | EI    |
|                          | System integration      | Optics design for QF1 package design (for WP-16)            | Beam optics design   | E     |
|                          | 1                       | Optics design for Crab cavity (for WP-3)                    | Beam optics design   | Е     |
|                          | 1                       | Optics design of beam diagnostic system                     | Beam optics design   | E     |
|                          | 1                       | Optics design of beam collimation system                    | Beam optics design   | E     |
|                          | 1                       | Optics design of mail beam dump line                        | Beam optics design   | E     |
|                          | 1                       | Optics design of tuning beam dump line                      | Beam optics design   | Е     |
|                          | 1                       | System design of the beam diagnostics                       | System design  | Е     |
|                          | 1                       | System design of Muon collimation                           | System design  | Е     |
|                          | 1                       | ILC lattice integration                                     | Beam optics design   | Е     |
|                          | 1                       | Integration of the hardware components in DR                | Component counts; Costing; Power, cooling water estimation | Е     |
|                          | 1                       | System design of emergency abort                            | System design  | Е     |
|                          | 1                       | L* and crossing angle                                       | System design  | Е     |
|                          |                         | Contact part with ADI for the beam optics issues            | Beam optics design   | E     |
| Group Leader             | Beam dynamics           | Tolerance evaluation for each device                        | Performance specification                                  | E     |
|                          | 1                       | Effect of the ground motion                                 | Performance specification                                  | E     |
|                          | 1                       | Collimation and detector background evaluation (incl. Muon) | Performance specification                                  | E     |
|                          | 1                       | Radiation loss evaluation in dump line                      | Performance specification; System design                   | Е     |
|                          | 1                       | S2E simulation (BDS part)                                   | Performance specification; System design                   | Е     |
|                          |                         | Contact part with ADI for the beam dynamics and tuning      | Performance specification                                  | E     |
| Representative for WP-15 | WP-15                   | Correction of higher order optics aberration (WP-15)        | Performance specification                                  | TP-   |
| Group Leader             | Beam tuning             | Beam tuning study with machine learning technique (WP-15)   | Performance specification                                  | TP-   |
|                          | Collective effect       | ATF3 beam test (WP-15)                                      | Performance specification                                  | TP-   |
|                          |                         | Short range static wakefield effect (WP-15)                 | Performance specification                                  | TP-   |
|                          |                         | Short range dynamic wakefield effect (WP-15)                | Performance specification                                  | TP-   |
|                          |                         | System desing of the intra-train orbit FB (WP-15)           | Performance specification                                  | TP-   |
|                          |                         | Cavity BPMs (WP-15)   | Performance specification; Costing                         | TP-   |
|                          |                         | IP intra-train FB (WP-15)                                   | Performance specification; Costing                         | TP-   |
|                          |                         | Upstream intra-train FB (WP-15)                             | Performance specification; Costing                         | TP-   |
|                          |                         | Wakefield minimization for vacuum components (WP-15)        | System design; Performance specification; Costing          | TP-   |
|                          | 1                       | Long range static wakefield effect (resisitive wall)        | Performance specification                                  | E     |
|                          |                         | Vacuum chamber diameter and magnet bore design              | Performance specification                                  | E     |
| Representative for WP-16 | WP-16                   | QDO SC magnet and cryostat package (WP-16)                  | Component design; Costing; Power estimation                | TP-   |
| Group Leader             | Final Focus Magnets     | Service cryostat,a and He transfer to FD package (WP-16)    | Component design; Costing; Power estimation                | TP-   |
|                          | 1                       | QD0 vibration test (WP-16)                                  | Performance specification                                  | TP-   |
|                          | 1                       | QF1 SC magnet and cryostat package                          | Component design; Costing; Power estimation                | E     |
|                          | 1                       | He transfer line ( from cryogenics to service cryostat)     | Component design; Costing; Power estimation                | E     |
|                          |                         | Power supplies, and cabling for SC magnet                   | Costing; Power, cooling water estimation                   | E     |
| Group Leader             | MDI                     | Polarimeters  | Performance specification; Costing                         | E     |
|                          | 1                       | Energy spectrometers  | Performance specification; Costing                         | E     |
|                          | 1                       | Anti-DID (detector solenoid)                                | Component design   | E     |
|                          | 1                       | System design of push-pull scheme                           | System design  | E     |
|                          |                         | System design of Packman                                    | System design  | E     |
|                          | (Technical systems)     | Items   | Deliverables   | Res   |
|                          | BDS magnets (Hardware)  | NC magnets  | Costing; Power, cooling water estimation                   | Е     |
|                          |                         | Power supplies, and cabling for NC magnet                   | Component counts; Costing; Power, cooling water estimation | Е     |
|                          | BDS Dump and collimator | BDS Collimater (spoiler, absorber)                          | System design; Performance specification; Costing          | Е     |
|                          |                         | MPS collimators   | System design; Performance specification; Costing          | Е     |
|                          |                         | Muon spoiler and muon wall                                  | Component design; Costing; Cooling water estimation        | E     |
|                          |                         |   |  |       |

# Magnet technical system for DR/RTML/BDS area system

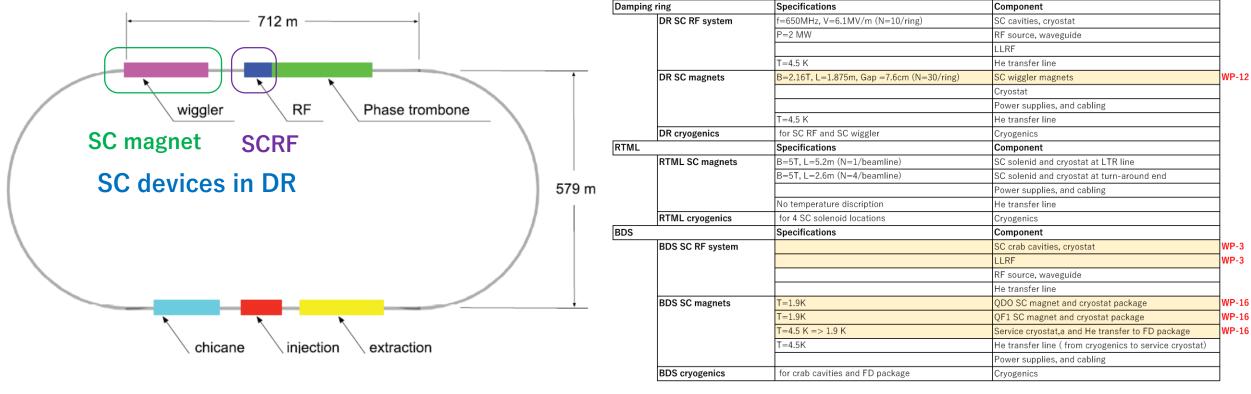
- Source and ML (BS and warm section) also have NC magnets.
- Source also has SC undulators.
- We'd better to consider how to make WBS by taking account of Source and ML area system, too.

Other NC and MC magnets ??

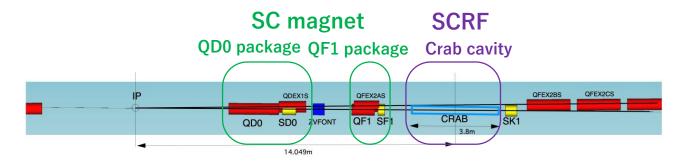
Better to be managed by DR area system?



# SC technologies for DR/RTML/BDS area system



### SC devices in BDS



Cryogenics and He transfer lines should be common for the SC magnets and SCRF.

It is very important how to coordinate the SC technology. But, I think it is not matter for our group.

# Next group meeting

Date and time: May 12<sup>th</sup> (WED) 22:00 JST

We would like to discuss the WBS of the BDS area system.

- Are there any other items that should be included in the to-do-list?
- What items in the list would be more efficient to handle in the same group as WP?

I would be happy if the following people could present their views from their respective positions.

- ➤ Angeles from WP-15
- ➤ Brett from WP-16
- Karsten or Tom from MDI