14th Meeting of DR/BDS/DUMP group

Date : 2021/04/20 (Wed)

Attendees : Karsten Buesser, Philip Burrows, Stephen Brooks, Angeles Faus-Golfe, Jenny List, Kiyoshi Kubo, Thomas Markiewicz, Shin Michizono, Toshiyuki Okugi, Brett Parker, Ivan Podadera, David L. Rubin, Ben Shephard, Fermado Sordo, Nobuhiro Terunuma, Andrzej Wolski, Mikhail Zobov

Topics : WBS for DR/RTML/BDS area systems (continued)

15th Meeting of DR/BDS/DUMP group

Date : 2021/05/12 (Wed)

Attendees : Karsten Buesser, Philip Burrows, Angeles Faus-Golfe, Andy Lankford, Andrea Latina, Kiyoshi Kubo, Shin Michizono, Toshiyuki Okugi, Ivan Podadera, David L. Rubin, Robert Ryne, Nikolay Solyak, Fermado Sordo, Nobuhiro Terunuma, Glen White, Jean-Luc Vay, Kaoru Yokoya, Mikhail Zobov

Topics : WBS for BDS area systems

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

Nork packages	Items	Deliverables	Related area and technical systems	
vuir packages	DR cell design, based on present ILC optics (WP-12)	Beam optics design	DR(WP-12)	
	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	
	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 40	lon 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 TDR)	
WP-14	System design of fast injection/extraction system (WP-14)	System design;	DR(WP-14)	
VVF-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	
lroa system	DR cell design, based on present ILC optics (WP-12)	Beam optics design	DR(WP-12)	
area system	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	
Intice decign and	ILC lattice integration	Beam optics design	ADI/DR	
Optics design and	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	
system integration	System design of emergency abort	System design	ADI/BeamDump/CFS/DR	
ystem megiation	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	
	Ion trapping and fast ion instability (WP-13)	Performance specification	DR(WP-13)	
Beam 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	
and tuning	Tune shift by guadrupole 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)	
	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	
	110115	Deliverables	nerateu area anu tecnnicai 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	
	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 counts; costing; power, cooling water estimation	Instrumentation/CFS/DR	
Magnet	SC cavities, cryostat, He transfer	Component design; costing	SCRF/DR	
Magnet	RF source, waveguide	Component design; costing; power, cooling water estimation	HLRF/DR	
	LLRF	Component design; costing	LLRF/DR	
	SC wiggler magnets (WP-12)	Component design; costing; power, cooling water estimation	DR(WP-12)/SCmagnet	
		Component design; costing	SCmagnet/DR	
	Cryostat, He transfer		SCmagnet/DR	
DE	Cryostat, He transfer Power supplies, and cabling for SC magnet	Component counts; costing; power, cooling water estimation		
RF		Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation	DR(WP-12)/PMmagnet	
RF		Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Performance specification	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet	
RF		Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet	
RF		Component counts; costing; power, cooling water estimation Component design; costing; power, cooling water estimation Parformance specification Component design; costing; power, cooling water estimation Component counts; costing; power, cooling water estimation	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet Magnet/OR	
	Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12)	Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet	
	Power supplies, and cabling for SC magnet Design of PM (WP-12) PM prototyping (WP-12) NC magnets (WP-12)	Component design; costing; power, cooling water estimation Performance specification Component design; costing; power, cooling water estimation	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet	
RF Vacuum	Power supplies, and cabling for SC magnet Design of PAI (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)	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	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet Magnet/DR DR(WP-13)/Vacuum (basic design was in TDR.)	
	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.)	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	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet OR(WP-12)/PMmagnet Magnet/DR OR(VP-13)/Vacuum (basic design was in TDR) Vacuum/DR	
	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 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	DR(WP-12)/PMmagnet DR(WP-12)/Magnet DR(WP-12)/Magnet DR(WP-12)/Magnet DR(WP-13)/Vacuum (basic design was in TDR.) Vacuum/DR Vacuum/DR Vacuum/DR	
	Power supplies, and cabling for SC magnet Design of PAI (WP-12) PM protopying (WP-12) NC magnets (WP-12) Power supplies, and cabling for NC magnet Vacuum chambers to reduce SEY for positive DR (WP-13) Regular vacuum components (pump etc.) Impedance calculations	Component design: costing: power, cooling water estimation Performance specification Component design: costing: power, cooling water estimation Component design: costing: power, cooling water estimation Performance specification Component design: costing: cooling water estimation Performance specification Component design: costing: cooling water estimation	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/VMagnet Magnet/DR DR(WP-13)/Vacuum (basic design was in TDR) Vacuum/DR Vacuum/DR	
	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 Photon stopper from wigglers System design of DR alignment system Magnet support	Component design: costing: power, cooling water estimation Performance specification Component design: costing: power, cooling water estimation Performance specification Component counts; costing: cooling water estimation Performance specification Component design: costing: cooling water estimation System design System design: costing	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Pmagnet DR(WP-12)/Pacuum (basic design was in TDR) Vacuum/DR Vacuum/DR Vacuum/DR Vacuum/CFS/DR Alignment/CFS/DR Alignment/Agnet/DR	
	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	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 design: costing: cooling water estimation System design: costing: cooling water estimation System design: costing System design: costing	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet DR(WP-12)/Magnet DR(WP-12)/Magnet/DR Vacuum/DR Vacuum/CFS/DR Alignment/CFS/DR Alignment/Magnet/DR Alignment/AD/CFS/DR	
	Power supplies, and cabling for SC magnet Design of PA (WP-12) PM prototyping (WP-12) NC magnets (WP-12) Power supplies, and cabling for NC magnet Vacuum components (pump etc.) Impedance calculations Photon stopper from wigglers System design of DR alignment system Magnet support Chamber support	Component design: costing: power, cooling water estimation Performance specification Component design: costing: power, cooling water estimation Performance specification Component counts; costing: cooling water estimation Performance specification Component design: costing: cooling water estimation System design: System design: costing System design: costing System design: costing System design: costing	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet Magnet/DR DR(WP-13)/Nacuum (basic design was in TDR) Vacuum/DR Vacuum/DR Vacuum/CFS/DR Alignment/CFS/DR Alignmet/AU/CFS/DR Crgv/CFS/SCRF/SCmagnet/DR	
	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	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 design: costing: cooling water estimation System design: costing: cooling water estimation System design: costing System design: costing	DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/PMmagnet DR(WP-12)/Magnet DR(WP-12)/Magnet DR(WP-12)/Magnet/DR Vacuum/DR Vacuum/CFS/DR Alignment/CFS/DR Alignment/Magnet/DR Alignment/AD/CFS/DR	

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
	-,	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-WP1
Group Leader	Optics design	DR cell design (further small emittancs) (WP-12)	Beam optics design	TP-WP1
-	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-WP1
		SC wiggler magnets (WP-12)	Component design; costing; power, cooling water	TP-WP1
		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-WP1
		PM prototyping (WP-12)	Performance specification	TP-WP1
		NC magnets (WP-12)	Component design; costing; power, cooling water	TP-WP1
		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-WP1
Group Leader	Beam dynamics	Electron cloud instability (WP-13)	Performance specification	TP-WP1
-		Fast FB system design (WP-13)	System design; costing	TP-WP1
		Fast FB test (WP-13)	Performance specification	TP-WP1
		Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	TP-WP1
		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-WP1
		Fast kicker devices (WP-14)	Component design; costing;	TP-WP1
		Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	TP-WP1
		System design of injection kicker for E-driven PS (WP-14)	System design;	TP-WP1
		Injection kicker device for E-driven PS (WP-14)	Component design; costing;	TP-WP1
		Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	TP-WP1
	(Technical systems)	Items	Deliverables	Resour

(A) Workpackage oriented

Damping Rings System cordinator (Area s

stem 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	
	Beam dynamics	ILC lattice integration	Beam optics design	EDR	
	Beam tuning	Small emittance tuning	Performance specification	EDR	
	System integration	Tolerance evaluation for each device	Performance specification	EDR	
		Spece charge effects	Performance specification	EDR	
		Impedance driven instability	Performance specification	EDR	
		Tune shift by quadrupole wake for E-driven PS	Performance specification	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	
		DR cell design (further small emittancs) (WP-12)	Beam optics design	TP-WP12	
		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	
		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	
Representative for WP-13	WP-13	Ion trapping and fast ion instability (WP-13)	Performance specification	TP-WP13	
-		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	
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	
		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	Resourc	
	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	
		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
		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
	5	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
		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
-		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
		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

Part of WP12 resources

3

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).

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

	Items	Deliverables	Related area and technical systems	T
Work packages	Correction of higher order optics aberration (WP-15)	Performance specification	BDS(WP-15)	
	Beam tuning study with machine learning technique (WP-15)	Performance specification	BDS(WP-15)	
	ATF3 beam test (WP-15) Short range static wakefield effect (WP-15)	Performance specification Performance specification	BDS(WP-15) BDS(WP-15)	
WP-15	Short range dynamic wakefield effect (WP-15)	Performance specification	BDS(WP-15)	Re
VVP-15	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	
	IP intra-train FB (WP-15)	Performance specification; Costing Performance specification; Costing	BDS(WP-15)/Instrumentation BDS(WP-15)/Instrumentation	
WP-16	Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	BDS(WP-15)/Vacuum	l l n
	QDO SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	BDS(WP-16)/SCmagnet/MDI	p
	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 Performance specification; Costing	BDS(WP-16)/SCmagnet/MDI	
	Polarimeters Energy spectrometers	Performance specification; Costing Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI BDS(MDI)/Instrumentation/ADI/MDI	
MDI	Anti-DID (detector solenoid)	Component design	BDS(MDI)/Scmagnet/MDI	
	System design of push-pull scheme	System design	BDS(MDI)/CFS/ADI/MDI	
	System design of Packman	System design	BDS(MDI)/CFS/ADI/MDI	4 1
	Items	Deliverables	Related area and technical systems	
	Optics design of final focus beam line (for WP-15)	Beam optics design	BDS	
Area system	Optics design for QD0 package design (for WP-16)	Beam optics design	BDS/SC magnet/MDI	
	Optics design for QF1 package design (for WP-16) Optics design for Crab cavity (for WP-3)	Beam optics design Beam optics design	BDS/SC magnet/MDI BDS/SCRF/MDI/ADI	
	Optics design of crab cavity (for wP-3) Optics design of beam diagnostic system	Beam optics design	BDS/SCRE/MDI/ADI	
Ontice design and	Optics design of beam collimation system	Beam optics design	BDS	
Optics design and	Optics design of mail beam dump line	Beam optics design	BDS	
	Optics design of tuning beam dump line	Beam optics design	BDS	
system integration	System design of the beam diagnostics	System design	BDS	
system integration	System design of Muon collimation ILC lattice integration	System design Beam optics design	BDS/MDI/ADI ADI/BDS	
	Contact part with ADI for the beam optics issues	Beam optics design	BDS/ADI	
	Integration of the hardware components in DR	Component counts; Costing; Power, cooling water estimation	BDS/TechnicalSystems	
Deeme dura sustan	System design of emergency abort	System design	ADI/BeamDump/CFS/BDS	
Beam dynamics	L* and crossing angle	System design	ADI/CFS/MDI/BDS	
	Correction of higher order optics aberration (WP-15)	Performance specification	BDS(WP-15)	
and tuning	Tolerance evaluation for each device	Performance specification	BDS(WP-15) BDS	
anu tuning	Effect of the ground motion	Performance specification	BDS	
	Long range static wakefield effect (resisitive wall)	Performance specification	BDS	
	Vacuum chamber diameter and magnet bore design	Performance specification	BDS	
	ATF3 beam test (WP-15) Short representatio websfield effect (WD-15)	Performance specification	BDS(WP-15)	
	Short range static wakefield effect (WP-15)	Performance specification	BDS(WP-15) BDS(WP-15)	
	System desing of the intra-train orbit FB (WP-15)	Performance specification	BDS(WP-15)	
	Collimation and detector background evaluation (incl. Muon)	Performance specification	BDS/MDI/ADI	
	Radiation loss evaluation in dump line	Performance specification; System design	BDS/ADI/CFS	
	S2E simulation (BDS part) Contact part with ADI for the beam dynamics and tuning	Performance specification; System design Performance specification	ADI/BDS ADI/BDS	
	Items	Deliverables	Related area and technical systems	
	Cavity BPMs (MP-15)	Performance specification: Costing	BDS/WP.15//instrumentation	
	IP Intra-train EB (WP-15)	Performance specification: Costing	BDS(WP-15)/instrumentation	R
	Upstream Intra-train FB (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation	
The state of the s	Beam current monitor	Costing	Instrumentation/BDS	o
Technical system	Beam size/profile monitors (laserwire)	Performance specification; Costing	Instrumentation/BDS	
	Polarimeters	Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI	
		Performance specification; Cosung		
-	Energy spectrometers Laser station for polarimeters and laser wire monitors		Instrumentation/CES/BDS/MDI	
Instrumentation	Energy spectrometers Laser station for polarimeters and laser wire monitors Cabling and monitor station	System design; Costing; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation	Instrumentation/CFS/BDS/MDI Instrumentation/CFS/BDS	
-		System design; Costing; Power, cooling water estimation Component counts; Costing; Power, cooling water estimation Component design; Costing; Power estimation		
-	Cabling and monitor station Crab cavities, cryostat (WP-3) Crab cavity LLRF (WP-3)	Component counts; Costing: Power, cooling water estimation Component design; Costing; Power estimation System design; Costing;	Instrumentation/CFS/BDS SCRF(WP-3)/BDS SCRF(WP-3)/LLRF/BDS	
-	Cabling and monitor station Crab cavities, cryostat (WP-3) Crab cavity LLRF (WP-3) He transfer for crab cavity	Component counts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: System design: Costing:	Instrumentation/CFS/BDS SCRF(WP-3)/BDS SCRF(WP-3)/LSRF/BDS SCRF(WP-37)/BDS	
Instrumentation	Cabling and monitor station Crab cavities, cryostat (WP-3) Crab cavity LLRF (WP-3)	Component counts; Costing: Power, cooling water estimation Component design; Costing; Power estimation System design; Costing;	Instrumentation/CFS/BDS SCRF(WP-3)/BDS SCRF(WP-3)/LLRF/BDS	
Instrumentation	Cabling and monitor station Crab cavities, cryostat (WP-3) Crab cavity LLRF (WP-3) He transfer for crab cavity	Component counts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: System design: Costing:	Instrumentation/CFS/BDS SCRF(WP-3)/BDS SCRF(WP-3)/LSRF/BDS SCRF(WP-37)/BDS	
-	Cabling and monitor station Crob civities, oryestat (WP-3) Crob cavity LLTR (WP-3) He transfer for crob cavity BF source, wavguide for cable cavity (CDO SC magnet and crystat package (WP-16) Service crystata; and He transfer to FD package (WP-16) (OD0 whereas the (WP-16)	Component counts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: System design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Parformance specification	Instrumentation/CFS/8DS SCR4 WH-34 (805 SCR4 WH-34) (805 SCR4 WH-37) (805 SCR4 W	
Instrumentation	Cabling and monitor station Craft cardies, constant (IVP-30 Cash cardies, constant (IVP-30 He transfer for cable cardy Fir's source, waveguide for craft cardy DOD 50 magnet and cystant alcreage (IVP-16) Envirok crystatut and He transfer to PD package (IVP-16) COD stransfer test (IVP-16) COD stransfer test (IVP-16) COD stransfer test (IVP-16)	Component courts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, estimation Parformance specification Component design: Costing: Power estimation Parformance specification Component design: Costing: Power estimation	Instrumentation/CF5/805 SCH194/9-3/165 SCH294/9-3/165 SCH294/9-3/165 ID5/WP-10/SCH294 ID5/WP-10/S	
Instrumentation	Cabling and monitor station Crab cavities, crystat (WP-3) Data cavity LLRF (WP-3) He transfer for crab cavity RF source, wavguide for crab cavity COD SC magnet and createst cachage (WP-18) Cavita crystatia and He transfer for ED package (WP-18) COD stations test (WP-18) COD stations test (WP-18) COD stations test (WP-18) He transfer line (from crystatic package	Component courts: Costing: Power, cooling water estimation Component design: Costing: Power estimation Posten design: Costing: System design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Portnamene specification Portnamene specification Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation	Instrumentation/CF5/805 SOLFWH-30(8	
Instrumentation Magnet	Cabling and monitor station Craft cardies, constant (IVP-30 Cash cardies, constant (IVP-30 He transfer for cable cardy Fir's source, waveguide for craft cardy DOD 50 magnet and cystant alcreage (IVP-16) Envirok crystatut and He transfer to PD package (IVP-16) COD stransfer test (IVP-16) COD stransfer test (IVP-16) COD stransfer test (IVP-16)	Component courts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, estimation Parformance specification Component design: Costing: Power estimation Parformance specification Component design: Costing: Power estimation	Instrumentation/CF5/805 SCH194/9-3/165 SCH294/9-3/165 SCH294/9-3/165 ID5/WP-10/SCH294 ID5/WP-10/S	
Instrumentation Magnet	Cabling and monitor station Craft confex, synthet (MP-30) Craft confex, synthet (MP-30) He transfer for coab can'ty GOO Sc magnet and create can'ty GOO Sc magnet and create can'ty Endoc synthetic and her transfer in PD package (WP-16) ED0 whether her (WP-16) CO0 whether her (WP-16) PAC synthesis and cabling for Sc magnet Ant TD0 Celector solewell MC magnets	Component courts: Costing: Power, cooling water estimation Component docussi; Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation	Instrumentation/CF5/805 SOLFWH-30(8	
Instrumentation	Cabling and monitor station Crist cantiles, constat (MP-2) Crist cantity LLRF (MP-2) Crist cantity LLRF (MP-2) RF source, wavguide for crab cavity (DD SC magnet and crastat package (MP-16) Crist Constant and the transfer to FD package (MP-16) CD abratises test (MP-16) QF1 SC magnet and crystat package H et transfer line (from crysterics to service crystat) Power supplies, and calling for SC magnet Anti-DD (Center solesed)	Component courts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation	Instrumentation/CF5/805 COTFWP-3/105 COTFWP-3/105 CCRFW-3/105 CCFFW-3/105 CCFFW-3/105 CCFFW-3/105 CCFF	
Instrumentation Magnet	Cabling and monitor station Critic orders, synthet (MP-30) Critic orders, synthet (MP-30) He transfer to cable carity RF source, waveguide for crab carity Critic Cable cables and the crashed rest (MP-16) Critic Carlos and the crashed rest (MP-16) Power supplies, and califing for SC magnet NC magnets Power supplies, and califing for NC magnet Power supplies, and califing for NC magnet Power supplies, and califing for NC magnet	Component courts: Costing: Power estimation Component design: Costing: Power estimation System design: Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, Poerhouse operating: Value estimation Component courts; Costing: Power, costing water estimation	Instrumentation/CFS/805 COTI 1997-301-301 COTI 1997-301-301 COTI 1997-301 COTI 1997-301 COT	
Instrumentation Magnet	Cabling and monitor station Craft confex, synthet (MP-30) Craft confex, synthet (MP-30) He transfer for coab can'ty GOO Sc magnet and create can'ty GOO Sc magnet and create can'ty Endoc synthetic and her transfer in PD package (WP-16) ED0 whether her (WP-16) CO0 whether her (WP-16) PAC synthesis and cabling for Sc magnet Ant TD0 Celector solewell MC magnets	Component courts: Costing: Power, cooling water estimation Component docussi; Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation	Instrumentation/CFS/80S CORT VM-SURGES CORT VM-SURGES CORT VM-SURGES SCREF VM-SURGES CORT VM-SUR	
Instrumentation Magnet RF	Cabling and monitor station Cable cavity, senset (MP-3) Cable cavity, LBP, SMP-3) He transfer to cable cavity EF source, waveguide for crab cavity CMD Schulgert and cavit of package (MP-16) CMD Schulgert and crystatic package (MP-16) CMD Schulgert and crystatic package He transfer line (from crystatic to service crystat) Power supples, and cabling for SC magnet Ant CMD Schulgert and cavity for NC magnet Power supples, and cabling for NC magnet Distances and cavity for NC magnet	Component courts: Costing: Power estimation Component design: Costing: Power estimation System design: Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, Poerhouse operating: Value estimation Component courts; Costing: Power, costing water estimation	Instrumentation/CFS/805 COTI 1997-301-301 COTI 1997-301-301 COTI 1997-301 COTI 1997-301 COT	
Instrumentation Magnet RF	Cabling and monitor station Cable orders, created (MP-30) Cable orders, create and MP-30) Cable orders, create cable, cable RF Source, waveguide for cable cable (COS Sin support and cables for cable cable) COS Sin support and cables for stationary (MP-10) COS sin support and crystal package (MP-10) COS sin support and crystal package (MP-10) COS sin support and crystal package (MP-10) Cost and cables, and cabling for Sin Sin space (MP-10) Cost and cables, and cabling for NC magnet Markedia International for support (MP-10) Vacuum components (kipe, bellows, pump etc.) BDS Collimator (spoller, absorber) MPS collimators	Component counts: Costing: Power, cooling water estimation Component docum; Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Component costing: Power, cooling water estimation Component counts: Costing: Power, cooling water estimation Component counts: Costing System design: Performance specification; Costing System design: Performance specification; Costing	Instrumentation/CFS/805 Coll 19/19-30:10 (19/19) Coll 19/19-30:10 (19/19) Coll 19/19-30:10 (19/19) Coll 19/19-30:10 (19/19) Coll 19/19-30:20 (19/1	
Instrumentation Magnet	Cablang and monitor station Craft confex, constant (IVP-30) Craft confex, constant (IVP-30) He transfer for craft confex, wweguide for craft confex IVP Source, wweguide for craft confex, IVP-16) EVD SC magnet and cystant plackage (IVP-16) EVD SC magnet and cystant plackage (IVP-16) EVD statistical and He transfer to PD package (IVP-16) EVD statistical and He transfer to PD package He transfer line (I from crysgenics to service crystat) Power supplies, and cabling for SC magnet Extension (IVP-15) EVD statistical information statistical constants (IVP-35) Mic magnets Power supplies, and cabling for NC magnet Extension (IVP-35) Fourier supplies, and cabling for NC magnet Extension (IVP-35) Extension Composites (gibp, Extension, gumg etc.) BDS Collimators Mution spoiler and muon wall	Component courts: Costing: Power estimation Component design: Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Costing: Power, cooling water estimation Component courts: Costing System design: Performance specification: Costing System design: Performance specification: Costing Component design: Costing: Costing Component design: Costing: Costing System design: Performance specification: Costing System design: Performance specification: Costing System design: Performance specification: Costing System design: Performance specification: Costing	Instrumentation/CFS/80S SCRF WM-30/R0S SCRF WM-30/R0S SCRF WM-30/R0S IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCREAGENT IDF3/	
Instrumentation Magnet RF	Cabling and monitor station Cable carlies, created (MP-3) Cable carlies, created (MP-3) Cable carlies, create carly BF sources, waveguide for cable carly COO SE canagest and created product (MP-16) COO SE canagest and carlot product (MP-16) COO SE canagest and carlot product (MP-16) COO Section (MP-16) Coordinations (MP-16) Coordination (MP-16) C	Component counts: Costing: Power, cooling water estimation Component docum; Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Parlormanes appendication Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component counts; Costing Component counts; Costing System design: Performance specification; Costing Component design: Costing: Costing System design: Costing: Costing: Power, cooling water estimation	Instrumentation/CFS/808 CORT (VM-301/CFS/808) CORT (VM-301/CFS/808	
Instrumentation Magnet RF	Cablang and monitor station Craft confex, constant (IVP-30) Craft confex, constant (IVP-30) He transfer for craft confex, wweguide for craft confex IVP Source, wweguide for craft confex, IVP-16) EVD SC magnet and cystant plackage (IVP-16) EVD SC magnet and cystant plackage (IVP-16) EVD statistical and He transfer to PD package (IVP-16) EVD statistical and He transfer to PD package He transfer line (I from crysgenics to service crystat) Power supplies, and cabling for SC magnet Extension (IVP-15) EVD statistical information statistical constants (IVP-35) Mic magnets Power supplies, and cabling for NC magnet Extension (IVP-35) Fourier supplies, and cabling for NC magnet Extension (IVP-35) Extension Composites (gibp, Extension, gumg etc.) BDS Collimators Mution spoiler and muon wall	Component courts: Costing: Power estimation Component design: Costing: Power estimation System design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Costing: Power, cooling water estimation Component courts: Costing System design: Performance specification: Costing System design: Performance specification: Costing Component design: Costing: Costing Component design: Costing: Costing System design: Performance specification: Costing System design: Performance specification: Costing System design: Performance specification: Costing System design: Performance specification: Costing	Instrumentation/CFS/80S SCRF WM-30/R0S SCRF WM-30/R0S SCRF WM-30/R0S IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCReagent/ADD IDF3/WF-18/SCREAGENT IDF3/	
Instrumentation Magnet RF	Cablang and monitor station Cable carries, exercise (1997-30) Cable carries, exercise (1997-30) He transfer for cable carry BF source, waveguide for cable carry (200 ES magnet and cryosite carry) (200 ES magnet and cryosite package (1997-16) Carry decarres and (1997-16) (201 ES carry and (1997-16)	Component counts: Costing: Power, cooling water estimation Component docum; Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Parlormanes appendication Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component counts; Costing Component counts; Costing System design: Performance specification; Costing Component design: Costing: Costing System design: Costing: Costing: Power, cooling water estimation	Instrumentation/CFS/808 CORT (VM-301/CFS/808) CORT (VM-301/CFS/808	
Instrumentation Magnet RF	Cabling and monitor station Cable carlies, created (MP-3) Cable carlies, created (MP-3) Cable carlies, create carly BF sources, waveguide for cable carly COO SE canagest and created product (MP-16) COO SE canagest and carlot product (MP-16) COO SE canagest and carlot product (MP-16) COO Section (MP-16) Coordinations (MP-16) Coordination (MP-16) C	Component courts: Costing: Power, cooling water estimation Component documes: Costing: Power estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Portomando superfloating: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component documes: Costing System design: Performance specification; Costing Component design: Costing: Costing Component design: Costing: Costing Component design: Costing: Costing Component design: Costing: Costing Costing Component design: Costing: Costing Costing Component design: Costing: Costing: Costing Component design: Costing: Costing: Costing Component design: Costing: Cos	Instrumentation/CFS/808 CORT (VM-301/CFS/808) CORT (VM-301/CFS/808	
Instrumentation Magnet RF	Cabling and monitor station Craft contex, crystell (MP-30 Craft contex, crystell (MP-30 He transfer for cable cavity COD Sciencey wavegalde for craft cavity COD Sciencey and and context in a station of the Context Cod Sciencey and a context cavity COD Sciencey and cavity and cavity (MP-16) COD whates test (MP-16) COD science selection MC magnet MC magnet MC magnet DO Science selection Context (pipe, and cabling for SC magnet MC magnet MC magnet Discretion of the Context (MP-16) COD wave upples, and cabling for NC magnet MC magnet Discretion of the Context (pipe, bellows, pump etc.) BDS Collimators (pipe, bellows, pump etc.) BDS Collimators (pipe, cabling and PS Turling beam dump Main beam	Component counts: Costing: Power, cooling water estimation Component design: Costing: Power estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component design: Costing: Costing Component design: Costing: Costing Component design: Costing: Costing Component design: Costing: Cooling water estimation Component design: Costing: Cooling water estimation System design System design: System design System design: Costing: Costing Costing: Costing Costing: Costing Costing: Costing: Costing Costing:	Instrumentation/CFS/808 COT VIPS-0005 COT VIPS-005 COT	
Instrumentation Magnet RF	Cablang and monitor station Craft cardies, constat (MP-30) Cost andre LLBP (MP-30) He transfer for cabl cavity EFF source, waveguide for cabl cavity EFF source, waveguide for cabl cavity EFF source, waveguide for cable cavity EFF source, waveguide for cable cavity (DO SE magnet and cyclest to EFF (MP-16) (DO starsfer later (MP-	Component courts: Costing: Power, cooling water estimation Component documes: Costing: Power, estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Portomands and estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component design: Costing: Costing System design: Costing: Costing Water estimation Component design: Costing: Costing water estimation System design: Performance especification; Costing System design: Performance especification; Costing System design: Performance especification; Costing System design: Performance especification; Costing	Instrumentation/CFS/80S SCRP VMP-307/80S SCRP VMP-307/80S SCRP VMP-307/80S IDDR/VMP-307/80S IDDR/VMP-107/SCRApper/VDD IDDR/VMP-107/SCRApper/VDD IDDR/VMP-107/SCRApper/VDD SCrapper/VD/R0S SCrapper/VD/R0S SCrapper/VD/R0S SCrapper/VD/R0S BDR/VMP-107/SCRAPPE IDDR/VMP-107/SCRAPE	
Instrumentation Magnet RF	Cablang and monitor station Craft carries, synthet (MP-30 Craft carries, synthet (MP-30 Craft carries, context carries, synthetic (MP-30 He transfer for cable carries (COS 65 migment and carries transfer (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS carries, and calling for SC magnet More supplies, and calling for SC magnet (MA-field influentation for second CMP-10) DIS Collimited (splite, absorber) MPS collimited (splite) System daign of BDS alignment system Alignet support Chamber support	Component counts: Costing: Power, cooling water estimation Component documes Costing: Power, cooling water estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component design: Costing: Costing Component design: Costing: Costing water estimation Component design: Costing: Costing water estimation System design: Costing: Costing: Costing water estimation System design: Costing: Power, cooling water estimation System design: Costing: Costing Costing System design: Performance specification: Costing System design: Costing: Power, cooling water estimation	Instrumentation/CFS/808 COT VIPS-001 0P:080 COT VIPS-001 0P:080 COT VIPS-001 0P:080 COT VIPS-001 0P:080 COT VIPS-001 COT V	
Instrumentation Magnet RF	Cablang and monitor station Craft confex, constant (MP-30) Cost and confex, constant (MP-30) He transfer for craft confex, UD0 SD magnet and costant ad-abase (WP-16) EXPLOSE of magnet and costant ad-abase (WP-16) EXPLOSE of the test (WP-16) COS stransfer and crystatt package (MP-16) COS stransfer and costant package He transfer line (from crysgenics to service crystatt) Power supplies, and cabling for NC magnet Explored to the stransfer line (Son Constant MC magnets Power supplies, and cabling for NC magnet Explored to the stransfer line (son constant components (VP-30) Vacuum components (gine, Abase, gune etc.) BDS Collimators MLm spoiler and muon wall Beam sweeper for durg, cabling and PS Turing Deam durge Explored and gine abaseter) MLMs and et all models System design of BDS alignment system Alignment for two beamlines around detector area Magnet support Charboter support	Component courts: Costing: Power, cooling water estimation Component documes: Costing: Power, estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Portomands and estimation Component design: Costing: Power estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component design: Costing: Costing System design: Costing: Costing Water estimation Component design: Costing: Costing water estimation System design: Performance especification; Costing System design: Performance especification; Costing System design: Performance especification; Costing System design: Performance especification; Costing	Instrumentation/CFS/805 SCHP WH-3/H05/SCHP W	
Instrumentation Magnet RF	Cablang and monitor station Craft carries, synthet (MP-30 Craft carries, synthet (MP-30 Craft carries, context carries, synthetic (MP-30 He transfer for cable carries (COS 65 migment and carries transfer (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS divident and the transfer in CP package (MP-16) COS carries, and calling for SC magnet More supplies, and calling for SC magnet (MA-field influentation for second CMP-10) DIS Collimited (splite, absorber) MPS collimited (splite) System daign of BDS alignment system Alignet support Chamber support	Component counts: Costing: Power, cooling water estimation Component documestic Costing: Power, cooling water estimation System design: Costing: Costing: Power, cooling water estimation Component design: Costing Power, cooling water estimation Component counts: Costing System design: Performance specification; Costing System design: Costing: Costing water estimation Component design: Costing: Costing water estimation System design: Performance specification; Costing System design: Costing: Costing water estimation System design: Costing: Costing water estimation System design: Costing: Costing Water estimation System design: Costing: Costing Water estimation	Instrumentation/CFS/808 COT VIPS-001095 COT VIPS-001097/005 COT VIPS-001097/005 HLBF/SCRF(WF-3)/805 COT VIPS-001097/005 HLBF/SCRF(WF-3)/805 COT VIPS-001097 COT VIPS-001	
Instrumentation Magnet RF	Cablang and monitor station Craft carries, synthet (MP-30 Craft carries, synthet (MP-30) Craft carries, control (MP-30) He transfer (cable carries) (COS Campet and Crash carries) (COS Campet and Crash carries (MP-16) (COS chargent and Crash carries) (COS Carries) (CO	Component courts: Costing: Power, cooling water estimation Component design: Costing: Power, estimation System design: Costing: Power, cooling water estimation Component design: Costing: Power estimation Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Power, cooling water estimation Component design: Costing: Costing System design: Costing: Costing Component design: Costing: Costing Component design: Costing: Costing System design: Costing: Costing water estimation Component design: Costing: Costing water estimation System design: Costing: Costing water estimation System design: Setting: Costing water estimation System design: Costing: Costing: Costing water estimation	Instrumentation/CFS/808 COTI VIPA-DICLOP/R08 COTI VIPA-DICLOP/R0	

Resource of technical preparation

Resource of EDR

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

em cordinator	(Area systems)	Items	Deliverables	Resourc
Group Leader	System design	Optics design of final focus beam line (for WP-15)	Beam optics design	EDR
aroup noutor	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
		Optics design of beam collimation system	Beam optics design	EDR
		Optics design of mail beam dump line	Beam optics design	EDR
		Optics design of tuning beam dump line	Beam optics design	EDR
		System design of the beam diagnostics	System design	EDR
		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
		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
		Effect of the ground motion	Performance specification	EDR
		Long range static wakefield effect (resisitive wall)	Performance specification	EDR
		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
		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-WF
		Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP
		ATF3 beam test (WP-15)	Performance specification	TP-WF
		Short range static wakefield effect (WP-15)	Performance specification	TP-WP
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP
		System desing of the intra-train orbit FB (WP-15)	Performance specification	TP-WF
		Cavity BPMs (WP-15)	Performance specification; Costing	TP-WP
		IP intra-train FB (WP-15)	Performance specification; Costing	TP-WP
		Upstream intra-train FB (WP-15)	Performance specification; Costing	TP-WF
		Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	TP-WF
Representative for WP-16	WP-16	QDO SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WF
		Service cryostat, a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	TP-WF
		QD0 vibration test (WP-16)	Performance specification	TP-WP
Group Leader	MDI	Polarimeters	Performance specification; Costing	EDR
		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	Resou
	BDS magnets (Hardware)	QF1 SC magnet and cryostat package	Component design; Costing; Power estimation	EDR
		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; Cover, cooling water estimation	EDR

(B) Work item 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
	Optics design	Optics design for QD0 package design (for WP-16)	Beam optics design	EDR
	System integration	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
		Optics design of beam collimation system	Beam optics design	EDR
		Optics design of mail beam dump line	Beam optics design	EDR
		Optics design of tuning beam dump line	Beam optics design	EDR
		System design of the beam diagnostics	System design	EDR
		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
		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
croup Leader	Beam dynamics	Effect of the ground motion	Performance specification	EDR
		Collimation and detector background evaluation (incl. Muon)	Performance specification	EDR
		Radiation loss evaluation in dump line	Performance specification; System design	EDR
		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-WP
Group Leader	Beam tuning	Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP
croup Leader	Collective effect	ATF3 beam test (WP-15)	Performance specification	TP-WP
	conective effect	Short range static wakefield effect (WP-15)	Performance specification	TP-WP
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP
		System desing of the intra-train orbit FB (WP-15)	Performance specification	TP-WP
		Cavity BPMs (WP-15)	Performance specification: Costing	TP-WP
		IP intra-train FB (WP-15)	Performance specification; Costing	TP-WP
		Upstream intra-train FB (WP-15)	Performance specification; Costing	TP-WP
		Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	TP-WP
		Long range static wakefield effect (resisitive wall)	Performance specification	EDR
		Vacuum chamber diameter and magnet bore design	Performance specification	EDR
Representative for WP-16	WP-16	QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WP
Group Leader		Service cryostat, a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	TP-WP
Group Leader	Final Focus Magnets	OD0 vibration test (WP-16)	Performance specification	TP-WP
		QF1 SC magnet and cryostat package	Component design; Costing; Power estimation	EDR
		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
Group Leader			Performance specification; Costing	EDR
Group Leader	MDI	Polarimeters Energy spectrometers	Performance specification; Costing	EDR
		Anti-DID (detector solenoid)	Component design	EDR
		System design of push-pull scheme	System design	EDR
				EDR
	(- - - - - - - - - -	System design of Packman	System design	
	(Technical systems)	Items	Deliverables	Resour
	BDS magnets (Hardware)	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
	1	Beam sweeper for dump, cabling and PS	Component design; Costing; Power, cooling water estimation	EDR

Should BDS collimator and Muon spoiler be managed by dump group ??

Discussion of WBS for BDS area systems

- Angeles presented that both structures (WP oriented, Work item oriented) are manageable during the Pre-lab phase. But, there should be a consistent philosophy of WBS to the structure for BDS as well.
- Kersten presented the topics in Pre-Lab phase as a point of MDI.
 - Topics with direct impact on physics
 - Topics with impact on detector design
 - > CFS topics with impact on detector design, assembly, maintenance
 - Topics with indirect impact on MDI
- BDS spoiler should belong to the same group to WP-15.
 BDS absorber should be designed in DUMP system (Angeles, Nobuhiro).
- ✓ S2E for polarization should also be considered (Jenney).
- ✓ Luminosity monitor (incoherent pair monitor) should be added to BDS instrumentation (Karsten).
 - Luminosity monitor is a task to be considered as a part of detector design.
 - Polarimeter and energy spectrometer are treated in MDI group in BDS area system.
- ✓ Detector solenoid and Anti-DID are tasks to be considered as a part of detector design (Karsten).

Technical system

Magnet technical system for DR/RTML/BDS area system

- Source and ML (bunch compressor 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.

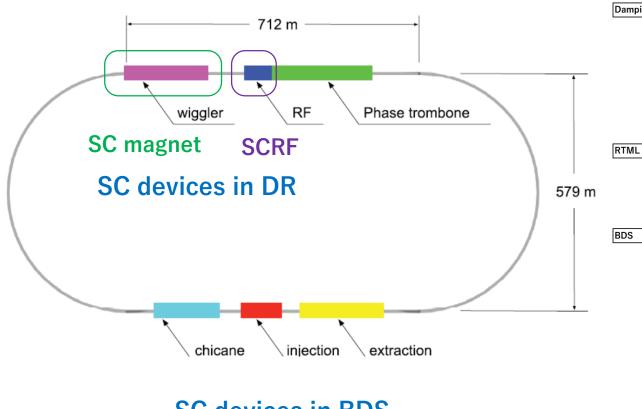
Other NC and MC magnets ??

Better to be managed by DR area system ?

To do list for magnet technical system Damping ring Items DR magnets SC wiggler magnets (WP-12) SC Cryostat, He transfer Yower supplies, and cabling for SC magnet Design of PM (WP-12) PM PM prototyping (WP-12) PM NC magnets (WP-12) NC NC Power supplies, and cabling for NC magnet DR cryogenics SC (commont to DR SCRF) Cryogenics RTML ltems DR **RTML** magnets SC solenoid magnet and cryostat for spin rotators SC SC He transfer Power supplies, and cabling for SC magnet SC NC magnets NC Power supplies, and cabling for NC magnet NC RTML cryogenics Cryogenics SC SC solenoids BDS Items BDS magnets QDO SC magnet and cryostat package (WP-16) SC for DS spin rotator Service cryostat,a and He transfer to FD package (WP-16) SC SC OD0 vibration test (WP-16) SC QF1 SC magnet and cryostat package He transfer line (from cryogenics to service cryostat) SC (common to crab cavity) ower supplies, and cabling for SC magnet SC NC VC magnets Power supplies, and cabling for NC magnet NC BDS cryogenics SC (common to crab cavity) Cryogenics

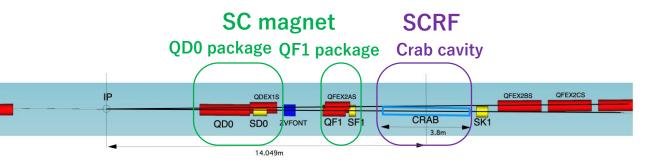
SC solenoids for upstream spin rotator

SC technologies for DR/RTML/BDS area system



Dampir	ng ring	Specifications	Component	
	DR SC RF system	f=650MHz, V=6.1MV/m (N=10/ring)	SC cavities, cryostat	
		P=2 MW	RF source, waveguide	
			LLRF	
		T=4.5 K	He transfer line	
	DR SC magnets	B=2.16T, L=1.875m, Gap =7.6cm (N=30/ring)	SC wiggler magnets	V
			Cryostat	
			Power supplies, and cabling	
		T=4.5 K	He transfer line	
	DR cryogenics	for SC RF and SC wiggler	Cryogenics	
RTML		Specifications	Component	
RTML SC magnets	RTML SC magnets	B=5T, L=5.2m (N=1/beamline)	SC solenid and cryostat at LTR line	
		B=5T, L=2.6m (N=4/beamline)	SC solenid and cryostat at turn-around end	
			Power supplies, and cabling	
		No temperature discription	He transfer line	
	RTML cryogenics	for 4 SC solenoid locations	Cryogenics	
3DS		Specifications	Component	
	BDS SC RF system		SC crab cavities, cryostat	N
			LLRF	N
			RF source, waveguide	
			He transfer line	
	BDS SC magnets	T=1.9K	QDO SC magnet and cryostat package	N
		T=1.9K	QF1 SC magnet and cryostat package	V
		T=4.5 K => 1.9 K	Service cryostat,a and He transfer to FD package	V
		T=4.5K	He transfer line (from cryogenics to service cryostat)	
			Power supplies, and cabling	
	BDS cryogenics	for crab cavities and FD package	Cryogenics	

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 : June 9th (WED) 22:00 JST

Continuous discussion of WBS in Pre-Lab period.

- WBS of the BDS area system from WP-16 (Brett)
- WBS of the DR 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?

 \succ HR in the Pre-Lab period.