

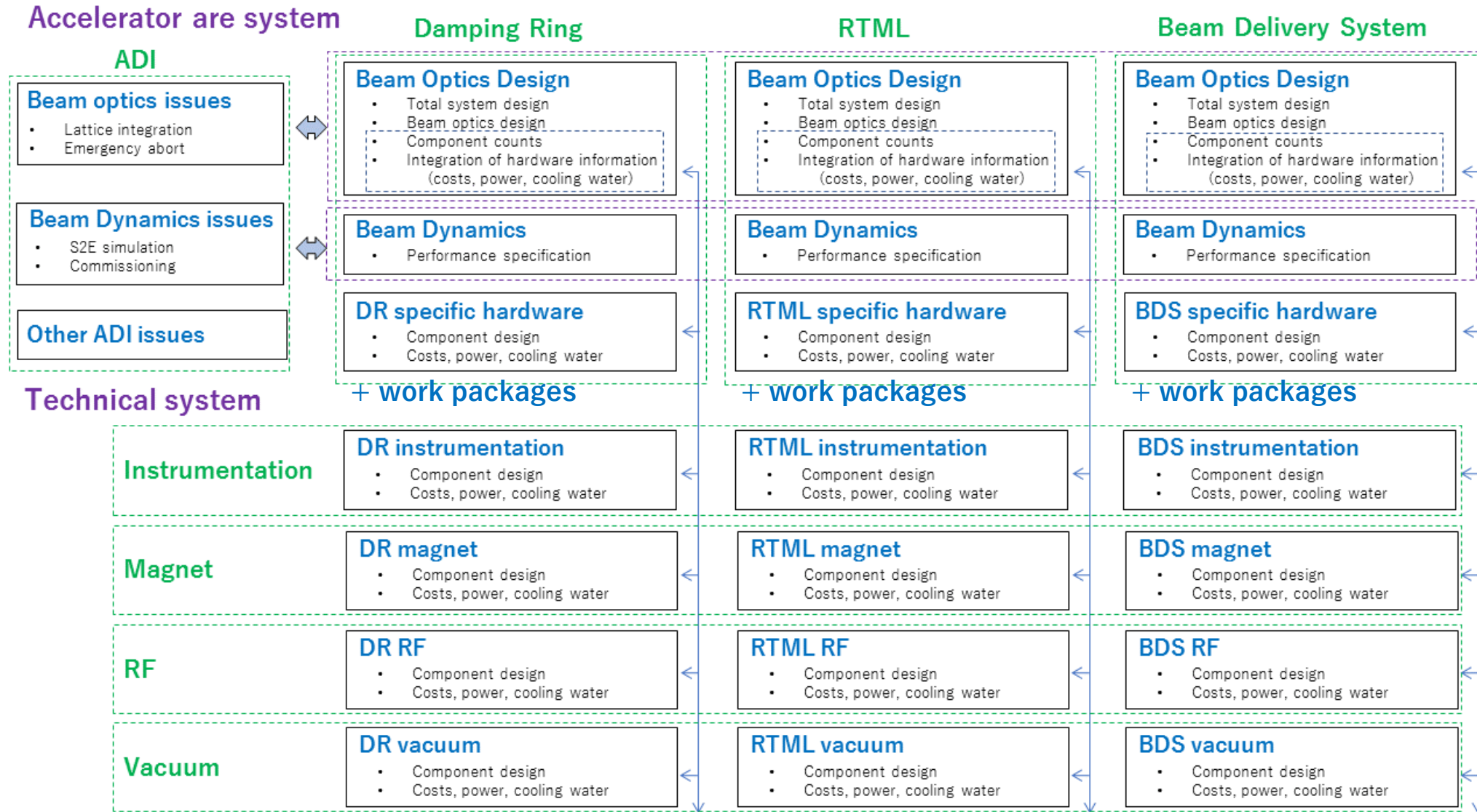
Discussion of WBS for DR/RTML/BDS area systems

2021/05/12

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IDT WG2 DR/BDS/DUMP group meeting

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

Work packages

WP-15
WP-16

MDI

Area system

Optics design and system integration

Beam dynamics and tuning

Technical system Instrumentation

Magnet

RF

Vacuum

Items	Deliverables	Related area and technical systems
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)	Performance specification	BDS/WP-15
Short range static wakefield effect (WP-15)	Performance specification	BDS/WP-15
Short range dynamic wakefield effect (WP-15)	Performance specification	BDS/WP-15
System design 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	BDS/WP-15/Instrumentation
Upstream intra-train FB (WP-15)	Performance specification; Costing	BDS/WP-15/Instrumentation
Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	BDS/WP-15/Vacuum
QDQ SC magnet and crystal package (WP-15)	Component design; Costing; Power estimation	BDS/WP-16/SCmagnet/MDI
Service cryostat and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	BDS/WP-16/SCmagnet/MDI
QDQ vibration test (WP-16)	Performance specification	BDS/WP-16/SCmagnet/MDI
Polarimeters	Performance specification; Costing	BDS/MDI/Instrumentation/ADI/MDI
Energy spectrometers	Performance specification; Costing	BDS/MDI/Instrumentation/ADI/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
Optics design of final focus beam line (for WP-15)	Beam optics design	BDS
Optics design for QDQ package design (for WP-16)	Beam optics design	BDS/SC magnet/MDI
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 of beam collimation system	Beam optics design	BDS
Optics design of main beam dump line	Beam optics design	BDS
Optics design of tuning beam dump line	Beam optics design	BDS
System design of the beam diagnostics	System design	BDS
System design of Muon collimation	System design	BDS/MDI/ADI
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	Component counts; Costing; Power, cooling water estimation	BDS/TechnicalSystems
System design of emergency abort	System design	ADI/BeamDump/CFS/BDS
L* and crossing angle	System design	ADI/CFS/MDI/BDS
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
Tolerance evaluation for each device	Performance specification	BDS
Effect of the ground motion	Performance specification	BDS
Long range static wakefield effect (resistive wall)	Performance specification	BDS
Vacuum chamber diameter and magnet bore design	Performance specification	BDS
ATF3 beam test (WP-15)	Performance specification	BDS/WP-15
Short range static wakefield effect (WP-15)	Performance specification	BDS/WP-15
Short range dynamic wakefield effect (WP-15)	Performance specification	BDS/WP-15
System design 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
SZE simulation (BDS part)	Performance specification; System design	ADI/BDS
Contact part with ADI for the beam dynamics and tuning	Performance specification	ADI/BDS
Cavity BPMs (WP-15)	Performance specification; Costing	BDS/WP-15/Instrumentation
IP intra-train FB (WP-15)	Performance specification; Costing	BDS/WP-15/Instrumentation
Upstream intra-train FB (WP-15)	Performance specification; Costing	BDS/WP-15/Instrumentation
Beam current monitor	Costing	Instrumentation/BDS
Beam size/profile monitors (laserwire)	Performance specification; Costing	Instrumentation/BDS
Polarimeters	Performance specification; Costing	BDS/MDI/Instrumentation/ADI/MDI
Energy spectrometers	Performance specification; Costing	BDS/MDI/Instrumentation/ADI/MDI
Laser station for polarimeters and laser wire monitors	System design; Costing; Power, cooling water estimation	Instrumentation/CFS/BDS/MDI
Cabling and monitor station	Component counts; Costing; Power, cooling water estimation	Instrumentation/CFS/BDS
Crab cavities, crystal (WP-3)	Component design; Costing; Power estimation	SCRF/WP-3/BDS
Crab cavities, RF beam	Component design; Costing; Power estimation	SCRF/WP-3/BDS
He transfer for crab cavity	System design; Costing	SCRF/WP-3/BDS
RF source, waveguide for crab cavity	Component design; Costing; Power, cooling water estimation	HLRF/SCRF(WP-3)/BDS
QDQ SC magnet and crystal package (WP-16)	Component design; Costing; Power estimation	BDS/WP-16/SCmagnet/MDI
Service cryostat and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	BDS/WP-16/SCmagnet/MDI
QDQ vibration test (WP-16)	Performance specification	BDS/WP-16/SCmagnet/MDI
QF1 SC magnet and crystal package	Component design; Costing; Power estimation	SCMagnet/MDI/BDS
He transfer line (from cryogenics to service cryostat)	Component design; Costing; Power estimation	SCMagnet/MDI/BDS
Power supplies, and cabling for SC magnet	Costing; Power, cooling water estimation	SCMagnet/BDS
Anti-DID (detector solenoid)	Component design	BDS/MDI/SCmagnet/MDI
NC magnets	Costing; Power, cooling water estimation	Magnet/BDS
Power supplies, and cabling for NC magnet	Component counts; Costing; Power, cooling water estimation	Magnet/BDS
Qualified construction for service cryostat (WP-16)	Component design; Power, cooling water estimation; Costing	Vacuum
Vacuum components (pipe, bellows, pump etc.)	Component counts; Costing	Vacuum/BDS
BDS Collimator (spoiler, absorber)	System design; Performance specification; Costing	BDS/CFS
MPS collimators	System design; Performance specification; Costing	BDS/CFS/MDI
Muon spoiler and muon wall	Component design; Costing; Cooling water estimation	BDS/Magnet/MDI
Beam sweeper for dump, cabling and PS	Component design; Costing; Power, cooling water estimation	BeamDump/Magnet/BDS
Tuning beam dump	Component design; Costing; Cooling water estimation	BeamDump/CFS/ADI/BDS
Alignment of BDS alignment system	System design; Costing; Cooling water estimation	Alignment/CFS/BDS
Alignment for two beamlines around detector area	System design	Alignment/MDI/CFS/BDS
Magnet support	System design; Costing	Alignment/Magnet/BDS
Chamber support	System design; Performance specification; Costing	Alignment/Vacuum/BDS
Cryogenics	System design; Costing; Power, cooling water estimation	Cryo/CFS/SCRF/SCMagnet/BDS
Cooling water system and distribution	System design; Costing; Cooling water estimation	CFS/Magnet/Vacuum/HL RF/BDS
Magnet power supply station	System design	CFS/Magnet/SCMagnet/BDS
System design of device installation procedures	System design	CFS/SCRF/SCMagnet/Magnet/BDS
System design of push-pull scheme	System design	BDS/MDI/CFS/ADI/MDI
System design of Packman	System design	BDS/MDI/CFS/ADI/MDI

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

Beam Delivery System Area System

System coordinator	(Area systems)	Items	Deliverables	Resource		
Group Leader	System design System integration	Optics design of final focus beam line (for WP-15)	Beam optics design	EDR		
		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 main 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 (resistive 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-WP15		
		Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP15		
		ATF3 beam test (WP-15)	Performance specification	TP-WP15		
		Short range static wakefield effect (WP-15)	Performance specification	TP-WP15		
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP15		
		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		
		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	QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WP16		
		Service cryostat,a 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		
		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	Resource		
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			
BDS Dump and collimator	Power supplies, and cabling for NC magnet	Component counts; Costing; Power, cooling water estimation	EDR			
	BDS Collimator (spoil, 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

System coordinator	(Area systems)	Items	Deliverables	Resource		
Group Leader	System design Optics design System integration	Optics design of final focus beam line (for WP-15)	Beam optics design	EDR		
		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 main 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
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 Group Leader	WP-15 Beam tuning Collective effect			Correction of higher order optics aberration (WP-15)	Performance specification	TP-WP15
		Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP15		
		ATF3 beam test (WP-15)	Performance specification	TP-WP15		
		Short range static wakefield effect (WP-15)	Performance specification	TP-WP15		
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP15		
		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		
		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 Group Leader	WP-16 Final Focus Magnets	QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WP16		
		Service cryostat,a 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	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		
		Polarimeters	Performance specification; Costing	EDR		
		Energy spectrometers	Performance specification; Costing	EDR		
(Technical systems)		Items	Deliverables	Resource		
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 Collimator (spoil, 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			

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

Next group meeting

Date and time : June 9th (WED) 22:00 JST

Continuous discussion of WBS in Pre-Lab period.

- 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?

WBS of the BDS area system.

- From WP-16 (Brett)

WBS of the DR area system.

- From LBNL (Robert Ryne, Jean-Luc Vay)
- From optics design and beam dynamics (UK?)
- From corrective effect (Mikhail)

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.

(A) Workpackage oriented

System coordinator (Area systems)		Items	Deliverables	Resource	
Group Leader	Optics design System design Beam dynamics Beam tuning System integration	DR straight section optics design (for WP-14)	Beam optics design	EDR	
		System design of the beam diagnostics	Beam optics design	EDR	
		ILC lattice integration	Beam optics design	EDR	
		Small emittance tuning	Performance specification	EDR	
		Tolerance evaluation for each device	Performance specification	EDR	
		Space 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	
		DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12	
		DR cell design (further small emittances) (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 positron 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	
		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)	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		

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

Damping Ring Area System

System coordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design Beam tuning System integration	System design of the beam diagnostics	Beam optics design	EDR
		ILC lattice integration	Beam optics design	EDR
		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
		DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12
		DR cell design (further small emittances) (WP-12)	Beam optics design	TP-WP12
		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
		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 positron DR (WP-13)	Performance specification	TP-WP13
		Space charge effects	Performance specification	EDR
		Impedance driven instability	Performance specification	EDR
		Tune shift by quadrupole wake for E-driven PS	Performance specification	EDR
		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

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

Damping Ring Area System

System coordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design Beam tuning System integration	System design of the beam diagnostics	Beam optics design	EDR
		ILC lattice integration	Beam optics design	EDR
		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
		DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12
		DR cell design (further small emittances) (WP-12)	Beam optics design	TP-WP12
		DR straight section optics design (for WP-14)	Beam optics design	EDR
		Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	TP-WP12
		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 positron DR (WP-13)	Performance specification	TP-WP13		
Space 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

