



Schedule for new system

Three computing systems in KEK

- . Belle computing system
- . Sharing computing system (for J-PARC, ILC users)
- . Super computer

Belle computing system and Sharing computing system are integrated

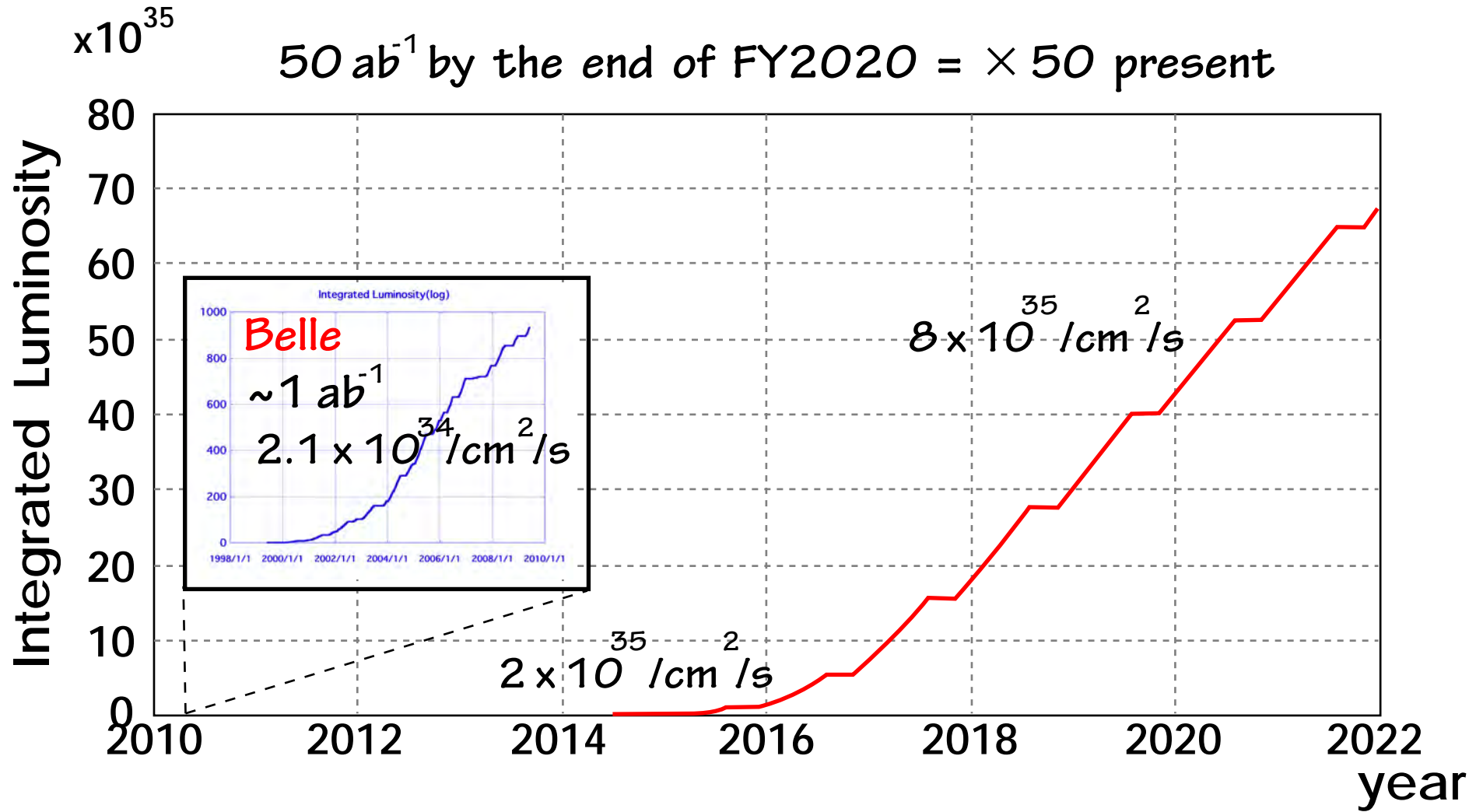
The lease contract of both systems ends at the end of FY2011

Belle data (3-4PB) has to be copied to new system (takes 10 months)

By when should the new comp system be ready ?

(one-year prior to exp?)

Luminosity Prospect



Expected Event Rate + Size

as of Feb. 20, 2010 (@Belle PAC)

- Expected event rate

L1 trigger rate: **20kHz** @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

1/2

after HLT : **10 kHz** @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

1/4

after phys-trig.: **2.5 kHz** @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

expected
reduction
factor

Here, $bb = \sim 1 \text{nb} = \mathbf{0.2 \text{kHz}}$ @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

(continuum $\sim 3 \text{nb}$, $\tau \sim 1 \text{nb}$: **total phys event: $\rightarrow \sim 1 \text{kHz}$**)

assumed to be 5kHz after phys-trigger for estimation (BG ???)

$9.6 \text{E}+10 \text{ events/yr}$ @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

↓ to storage

- Expected event size

cf. Atlas : $2 \text{E}+09 \text{ events/yr}$

SVD	40
CDC	6
TOP	8
ARICH	6
ECL	12
KLM	5

total raw data size is **assumed to be 300kB/event**
($\sim 1,000 \text{ kB/event}$ is expected for PXD, though...)

(kB/event)

cf. Atlas : $1,600 \text{ kB/event}$

Expected Event Rate + Size

provided by Trigger group

Data flow estimation for various cases

@ $8 \times 10^{35} / \text{cm}^2 / \text{s}$

	Worst I	Worst II	Modest I	Modest II
PXD size	1MB	1MB	0.5MB	0.5MB
other size	100kB	100kB	50kB	50kB
PXD reduction	1/5	1/10	1/5	1/10
PXD size aft.red.	200kB	100kB	100kB	50kB
Total event size	300kB	200kB	150kB	100kB
L1 rate	30kHz	30kHz	20kHz	20kHz
HLT reduction	1/5	1/5	1/5	1/5
Rate @ storage	6kHz	6kHz	4kHz	4kHz
BW @ storage	1.8GB/sec	1.2GB/sec	600MB/sec	400MB/sec

close to
-physics”
rate

We adopted these values and recalculated the required resources

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- Expected event rate

L1 trigger rate: $20\text{kHz} @ 2 \times 10^{35} / \text{cm}^2 / \text{s}$
 rate @ storage: **6kHz** @ $8 \times 10^{35} / \text{cm}^2 / \text{s}$

 after HLT: 4kHz: of these: physics (bb + continuum + tau = $\sim 5\text{nb}$)
 after physics trigger: remaining 2kHz: irreducible background
 Here, bb = $\sim 1\text{nb} = 0.2\text{kHz} @ 2 \times 10^{35} / \text{cm}^2 / \text{s}$
 (continuum $\sim 3\text{nb}$, tau $\sim 1\text{nb}$: total phys event: $\rightarrow \sim 1\text{kHz}$)
 assumed to be 5kHz after phys-trigger for estimation (BG ???)
 9.6E+10 chaevents/yr @ $2 \times 10^{35} / \text{cm}^2 / \text{s}$

1/2
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- Expected event size

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same as before

(kB/event)

cf. Atlas : 1,600 kB/event

Expected Event Rate + Size

as of Feb. 20, 2010 (@Belle PAC)

- Expected event rate

rate @ storage: **6kHz** @ $8 \times 10^{35} / \text{cm}^2 / \text{s}$

after HLT 4kHz: of these: physics (bb + continuum + tau = $\sim 5\text{nb}$)

Other changed parameters

Other changed parameters

- . safety factor (=2) is applied to storage space for raw data
- . CPU for analysis is based on integrated lum.
(so far based on yearly-base lum.)

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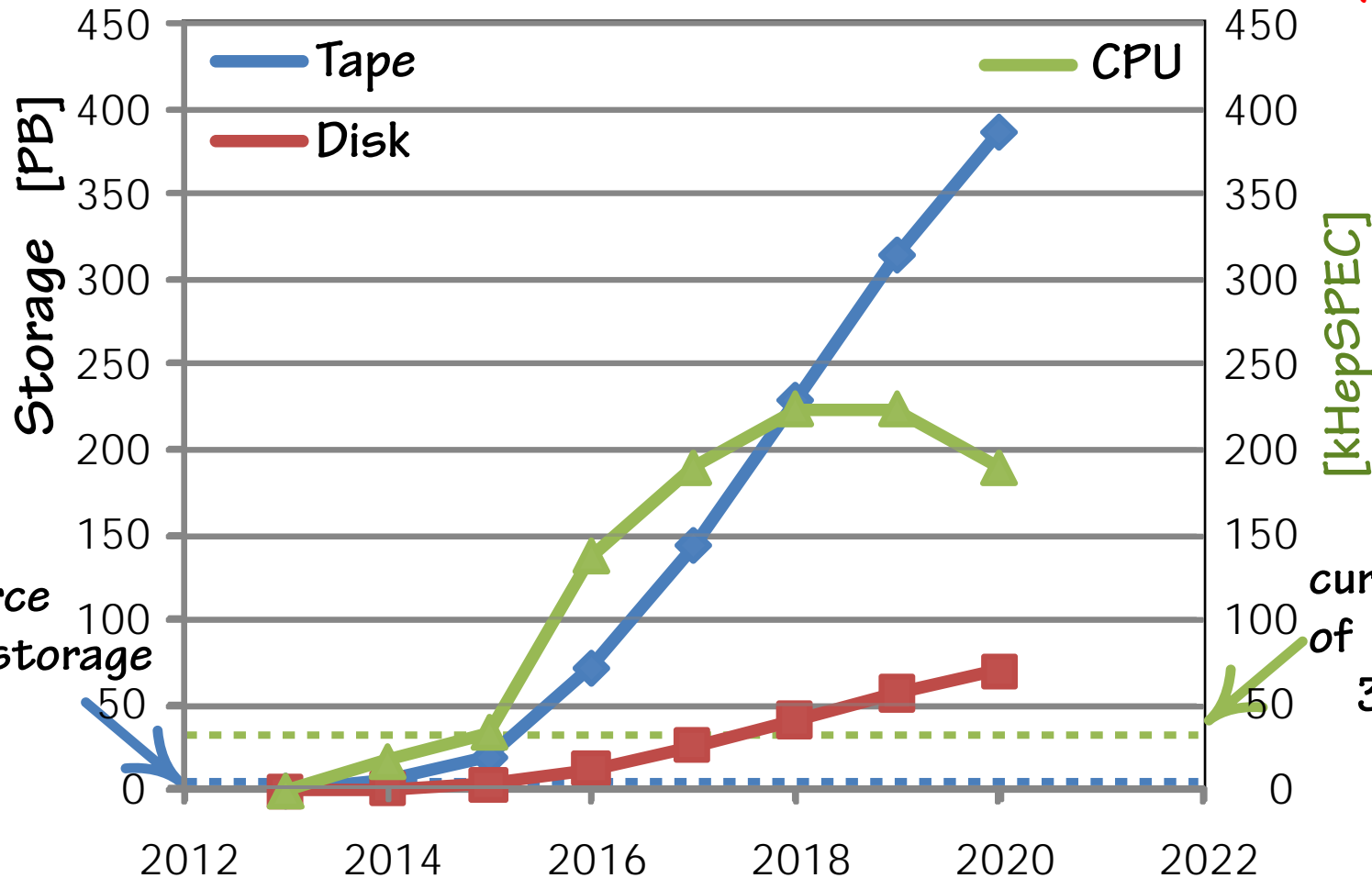
(kB/event)

cf. Atlas : 1,600 kB/event

Resource requirement for KEK

All raw data is processed (in 5 months : beam-off period)
30% of MC is produced (in 5 months)
All raw data, mDST and 30% of MC are archived

as of Feb. 20, 2010 (@Belle PAC)



current resource
of Belle Tape storage
3.5 PB
(disk : 1.5PB)

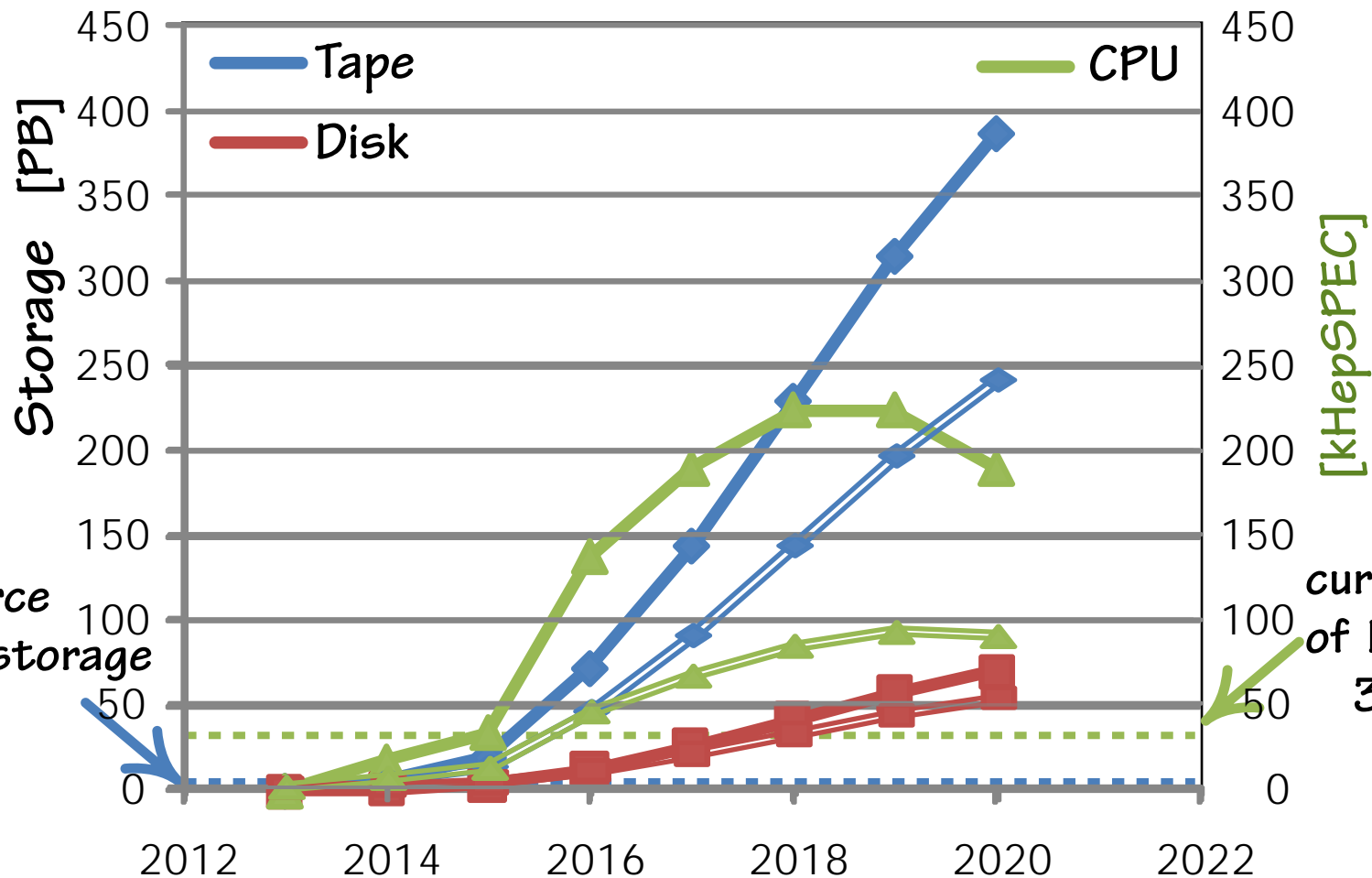
current resource
of Belle CPU
35kHepSPEC

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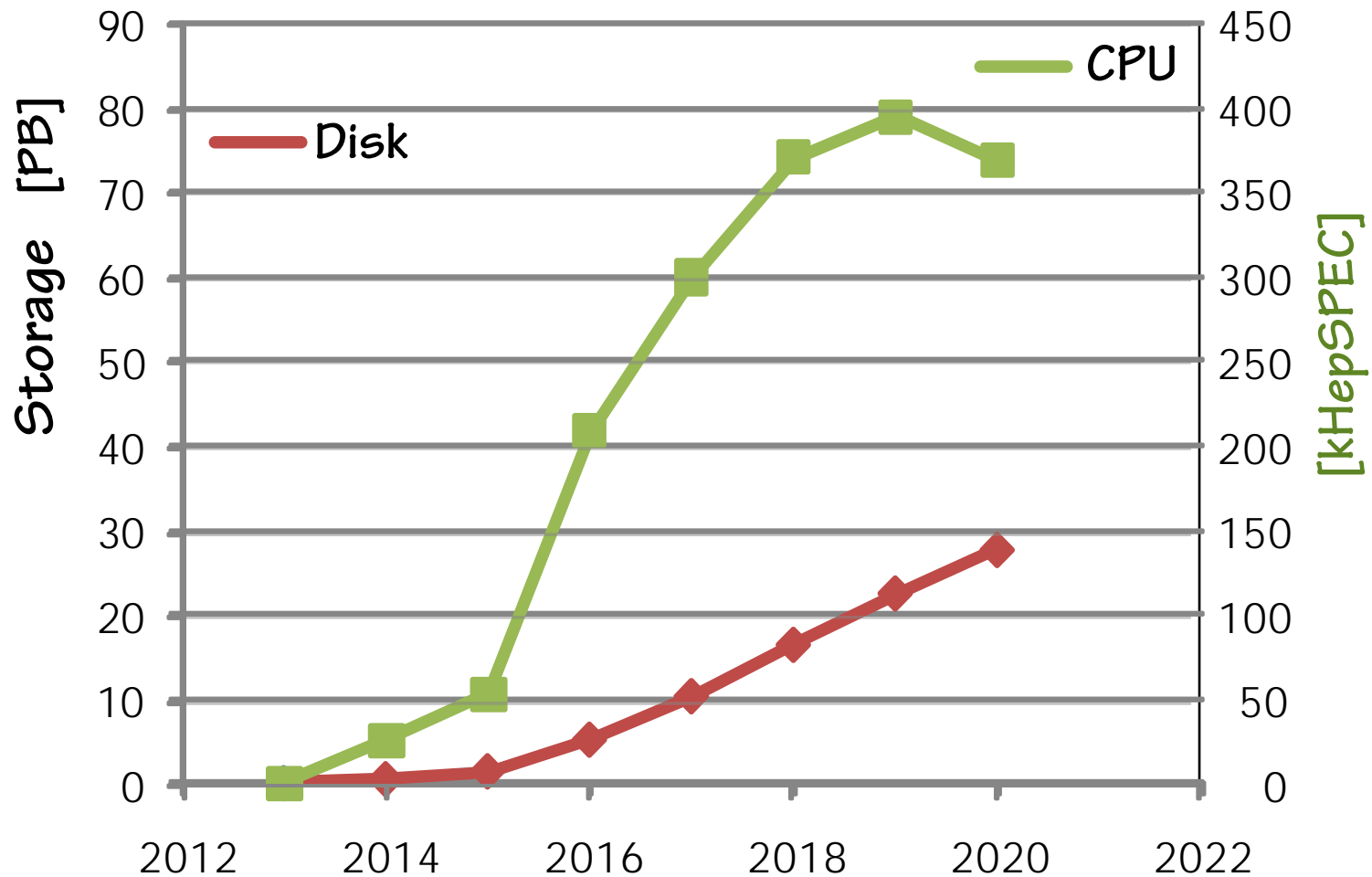
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Resource requirement for Grid site

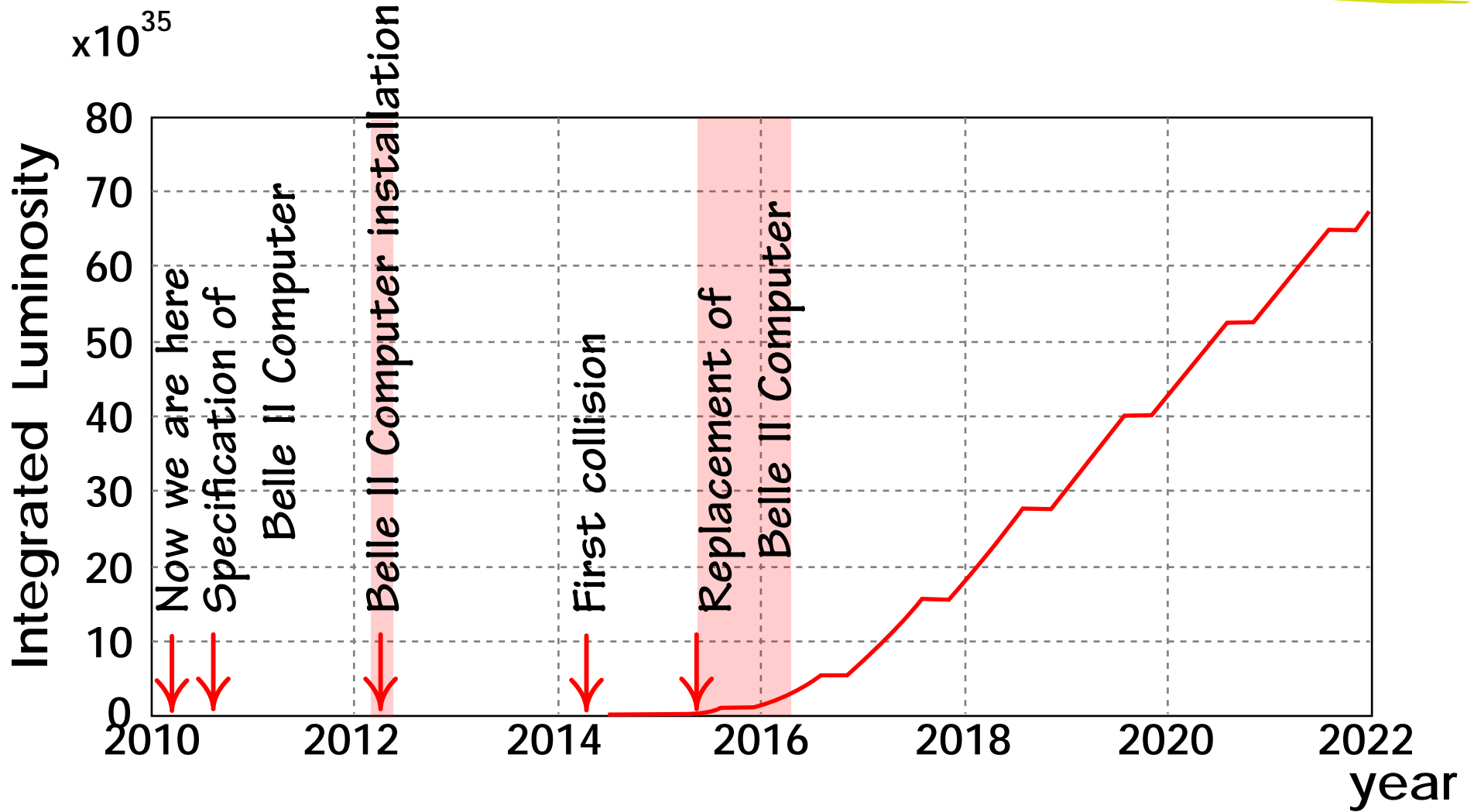
15% of MC is produced (in 5 months)

All mDST and 15% of MC are archived

15% analysis users use this site



Milestone for computing





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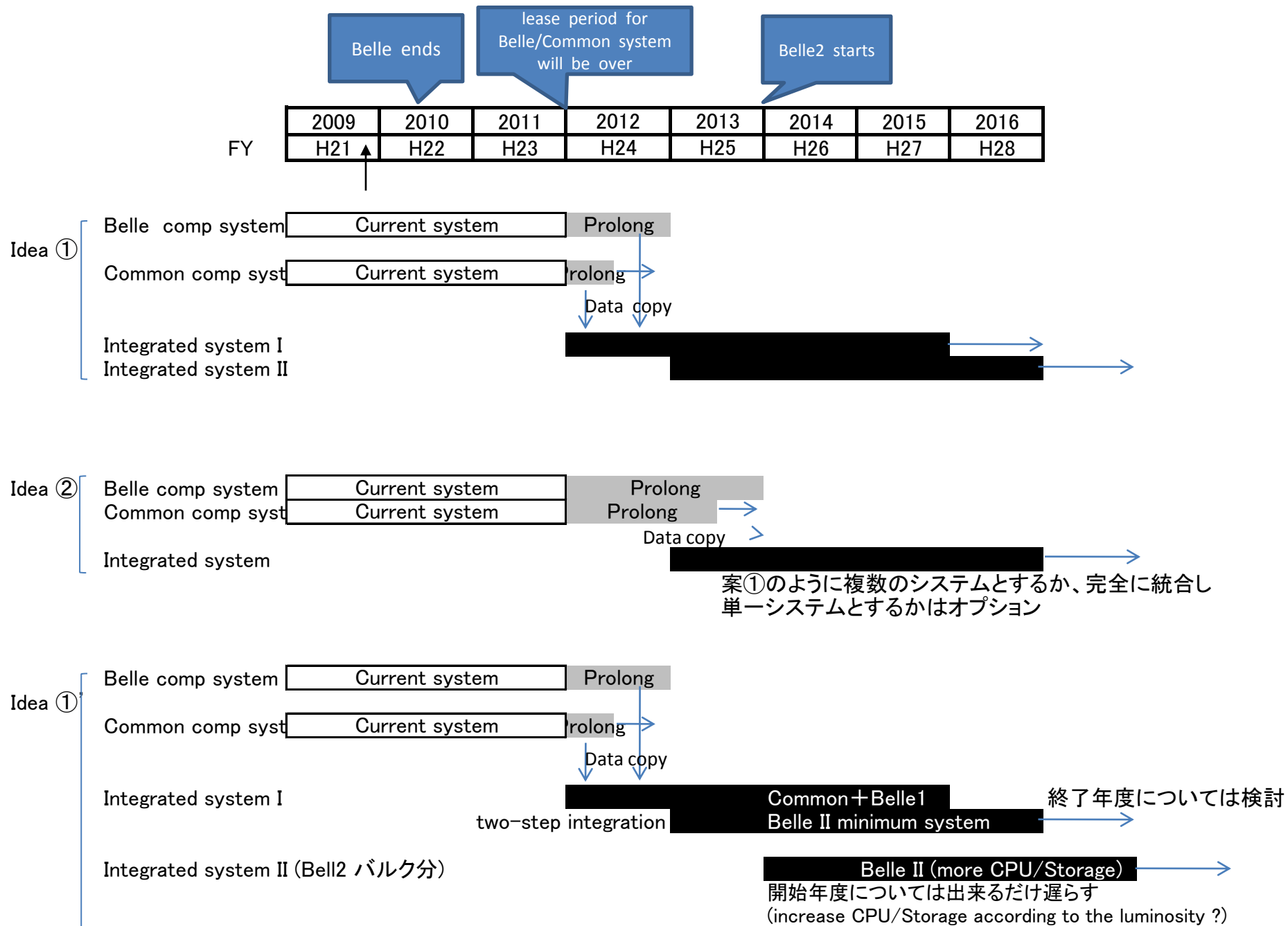
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By when should the new comp system be ready ?

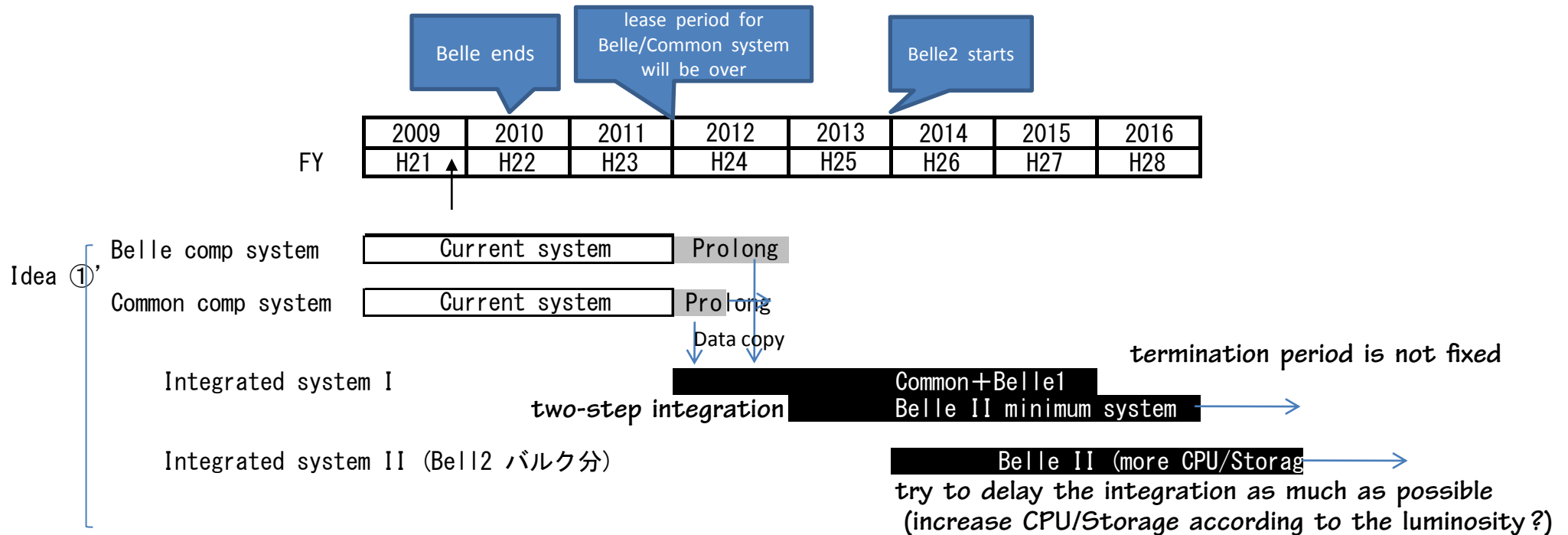
(one-year prior to exp?)

図1

統合案



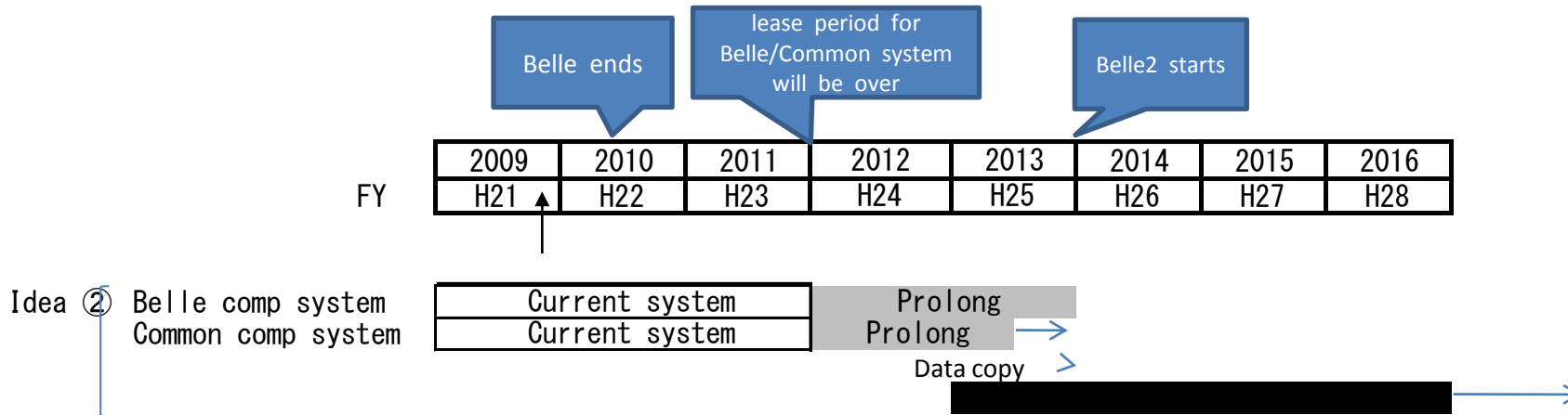
Pros & Cons : idea 1



pros: data transfer is (relatively) easier than idea2

cons: procurement will be done in two steps. We cannot expect a high discount rate. SE cannot be used effectively (?)
Each system may be maintained by different company.

Pros & Cons : idea 2



pros : discount ?

cons : To transfer the Belle I/J-PARC data, three different systems have to coexist at once. For that purpose, we need a new building as soon as possible. We have to prolong the contract for Belle I (two years), but it may not be able to prolong.



Schedule for new system

Is “Idea 1” reasonable ?

By when should the new comp system be ready ?

(one-year prior to exp ?)

In that case, we have to prepare an rough specification soon
(not the final one, but we need to fix the basic concept)

Need to discuss with other experiment groups

Which environemnt do we need for Belle II (OS, compiler, ...)

other groups like to use other OS, compiler, etc.

To realize this, VM is a candidate ??? (but no concrete idea now)

Belle data (3-4PB) has to be copied to new system (takes 10 months)

How to integrate the Belle analysis environment to the new system