



Data Preservation Working Group Report



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on behalf of the Belle DPWG

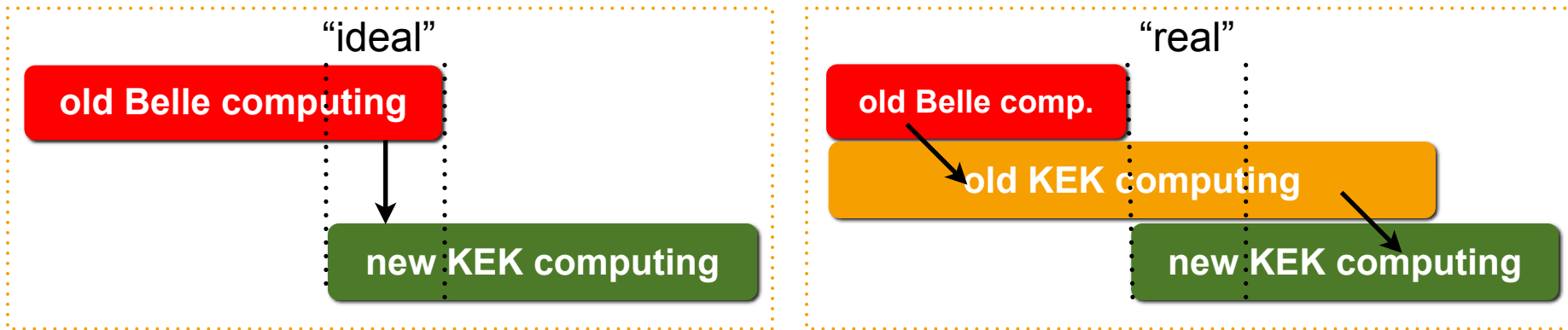
6th DPHEP Workshop
19. - 21. November 2012, Marseille

1. Causes for data loss
2. Extent of data loss
3. Formation of Belle DPWG
4. First decisions reached



> Complicated data transfer procedure

- For the contract of old Belle computers couldn't be extended (lack of budget)
- Belle provided a list of directories → Company "A" converted this to a list of file → Data copy from old Belle to old KEK computing → Company "B" copied data from...



> Further complication due to

- Shortage on person-power
- Tight schedule
 - To tighten it, Belle had to select data to be copied
- Unclear responsibilities
 - Check of files before/after copying
- Requirement to return tape media to company
- Omission of data integrity check right after transfer
 - Copying finished in Jan 2012 ↔ Data loss identified Jul 2012



- > Belle I data: 1.2 PB on Disk → **copied without problems**
3 PB on tape (HSM), with 0.4 PB disk cache

- > Extent of loss: 18% of raw-data was not copied properly
 - KEK had a partial duplex of raw-data in another HSM
→ **12% of raw-data lost**
 - KEK kept intermediate files (so called 'all-mdst')
 - Produced during re-processing
 - Contain reconstructed information
 - 42% of these were also lost, possible to create skim files though
→ **Finally 5% of data used in analyses lost**

- > Impact on Analyses
 - B/ τ : All skimmed data files are available
 - Most skimmed data sets are available at different places e.g. KEK, PNNL, Nagoya
→ No problem for ongoing and future analyses
 - Special energy runs (energy scans)
 - On average 30% of data (ypipi skim) lost for 6 out of 25 energy points
 - Most analyses based on ypipi skim are done and published
→ New analysis on remaining data will be affected (statistical uncertainty not better than ~4%)
 - Re-processing
 - In the case of a necessary reprocessing 12% of the data will be lost
→ "Grand reprocess" was done in 2010, No further re-processing envisaged



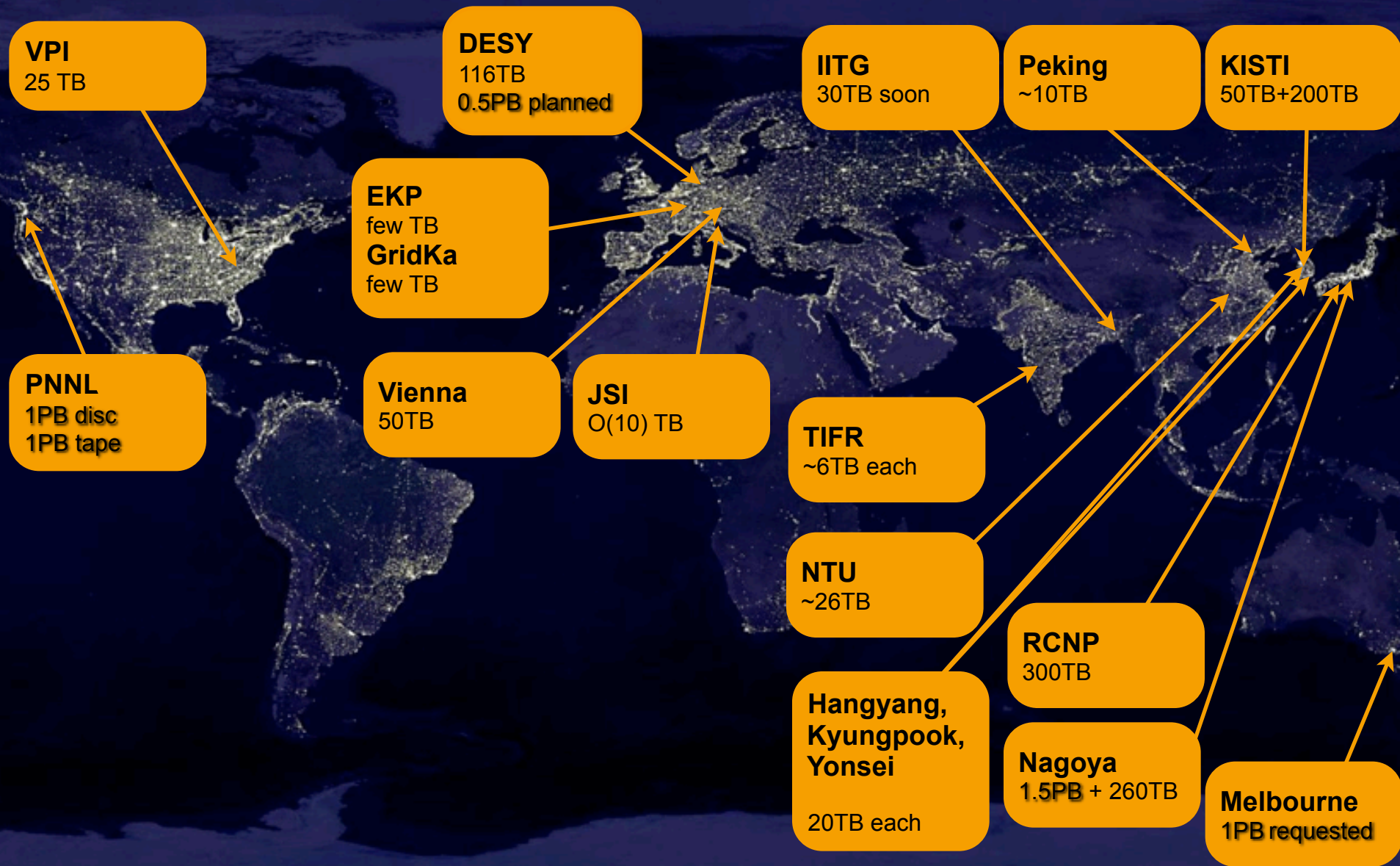
- > Established in consequence of the sizeable data loss
 - Representatives for all regions were asked (and agreed) to contribute
 - Constituent meeting held on Oct, 16th

Asia	Europe
KEK	EKP
S. Nishida(*)	T. Kuhr
T. Hara	DESY
Nagoya	M. Steder
K. Hayasaka	
NCU	
H. Nakazawa	
America	Australia
PNNL	U Melbourne
D. Asner	M. Sevier
Virginia Tech	
L. Piilonen	(*) chair

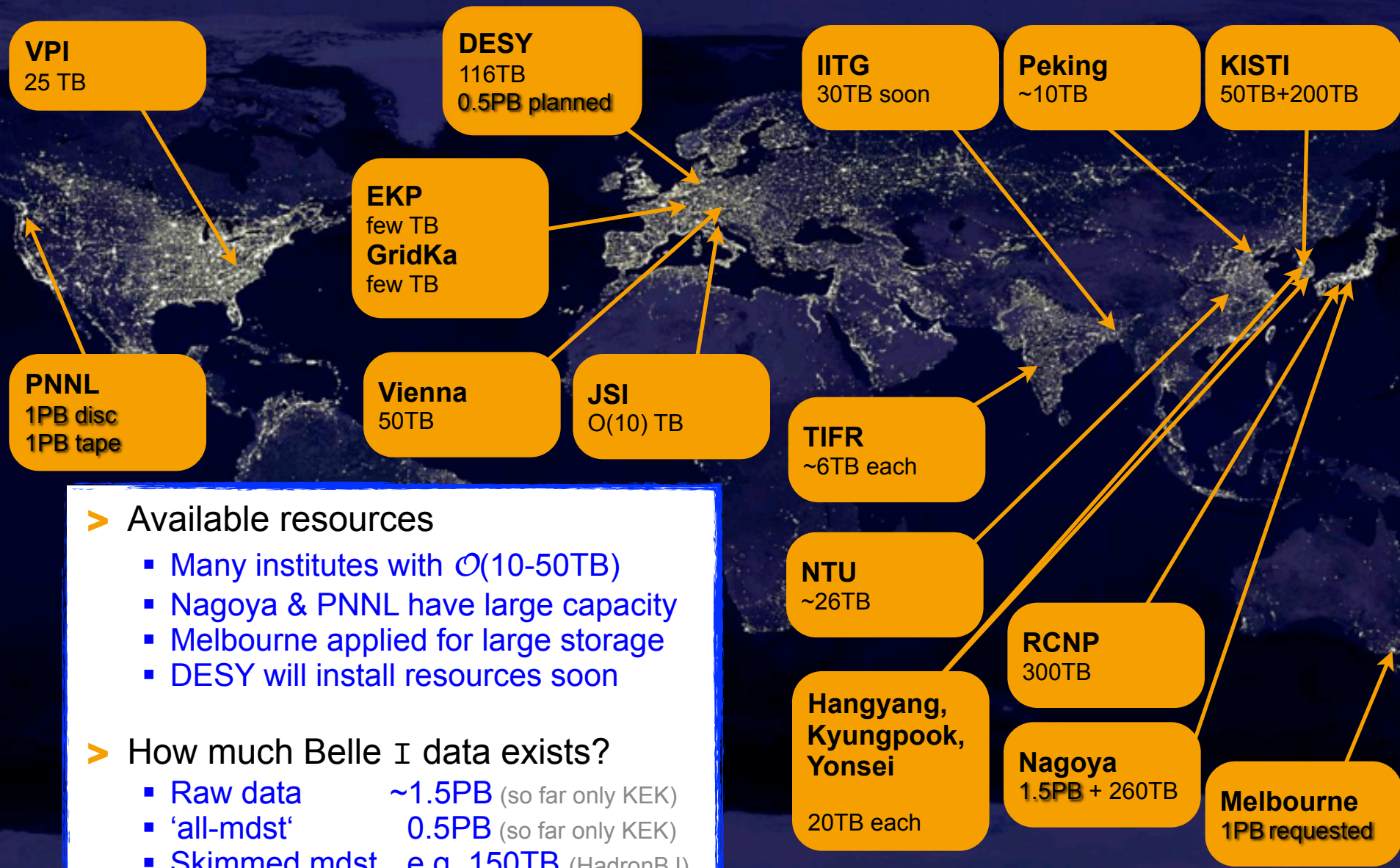
- > Belle EB asks DPWG to discuss following points:
 - What data (and files) should be copied to where?
 - How much resources are needed, how much are available?
 - Consider how to get needed resources and request to management
 - How to copy data? Perform copies.
- > The working group elected S. Nishida to chair the project
 - First task was a survey of available storage resources in the labs and institutes



(non-KEK) Storage resources for Belle I data



This map does not show all institutes being member of the Belle collaboration.



- > Available resources
 - Many institutes with $\mathcal{O}(10-50\text{TB})$
 - Nagoya & PNNL have large capacity
 - Melbourne applied for large storage
 - DESY will install resources soon

- > How much Belle I data exists?
 - Raw data $\sim 1.5\text{PB}$ (so far only KEK)
 - 'all-mdst' 0.5PB (so far only KEK)
 - Skimmed mdst e.g. 150TB (HadronBJ)

This map does not show all institutes being member of the Belle collaboration.

- > Another full re-processing is very unlikely
 - **'all-mdst'-files should form basis for Belle DP project**
 - Contain all information relevant for analysis
 - Can be used to create skim files
 - Available for 330fb^{-1} / approx. 550fb^{-1} should be re-produced from (SVD2) raw data
 - Educated guess: Takes $\mathcal{O}(0.5\text{a})$ for $\mathcal{O}(0.3\text{FTE})$
 - Person-power requested during Belle Collaboration Meeting (Nov 2012)

- > Belle DPWG advocates **duplication of all-mdst files** (outside of KEK)
 - DESY offered to host second copy of all Belle I 'all-mdst'-files
 - 116TB disk added to DESY Grid SE now
 - In total $\mathcal{O}(0.5\text{PB})$ will be required
 - Data will be accessible for analyses (NAF 2.0)
 - Lively discussion started between DESY-IT and KEKCC to optimise performance

- > **Keep all-mdst well beyond start of Belle II** (at least special energy runs)
 - Usage of grid catalog (e.g. lfc) preferred to static web pages
 - Monitor Belle II developments, try to adopt and provide feedback

- > Alongside: Prepare Data Preservation Strategy for Belle II