WG5 (CFS) Summary

LCWS13, 15 November 2013

A. ENOMOTO (KEK)
J.A. Osborne (CERN)
V. Kuchler (FNAL)

WG5 Charges

The primary activity for the CFS group is to adapt the generic Mountain Topography (MT) design described in the TDR to the newly-selected Kitakami site in the Tohoku District of northern Japan.

While many general aspects of the chosen site were already included in the TDR, the CFS team made sure to use the average between the two sites that were involved in the selection process in order to have the correct balance. The group should examine the design and correct parameters and cost estimation information as site-specific details are now available. Since engineering resources will be required for this task, the CFS group should attempt to evaluate the needed effort and prioritize the work, if practical.

Specifically, the CFS group should:

Identify aspects of the TDR generic MT design that represent either a compromise or a direct 'average' of the two Japanese sites, or directly adapted from Americas or European region design work.

For each aspect that is not consistent with the Kita-Kami site layout the group should assess and prioritize the design effort needed to correct the TDR.

The group should plan the work and prepare a short report that indicates how it might be accomplished and reviewed.

As a follow-on task to the Arup (UK) study of the experimental hall, the group should commission Arup (Japan) to perform an equivalent analysis to the Kita-Kami site experimental hall. (CERN is expected to provide some resources in support of this work.)

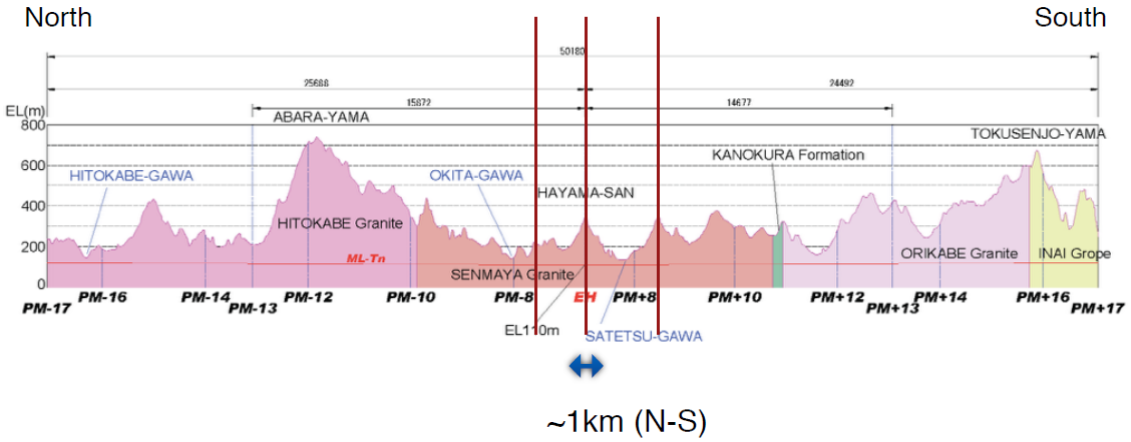
The group should also review and report on the TDR documentation status, generally, and make a special effort to update EDMS with information collected throughout the site evaluation process.

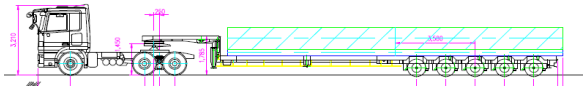
WG5 Talks

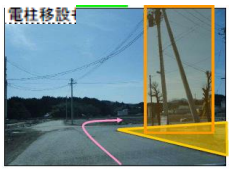
Tues	0900-1030	Site	T. Sanuki(Tohoku U.), M. Miyahara(KEK)
	1100-1230	Civil	A. Enomoto(KEK)
	1400-1530	Mech/Elec	A. Enomoto(KEK)
	1600-1730	Joint e+	
Wed	0900-1030	DH JPOWER/ARUP	Y. Nishimoto(JPOWER)
	1100-1230	Joint CFS/MDI	T. Sanuki(Tohoku U.), M. Oriunno (SLAC),
	1400-1530	Effort/Resources	A. Enomoto
Thur	0900-1030	EDMS	L. Hagge
	1100-1230	Summary	
	1400-1530	ECO/Green	J. Fujimoto, D. Perret-Gallix
	1600-1730	ECO/Green	T. Saeki

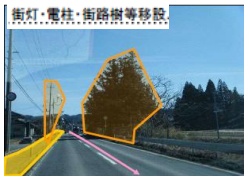
WG5 Talks

Site T. Sanuki(Tohoku U.), M. Miyahara(KEK)





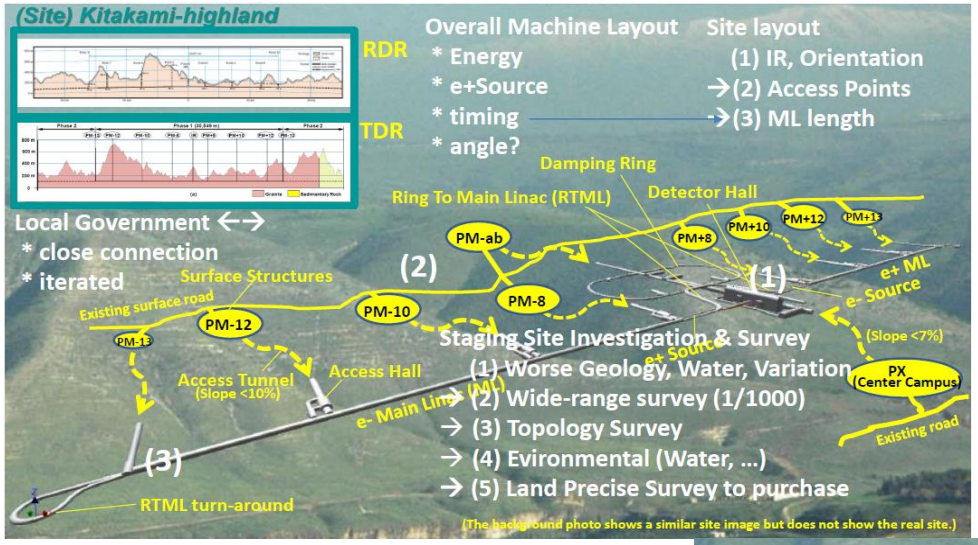


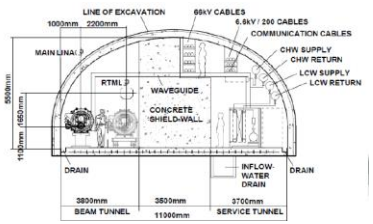


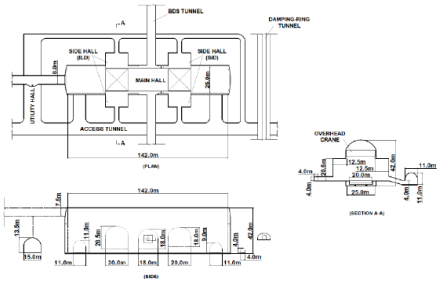
Site aspect and geology information were reported.
IR position and ML orientations are almost fixed without small adjustments.
Appropriate surface access yards were already studied for each access points including IR.

WG5 Talks

Conventional Facility (Civil, Electrical, and Mechanical) A. Enomoto(KEK)

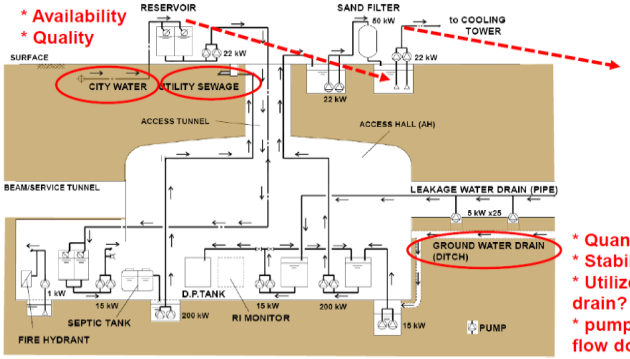


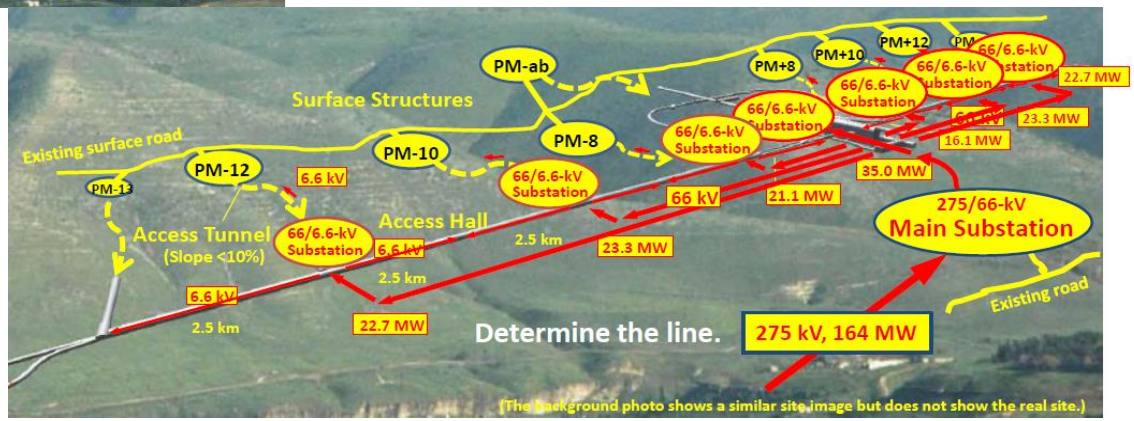




DKS Power Load in MW (TDR baseline - Low Power)

Area System	RF Power	Racks	NC magnets	Cryo	Conventional		Total
					Normal	Emerg	
e- sources	1.28	0.09	0.73	0.80	1.47	0.50	4.87
e+ sources	1.39	0.09	4.94	0.59	1.83	0.48	9.32
DR	8.67		2.97	1.45	1.93	0.70	15.72
RTML	4.76	0.32	1.26	part of ML cryo	1.19	0.87	8.40
Main Linac	52.13	4.66	0.91	32.00	12.10	4.30	106.10
BDS			10.43	0.41	1.34	0.20	12.38
Dumps					0.00	1.21	1.21
IR			1.16	2.65	0.90	0.96	5.67
TOTALS	68.2	5.2	22.4	37.9	20.8	9.2	164



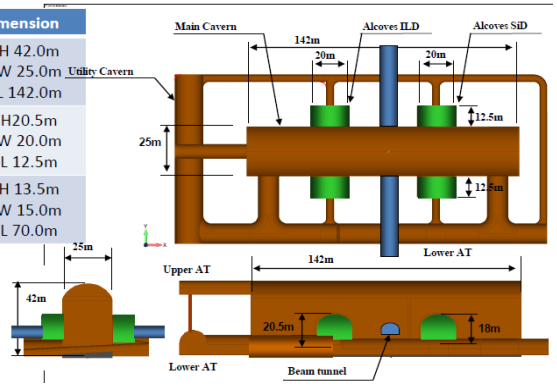


WG5 Talks

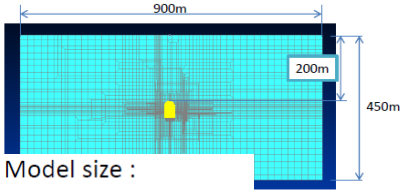
DH JPOWER/ARUP Y. Nishimoto(JPOWER), Experimental Hall 3D deformation analysis

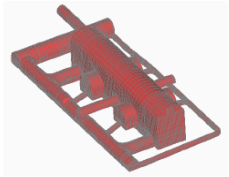
Design of Experimental Hall of Asian site

Cavern	Dimension
Main hall	H 42.0m W 25.0m L 142.0m
Alcoves	H20.5m W 20.0m L 12.5m
UT cavern	H 13.5m W 15.0m L 70.0m



- Analysis method :
  - 3D Elastic FEM analysis considering excavation step
  - Deformation modulus at fractured elements reduced to one-100th by every excavation step considering plasticity.





Model size :

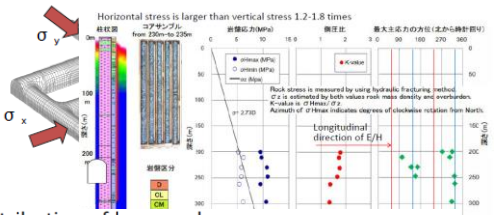
- H450m x W900 x L900m
- Overburden : 200m

	High class	Middle class	Lower class
Density	26.5 kN/m³	26.5 kN/m³	26.5 kN/m³
Deformation modulus	10.0 GPa	5.0 GPa	2.5 GPa
Poisons ration	0.3	0.3	0.3
Shear strength	4.0+σtan60° MPa	2.5+σtan55° MPa	1.2+σtan45° MPa

Ground stress

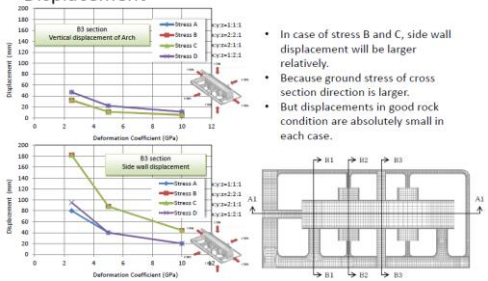
	Case	σ_x Beam line	σ_y E/H axis	σ_z Vertical
Isotropic	Stress-A	1	1	1
Anisotropic	Stress-B	2	2	1
	Stress-C	2	1	1
	Stress-D	1	2	1

Ground stress test at investigation borehole near E/H site



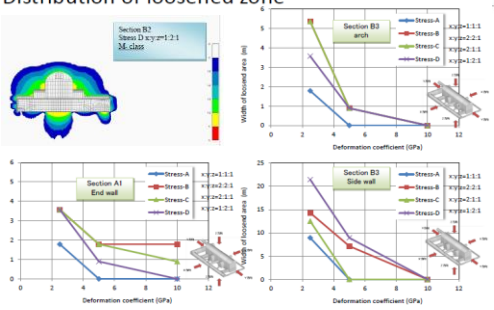
Study 1 : Excavation analysis

Displacement



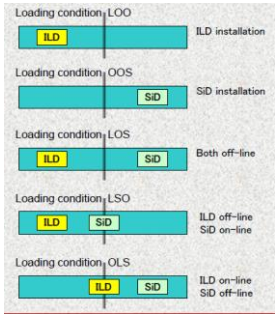
- In case of stress B and C, side wall displacement will be larger relatively.
- Because ground stress of cross section direction is larger.
- But displacements in good rock condition are absolutely small in each case.

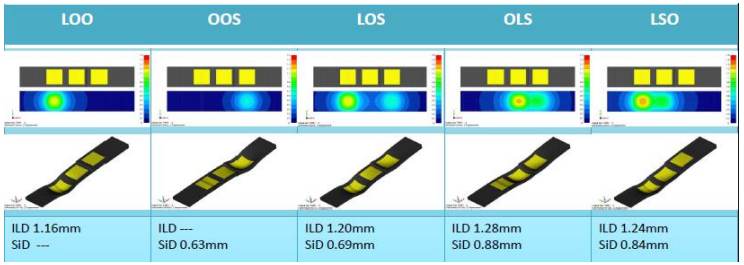
Distribution of loosened zone



Study 2 : Bedrock displacement installing Detector

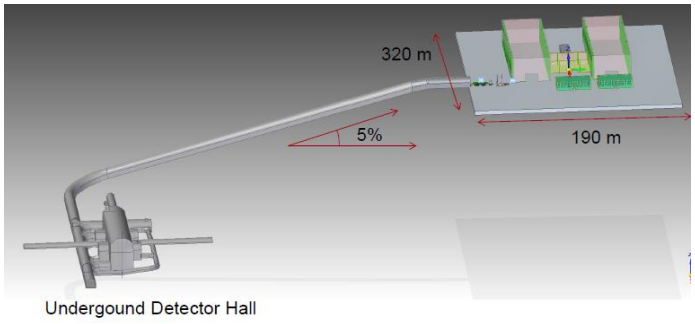
Total weight of excavated rock mass : 350,000 tons at least
Detectors weight : 25,000 tons

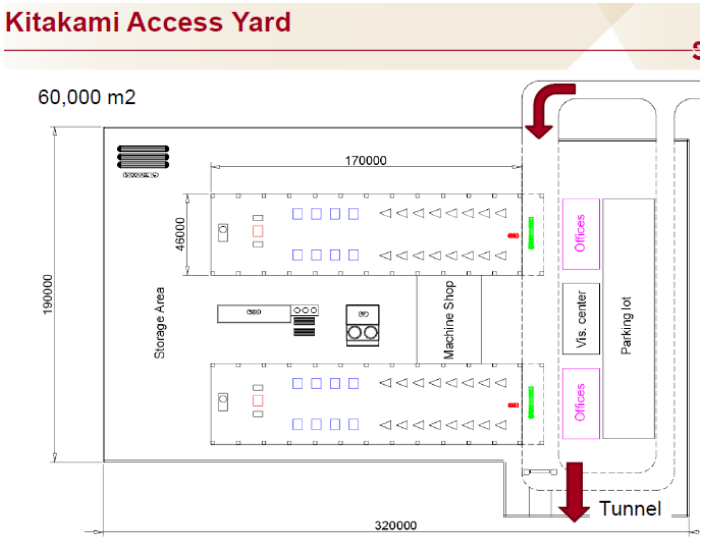


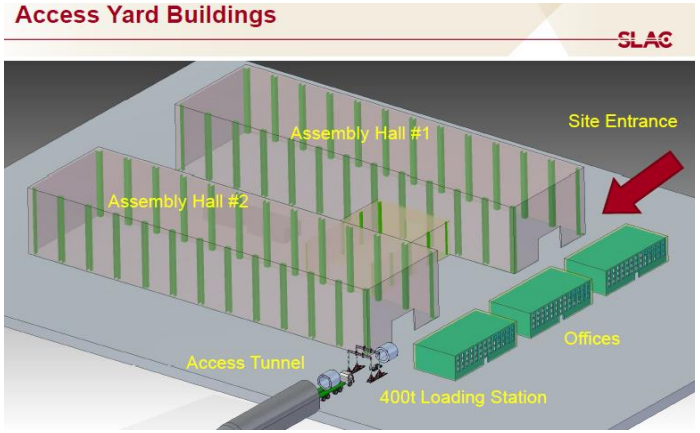


WG5 Talks

M. Oriunno (SLAC),

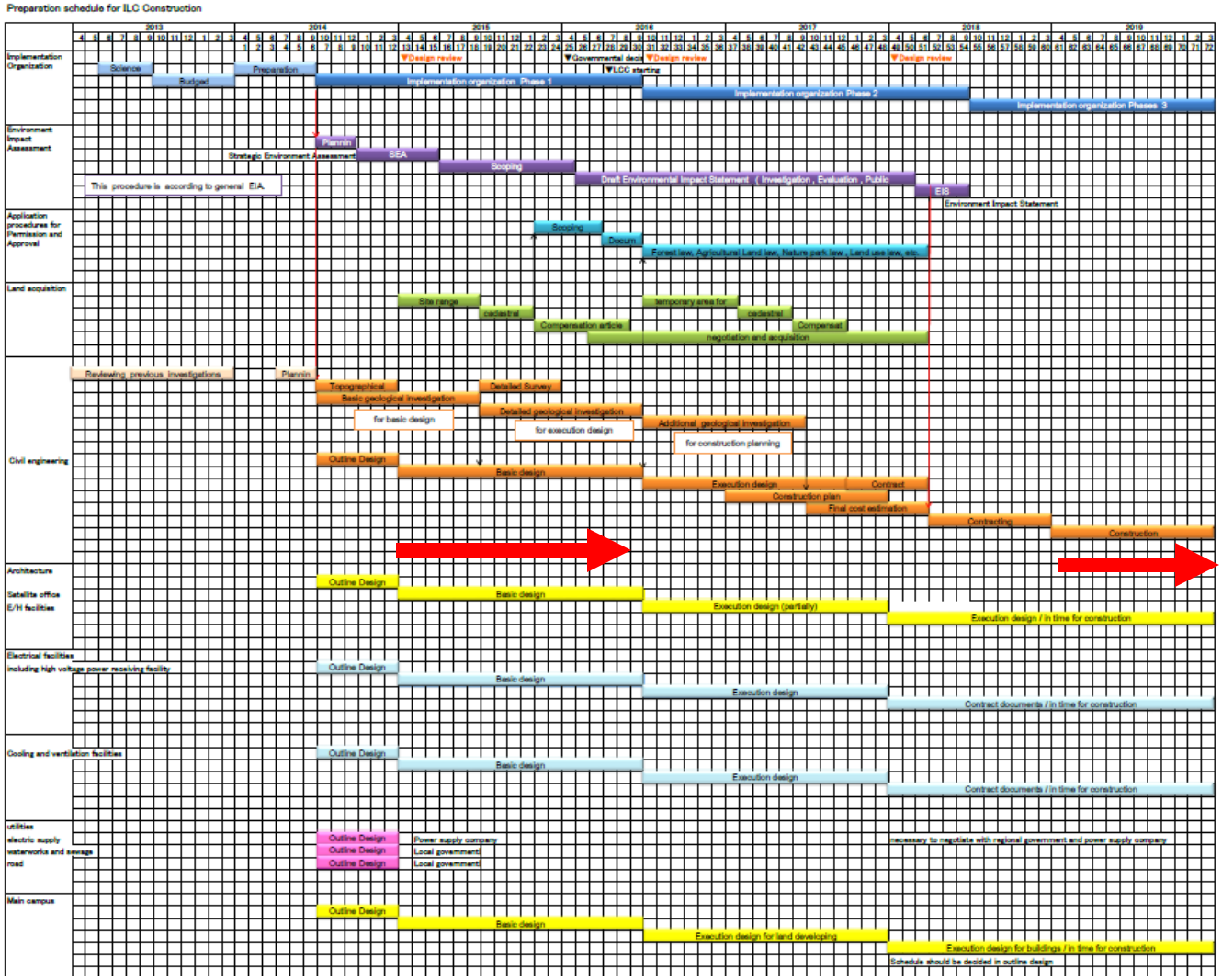






WG5 Talk

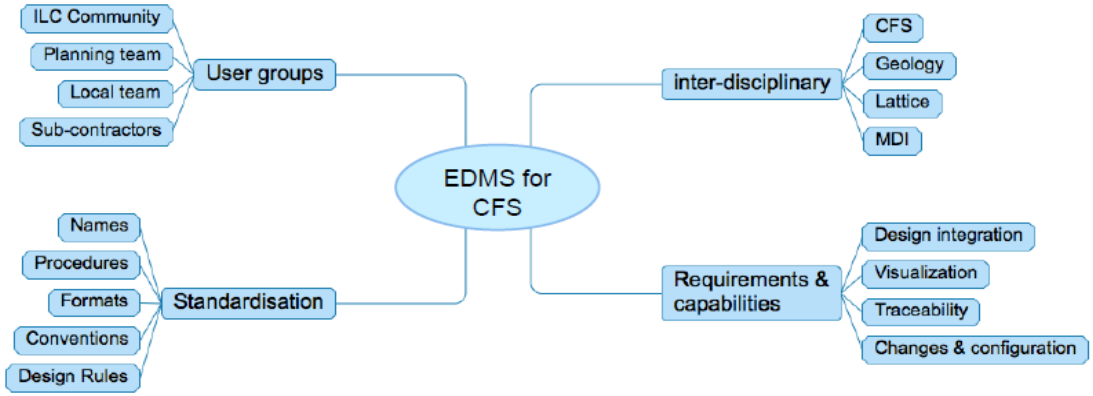
Effort/Resources



WG5 Talks

EDMS L. Hagge

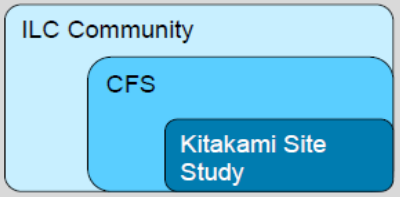
EDMS for CFS planning



Lars Hagge, Benno List | EDMS for CFS | 14.11.2013 | Page 2

DESY

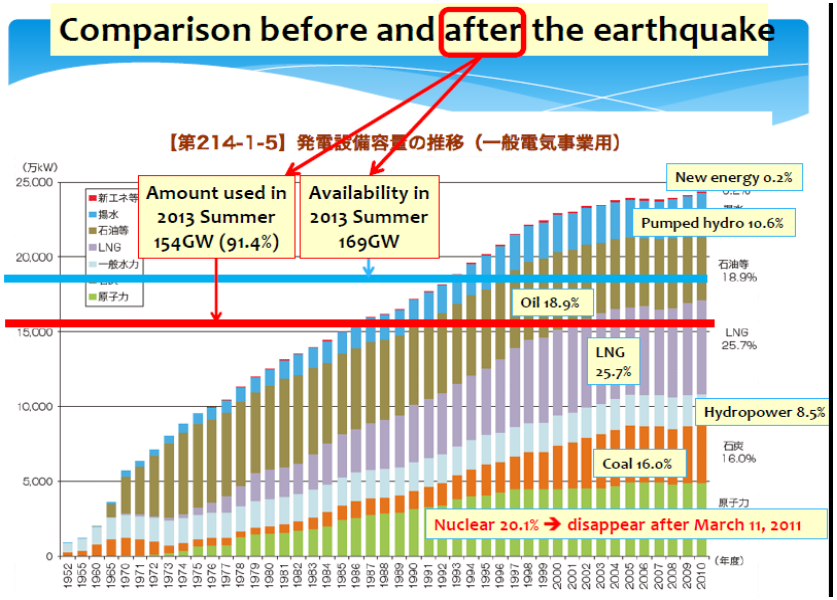
Access control in EDMS

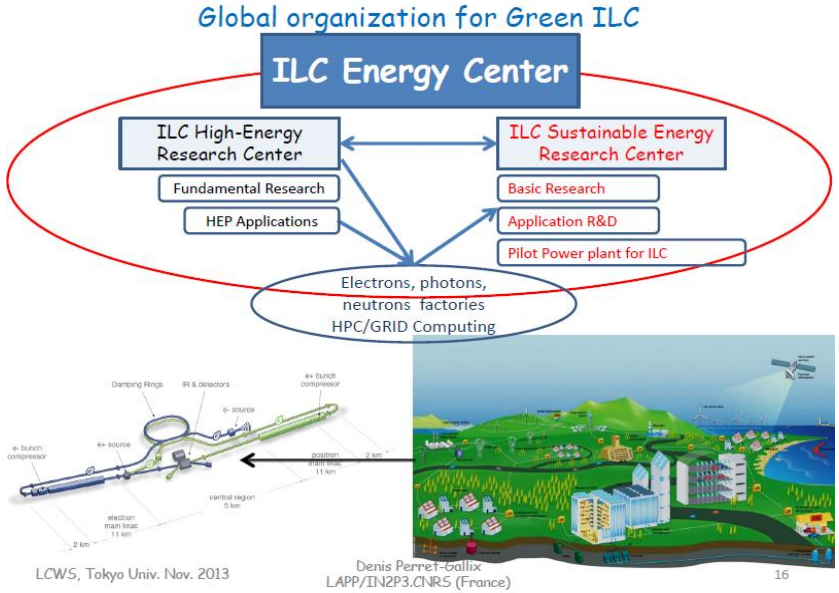


- EDMS offers several mechanisms of access control for protecting confidential information
- One example: Hierarchy of "storage areas": Make documents visible only within one area, or also in the next level(s), …
- May change level of access at later times

WG5 Talks

ECO/Green J. Fujimoto, D. Perret-Gallix, T. Saeki





Conclusions

(1) The latest Kitakami geologic investigation and site information was reported to the CFS group and discussed. The most important conclusion is that the site satisfies the TDR conventional facility designs without any fundamental issues or impact to technical aspects of the ILC TDR machine design.

(2) Even though there are still open questions which still need resolution, such as collision timing and positron source configuration, these issues do not affect the underground construction or surface facility layout.

(3) In a joint session with the MDI/Detector Working group, a request was made for CFS to study the possibility of vertical shafts for the detector hall in the Kitakami IR region. This option is not consistent with the TDR design in the Asian region and will be addressed by reviewing impacts on construction risk and cost.

(4) The detector hall geotechnical analysis was reported by an engineer from JPOWER. Substantial progress has been made on the IR study, which has demonstrated that the Kitami site has excellent geology. This result is to be reviewed by ARUP consultants for consistency with the previously completed European IR Hall analysis.

Conclusions (continued)

(5) A database system to collect all information for geological and site investigation is essential that a preferred site has been identified and design efforts continue. The ILC EDMS system supported by DESY is to be developed further for this purpose. This effort will begin soon at the next CFS meeting on 26 November.

(6) A “Pre-Construction” schedule was discussed, assuming the construction of the facility, based on the TDR baseline design, of a 500-GeV ILC. This Pre-Construction schedule reflects a five year period prior to the start of construction. Once the effort is set in motion, a substantial amount of effort and resources will be required to satisfy all elements included in the scope of the schedule. One important aspect of this schedule will require the freezing of the final ILC criteria aproximately18months after the start of the effort.