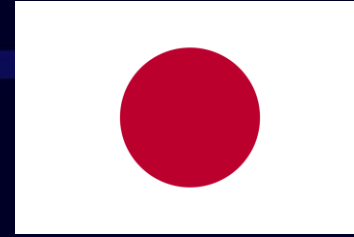


Paris Session
2022



A Study For Digital Twins for Substation Control Circuits

SC B3

PS3 / Q.2

Shibata kazuhiko, Japan



Kansai Transmission and Distribution

Question and our contribution

Question PS3.2

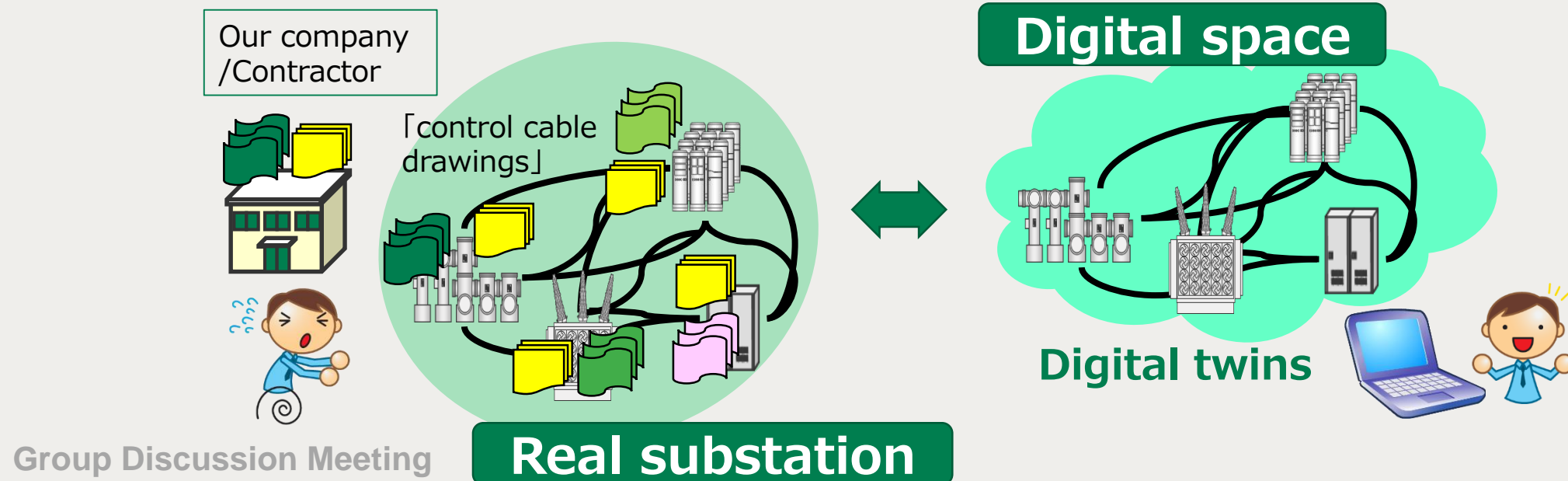
- What examples and return of experience can be provided on **digital substations and digital twins?** Which **emerging digital technologies** will improve substations for the grid of the future?

Answer

- ✓ ***The Examples and return of experience regarding digital twins***
 - We developed on digital twins used to work on connecting/disconnecting control cables.
- ✓ ***The emerging digital technologies***
 - Digital twins of control circuit.

Utilizing the digital twins in substations

- ✓ Digital twins are aggregates information on objects that exist in the real substation, and reproduces and manages them in digital space.
- ✓ As a situation management for control circuits in substations, the prototype tool was created to link the real substation with the digital space and its practicality was verified. We created a prototype tool for digital twinning, which links the real substation with the digital space, and verified its practicality.

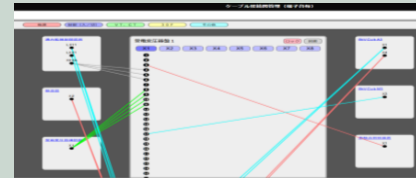
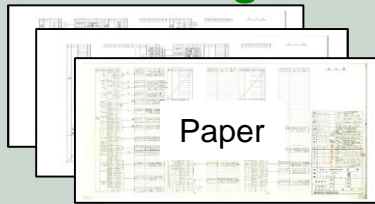


Concept of improving work efficiency through system utilization

Changes due to systemization

Impact on Operations

Before starting construction

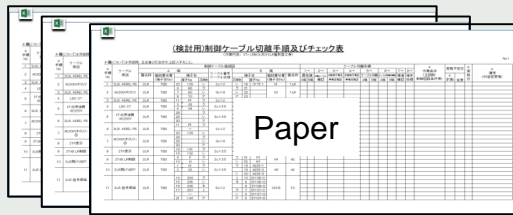


Digital twins of control cables

Cable connection status is recorded on paper called "control cable connection table".

- Many tables can be checked on a PC
- Quick confirmation of connection points
- Prevention of HE(human error) due to misreading

Under construction



Semi-automated creation

NO.	種別	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	
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2	ケーブル	ケーブル	1012	ケーブル	1013	ケーブル	1014	ケーブル	1015	ケーブル	1016	ケーブル	1017	ケーブル	1018	ケーブル	1019	ケーブル	1020	ケーブル	1021	ケーブル	1022



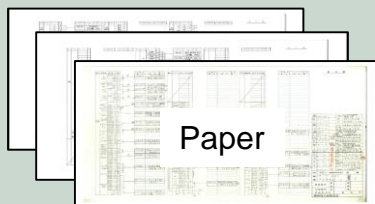
work by using tablet

NO.	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名	種別ID	種別名
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2	ケーブル	1006	ケーブル	1007	ケーブル	1008	ケーブル	1009	ケーブル	1010	ケーブル
3	ケーブル	1011	ケーブル	1012	ケーブル	1013	ケーブル	1014	ケーブル	1015	ケーブル
4	ケーブル	1016	ケーブル	1017	ケーブル	1018	ケーブル	1019	ケーブル	1020	ケーブル
5	ケーブル	1021	ケーブル	1022	ケーブル	1023	ケーブル	1024	ケーブル	1025	ケーブル

Create a cable connection/disconnection checklist using the control cable connection table, and work by using it.

- Reduction of time required to prepare forms
- Prevention of HE due to copying errors
- Paperless(No need to print drawings)

After completing construction



Automatic update

Update to the latest connection status.

- No work to update drawings
- Prevention of HE due to omission of correction

Conclusion

- In control cable connection work in electrical construction, checking disconnection and connection points and revising connection tables have become a burden for contractors and utilities.
- In order to carry out improving level of work with a limited number of personnel, it is necessary to improve work efficiency using DX technology.
- We developed a prototype tool for a "control cable connection table" to link the real substation and the digital space as a status management tool for control circuits in substations and verified its practicality.

Thank you