

Linking shielding calculation and BIM for accelerator facility design

Koichi Okuno, Koji Shirabe
Hazama-Ando Corporation

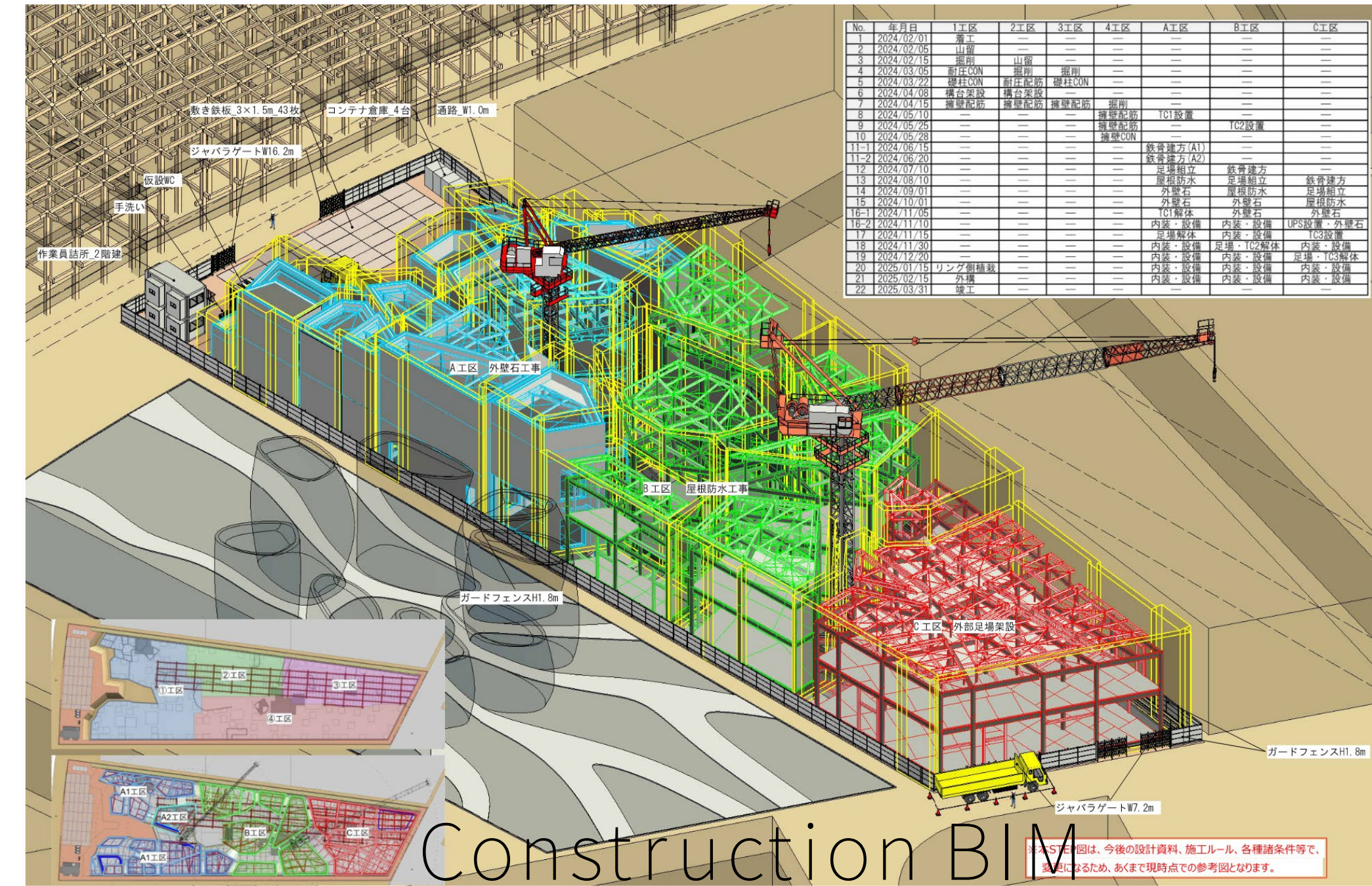
email: okuno.koichi@ad-hzm.co.jp

Introduction

Shielding specialists and architectural designers often work independently on accelerator facility design. Close communication during design is essential to create practical, user-friendly facilities, particularly medical accelerator facilities. Therefore, Developing tools that link shielding calculation results with BIM to improve communication between these teams during building design and construction.

BIM (Building Information Modeling)

Building Information Modeling (BIM) combines a 3D building model with information such as building materials etc. BIM is currently in standard use. It helps teams work more efficiently during facility design and construction.

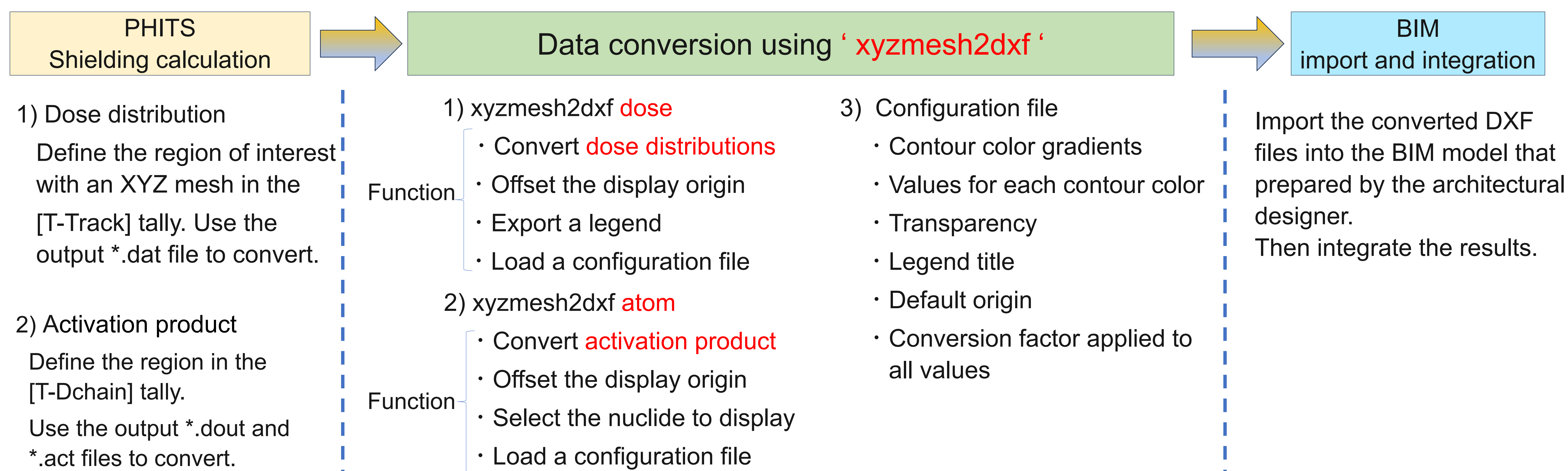


PHITS to BIM Conversion Program

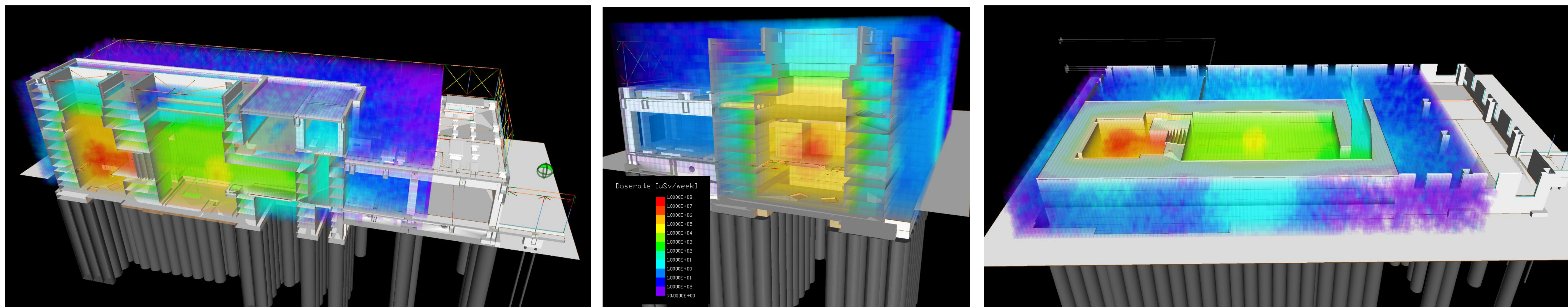
Data conversion program were developed to display PHITS and DCHAIN code calculation results in BIM, with Autodesk Revit as the target software. Autodesk Revit is often used in BIM.

Because Revit's native file format specifications were not public and XYZ mesh output of PHITS is 2D, therefore, chose to convert it to the DXF format. The convert program 'xyzmesh2dxf' were developed with Python 3.8, which is well suited to data conversion.

Workflow



BIM display example : 3D dose distribution in a proton therapy facility



Conclusions and Future Plans

Developed a program that displays PHITS and DCHAIN code calculation results in BIM. Integrating these results enables 3D visualization of radiation dose and activation within a facility.

This helps shielding specialists and architects communicate more easily and supports more efficient facility design, including room layout and planning.

● Issues requiring improvement

- 1) XYZ-mesh output of [T-Track] output is 2D, therefore 3D visualization requires multiple XYZ meshes.
This takes a lot of steps.
- 2) xyzmesh2dxf program currently runs only command line. A GUI is a future development goal.

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