

Geometric Digital Twin Assessment Tool

User Guide

What Is It?

The Geometric Digital Twin (GDT) Assessment Tool is an interactive web app for comparing two versions of a GDT:

- Model G(0): The original/baseline model
- Model G(t): The updated/current model

It helps you evaluate model quality, compare updates, and download reports.

App Overview: Three Main Tabs

1. Model G(0) – Input baseline model details
2. Model G(t) – Input updated model info
3. Assessment Results – Compare and review

Tab 1: Model G(0)

Step 1: GDT Characteristics

- GDT Scale: Select the scale (e.g., Building Part, Building, Site, Urban).
- GDT Scale Value: (Optional) Enter a specific value for the scale.
- Building Life Cycle Stage: Choose the stage (e.g., Pre-construction, Use, End of Life).
- AGR of Model: Enter the Average Ground Resolution (mm/px).

Step 2: Sample for Evaluation

- Sample Type: Choose between Feature-based or Scale-based evaluation.
- Feature-based: Enter the total number of features/items.
- Scale-based: (Optional) Enter the sample scale.

Step 3: Parameters for Updating

- Number of Previous Updates: Enter how many times the model has been updated.
- Update Schedule: Select Planned or Event-driven.
- Survey Type: Choose Image-based or Range-based.
- Data Acquisition Sequence: Select Parallel, Sequential, or Mixed.

Step 4: LoD Verification

- The tool suggests a Level of Detail (LoD) based on your AGR input.
- Verified LoD: Select the verified LoD if applicable.
- Feature's RMSE: (Optional) Enter the Root Mean Square Error for specific features.

Step 4.1: Ground Sample Distance (GSD) Calculation.

- Enter: Sensor size (mm), Focal length (mm), Flight height (m), Image width (px).
- The tool calculates GSD and model resolution.

Step 5: Data Quality Elements

- Depending on your sample type, select relevant Data Quality (DQ) measures from a checklist.
- For each selected measure, provide the required value (number, yes/no, or text).

Download & Save

- Download Model Data: Download your input as a CSV file.
- Save & Continue: Save your progress and move to the Model G(t) tab

Tab 2: Model G(t)

- Enter updated values for the new model version.
- Select and fill in DQ measures (only those chosen in Model G(0) are available).
- Download Model Data: Download Model G(t) data as CSV.
- Save & View Results: Save your progress and move to the Assessment Results tab.

Tab 3: Assessment Results

- GDT Scale & Life Cycle Stage: Review the selected values for both models.
- Sample for Evaluation: Review sample type and details.
- LoD Verification Summary: Compare AGR, suggested LoD, resolution, and RMSE for both models.
- Measures Summary: Compare all selected DQ measures between models.
- Decision Model: Input geometric deviation statistics for model alignment.
- Model Accuracy Assessment: The tool calculates and compares accuracy metrics (D_{acc} vs δ_D).
- Model Resolution Validation: Compares LoD and resolution between models.
- Performance Comparison: Shows the percentage of DQ parameters where Model G(t) outperforms Model G(0).
- Visual Score: A color-coded summary indicating the suitability of Model G(t) for updating.
- Download Results: Download the full assessment as CSV or JSON.

Tips and Troubleshooting

- Session State: The app uses session state to remember your inputs as you navigate between tabs.
- Download Buttons: Use the download buttons to save your work at each stage.
- Required Fields: Some calculations require all relevant fields to be filled. If a result is “Not calculated,” check for missing or zero values.
- Data Quality Elements: Only measures selected in Model G(0) are available for Model G(t) to ensure a fair comparison.
- App not displaying? Try refreshing your browser.

Contact

For help or to report issues, contact the tool's developer (iryna.osadcha@ktu.lt)