

A Checklist for Building Reproducible NAMs-ready 3D Models

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Predictive biology depends on models that perform consistently, scale reliably, and generate data that can support confident decisions. A model may be biologically compelling, but it becomes decision-ready only when its identity, quality, process controls, analysis, and documentation are fit for purpose.

For each category, identify the controls, quality attributes, and records most relevant to your model and intended application. Checking multiple considerations across each area helps reduce avoidable variation, strengthen traceability, and create a more reproducible and scalable workflow.

1. Biological Foundation

Define model identity before you optimize anything else.

- ☐ Document **cell type, source, and donor information**
- ☐ Ensure **passage number** is tracked and within limits
- ☐ Confirm **differentiation status** before use
- ☐ Select **matrix type** based on context of use, not convenience

2. Consistency by Design

Control the variables that shape model behavior before treatment begins.

- ☐ Determine **culture platform and matrix** based on your biological question, not convenience, such as:
 - ☐ Scaffold-free
 - ☐ Hydrogel
 - ☐ Membrane
 - ☐ Suspension
- ☐ Set **critical quality attributes** and their thresholds before dosing, such as:
 - ☐ Spheroid or organoid size
 - ☐ Morphology
 - ☐ Viability
 - ☐ Marker expression
- ☐ Establish **pre-assay exclusion rules** by screening out models that fail quality checks before advancing downstream assays

3. Process Control

Standardize the workflow from setup to endpoint so variation reflects biology, not technique.

- ☐ Standardize **seeding density** and document it
- ☐ Confirm **cell viability** at setup
- ☐ Follow a written protocol for your **feeding schedule**
- ☐ Time the **treatment window** relative to model maturity
- ☐ Define and enforce **passage limits**

4. Throughput and Analysis

Ensure data pipelines can keep pace with model production.

- ☐ Lock **image settings** or **segmentation parameters**
- ☐ Ensure the **analysis pipeline** handles 3D spatial data at pace with model formation
- ☐ Match **readouts to the decision stage**, not the most complex endpoint

5. Reporting Data

Make the results understandable, traceable, and defensible beyond the original experiment.

- ☐ Capture **metadata** and essential experimental details for every run
- ☐ Record **reagent lots** to document lot-to-lot differences
- ☐ Make sure **plate maps** track treatment groups, controls, and replicates
- ☐ Log **quality control checkpoints** before the final readout
- ☐ Document **deviations with rationales** that may affect interpretation



Read our full white paper: **Overcoming the Operational Barriers to NAMs-ready Research with 3D Models.**



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