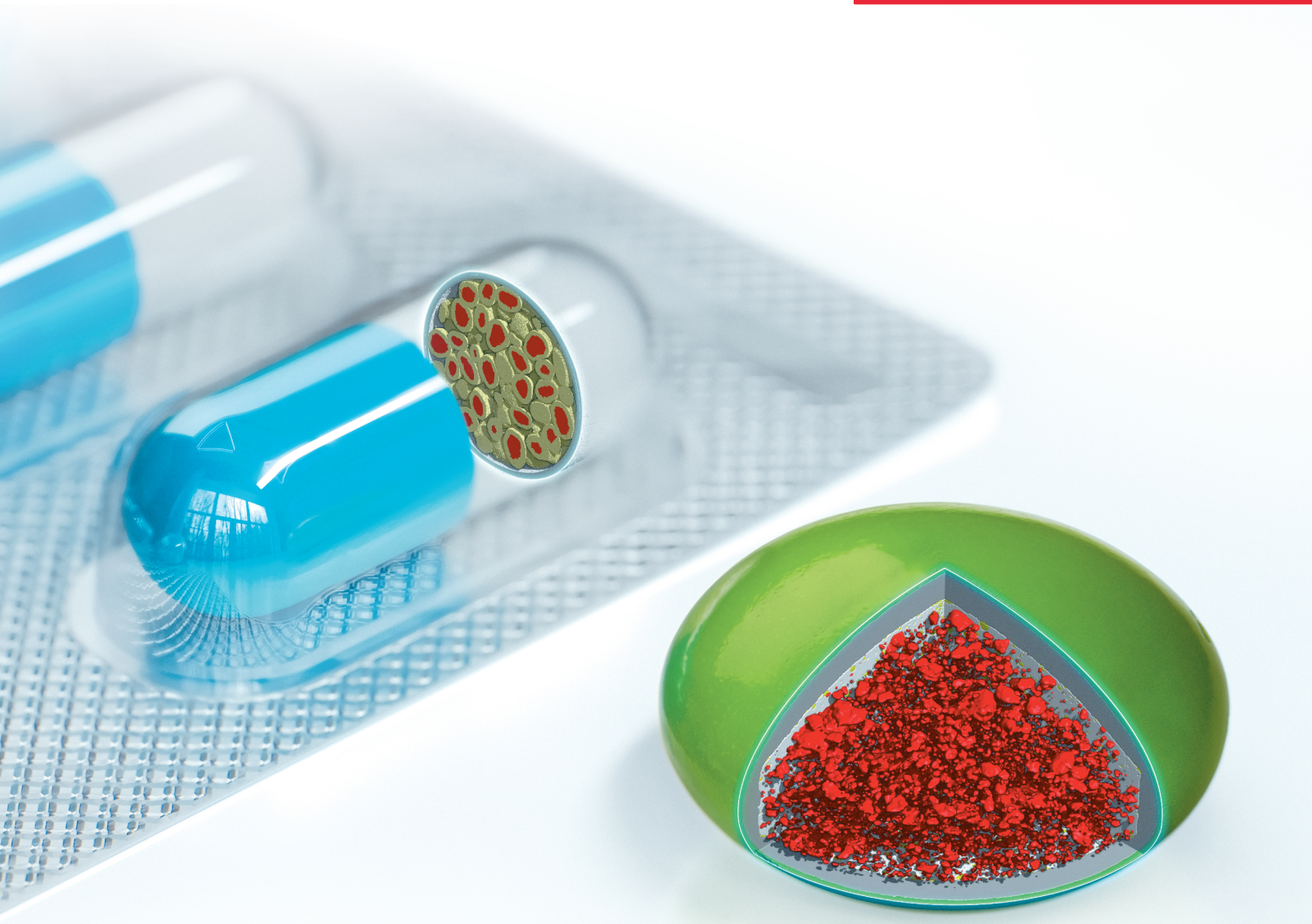
GeoDict

The Digital Material Laboratory

Digital Solutions for Pharmaceutical Formulation



The Motivation

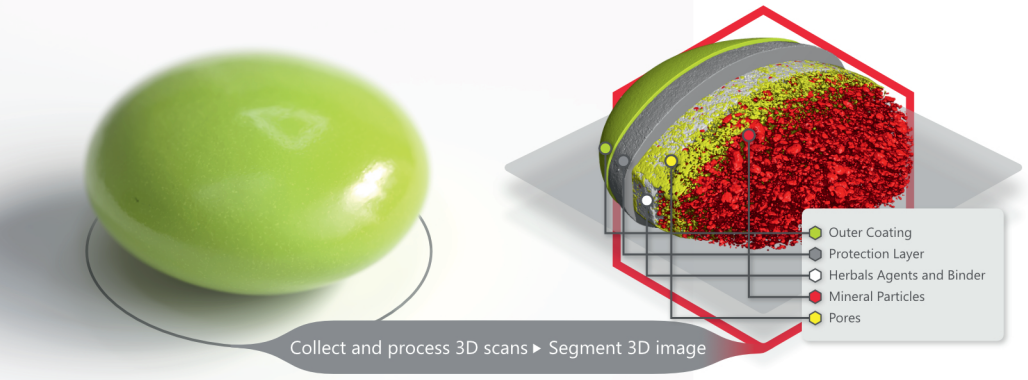
- Trial-and error in formulation is **costly, slow, and hard to scale**.
- Lack of microstructure-property insights limits robust design.
- Digital tools and workflows are needed for **faster, transparent, and reproducible development**.

Our Solution

- **GeoDict software:** platform for digital material development.
- Combines **image-based modeling, digital twins, and multiphysics simulations**.
- Supports scientist and engineers in **all stages of solid dosage and delivery design**.

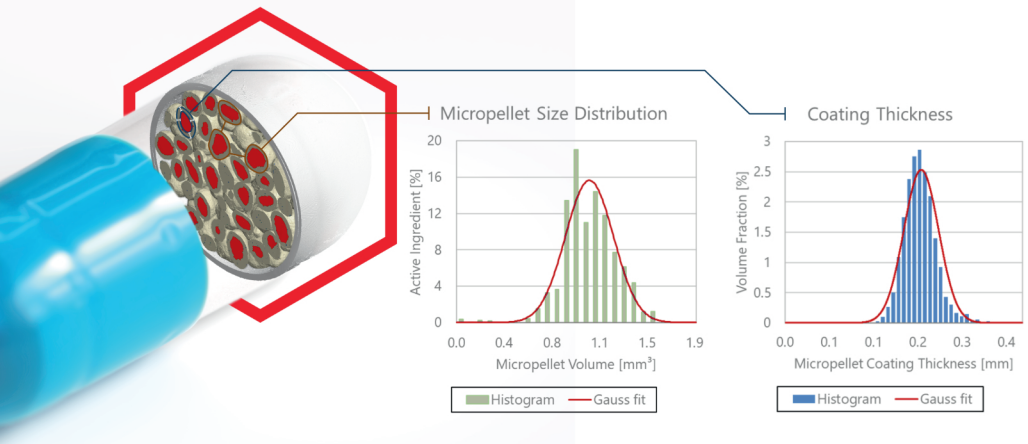
Your Benefit

- Accelerate **formulation development** with predictive simulations.
- Improve robustness and ensure **consistent product quality**.
- Enable **QbD**, **scale-up, and regulatory submissions** by digitally identifying safe operating ranges for formulations and manufacturing.



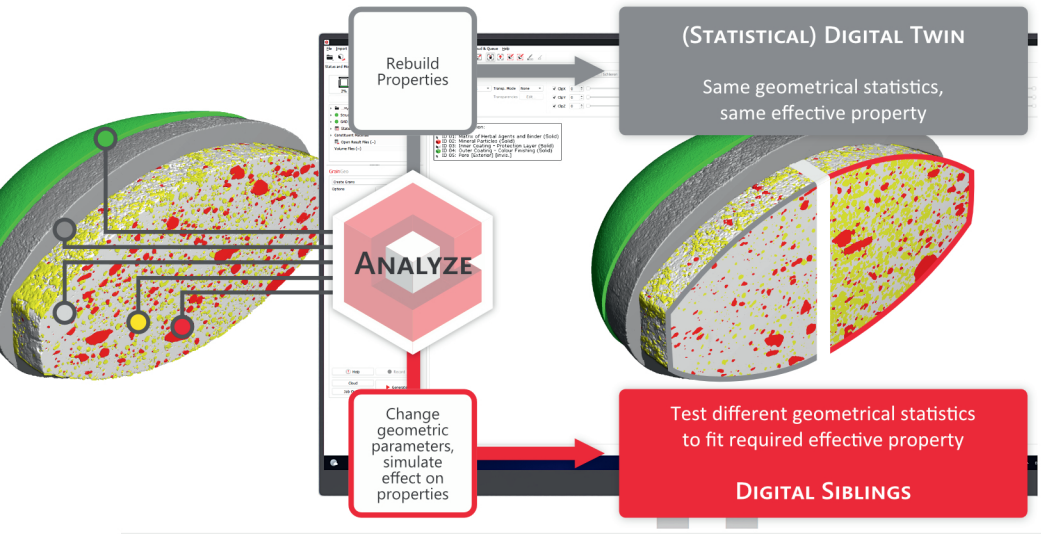
Digitalization

- Segment and convert µCT scans into **3D digital structures** of powders, tablets, pellets, capsules... with image filters and AI tools
- These digital structures are the basis for **analysis and multiphysics simulations**.



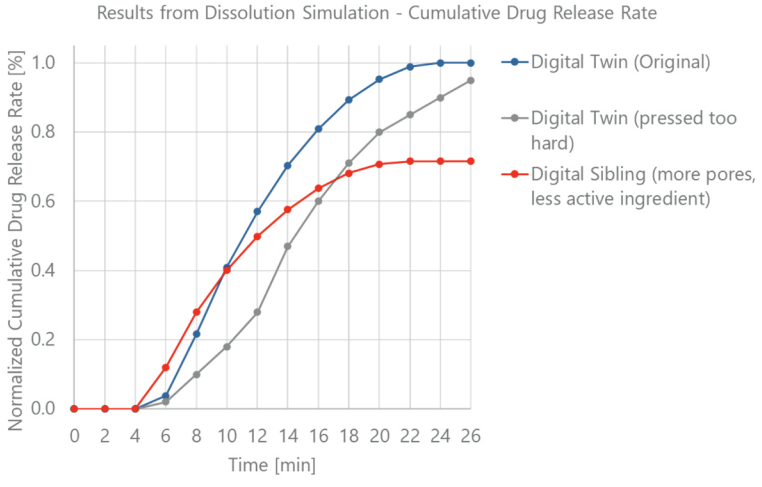
Non-destructive analysis & Quality Control

- Extract **grain & pore size distribution, packing density, porosity, tortuosity**, and **coating thickness** directly from 3D scans.
- Perform **digital testing of stability and dissolution** without destroying samples.
- Enable **simulation-based analytics** for reliable quality control.



Digital Twins & Digital Siblings

- Build **digital twins** of powders, granules, tables, capsules, and more in full 3D detail from parameters extracted from digital analysis.
- Generate **digital siblings** by systematically varying particle morphology, excipient ratios, compaction force, or coatings uniformity.
- Conduct **sensitivity analysis** and **virtual scale-up** prior to manufacturing.



Property Prediction

- Run **multiphysics simulations** to predict packing, compaction, mechanical robustness, friability, permeability, release, and dissolution kinetics.
- Directly link microstructure to critical quality attributes.
- Support QbD strategies, regulatory submissions, and high reproducible, **accelerated formulation development** with physic-based predictions.

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