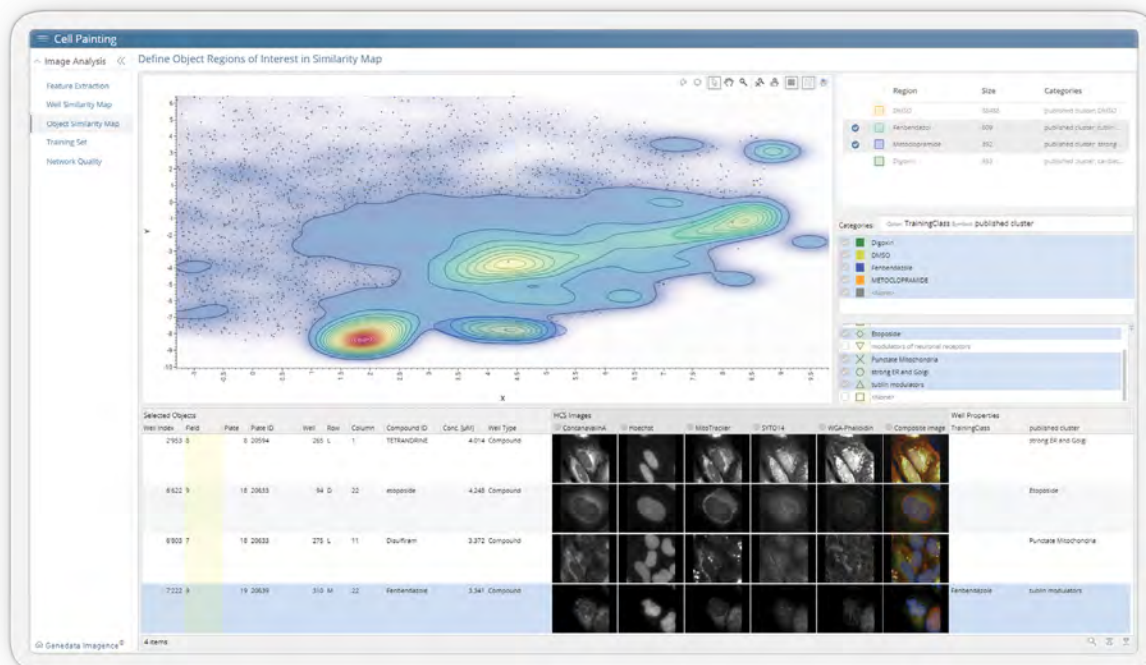


High Content Image Analysis. Reinvented.



Developed in partnership with leading pharmaceutical companies, Genedata Imagence® is an advanced deep learning-based software solution for the automation of image analysis that is revolutionizing High Content Screening (HCS). Now, every biologist can easily take control and analyze HCS outcomes, enabling the broad application and scale-up of HCS. This award-winning solution uses deep learning to automate feature extraction and phenotype classification, drastically reducing image analysis time while delivering high-quality, reproducible results.

Fully Automated Workflow

Streamlining and automating the workflow are key challenges in HCS image analysis. The many steps and professional

competencies required render it a cumbersome process (Fig. 1A). With Genedata Imagence and its integration with Genedata Screener®, it is now possible to fully automate HCS image analysis. The result: project cycle times are significantly shortened and a single biologist is empowered to run the workflow from end-to-end, bypassing complicated analysis set-ups and many manual steps (Fig. 1B).

New Insights

Genedata Imagence enables scientists to train a deep neural network (DNN) to recognize and classify phenotypes. The trained classifier is then applied to classify large image sets from compound library screens automatically. So far, DNN-based classifiers could not handle quality issues and unexpected phenotypes that might arise only during production screens. However, Imagence provides an estimation of the classification uncertainty that enhances QC and facilitates novel phenotype detection.

CLASSIC HCS WORKFLOW

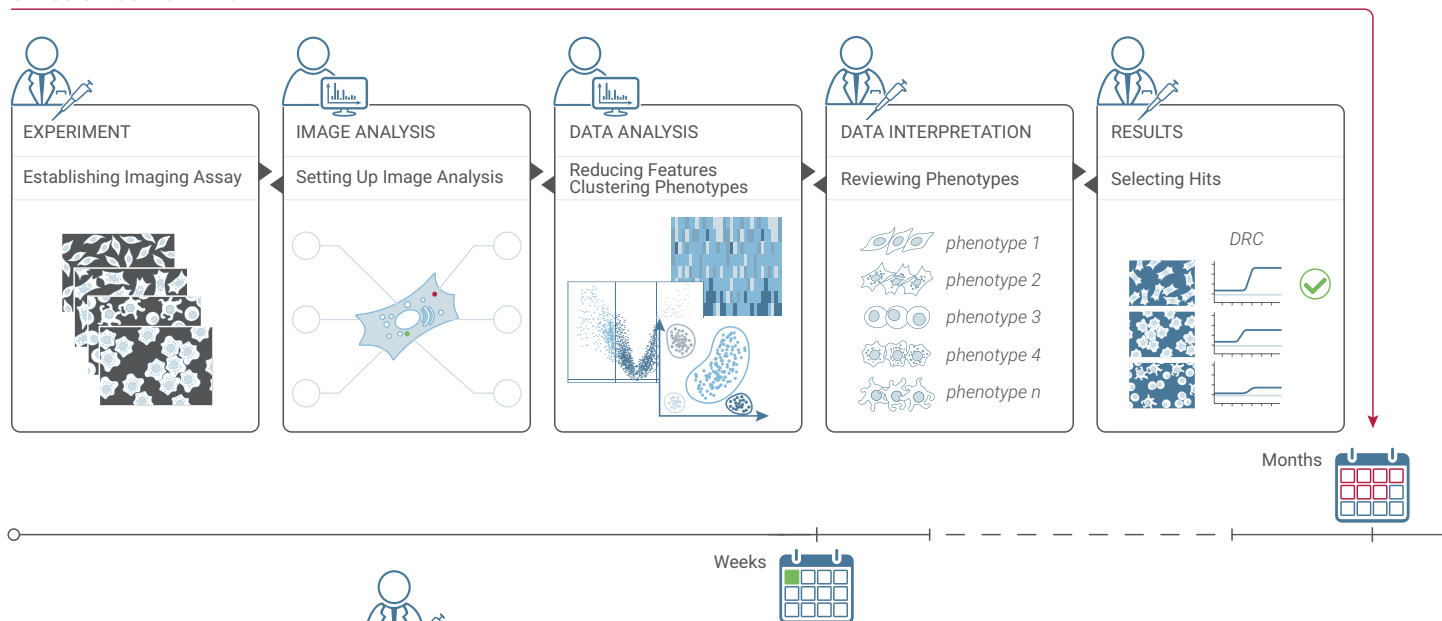


Figure 1. Classical vs. Deep Learning-Based Workflow

A. The classical HCS workflow includes many steps, several professional competencies, and continuous iterations, resulting in an HCS campaign that can take up to several months.

B. Genedata Imagence for HCS image analysis shortens the time required from experiment to results while simplifying the entire process. The workflow from assay set-up to screening can be shortened to just weeks as Imagence removes conventional interdependency of assay- and image analysis development, enabling rapid robing of experimental conditions. Moreover, Genedata Imagence allows scientists to fully automate the analysis workflow, from routine assays to high-throughput screening campaigns. As soon as images are acquired, the trained CNN network is automatically applied, data is analyzed, and results are reported.

DEEP LEARNING-BASED HCS WORKFLOW

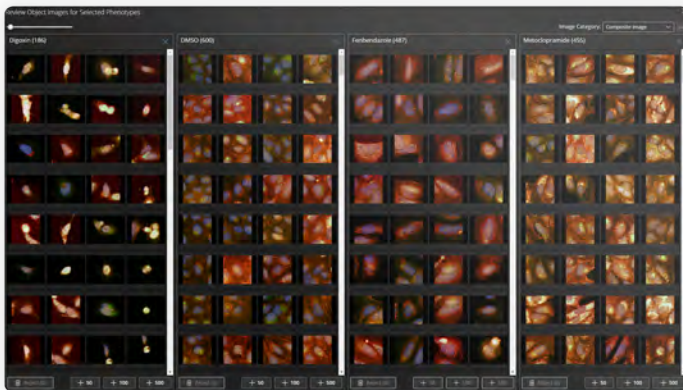
Scalability

Genedata Imgence supports on-premise compute clusters managed by job schedulers such as Slurm. Likewise, the software can operate with leading cloud computing service providers such as Amazon Web Services (AWS), or in a hybrid deployment architecture. The flexibility allows organizations to cost-efficiently scale-out the compute, even from multiple geographic locations and users. This infrastructure model never reaches its limits as it expands easily and contracts when the workload decreases. The system is constantly adapting

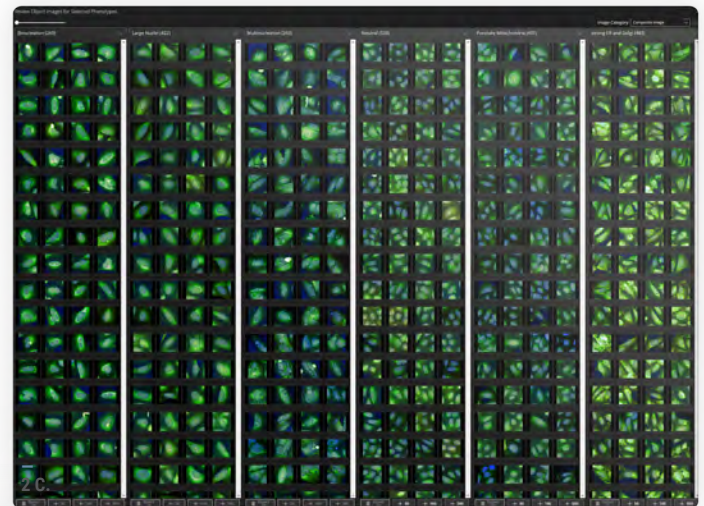
to the needs of the whole organization while ensuring high performance and parallelization for fast computations.

Interactive Data Exploration

Images are accessible at all stages of the workflow for rapid QC and data exploration to support interpretation of results (Fig. 2B). Scientists can compare images, adjust the training sets in a few clicks, and apply the trained network to any new set of images without special expertise in machine learning. The seamless integration of Genedata Imgence with Genedata Screener



2 B.



2 A.

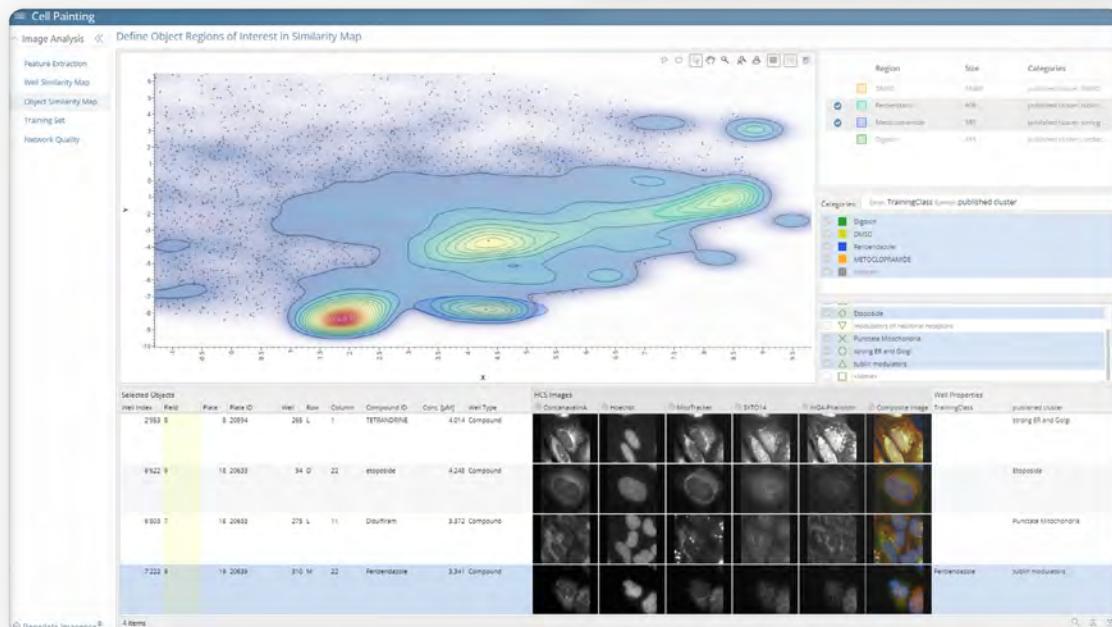


Figure 2. Classical vs. Deep Learning-Based Workflow **A.** The classical HCS workflow includes many steps, several professional competencies, and continuous iterations, resulting in an HCS campaign that can take up to several months. **B.** Genedata Imgence for HCS image analysis shortens the time required from experiment to results while simplifying the entire process. The workflow from assay set-up to screening can be shortened to just weeks as Imgence removes conventional interdependency of assay- and image analysis development, enabling rapid robing of experimental conditions. Moreover, Genedata Imgence allows scientists to fully automate the analysis workflow, from routine assays to high-throughput screening campaigns. As soon as images are acquired, the trained CNN network is automatically applied, data is analyzed, and results are reported.

allows the immediate assessment of the result quality using pharmacological metrics quantifying reproducibility, potency, or efficacy, facilitating the optimization of experiments and analysis. Additionally, the results of the classification performed by the neural network for each analyzed cell can be visualized in Genedata Screener (Fig. 2C). This unique functionality, together with the built-in classification confidence metric, not only enables scientist to assess the quality of the classification but it can also lead to detection of novel phenotypes.

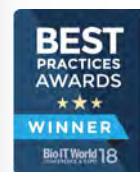
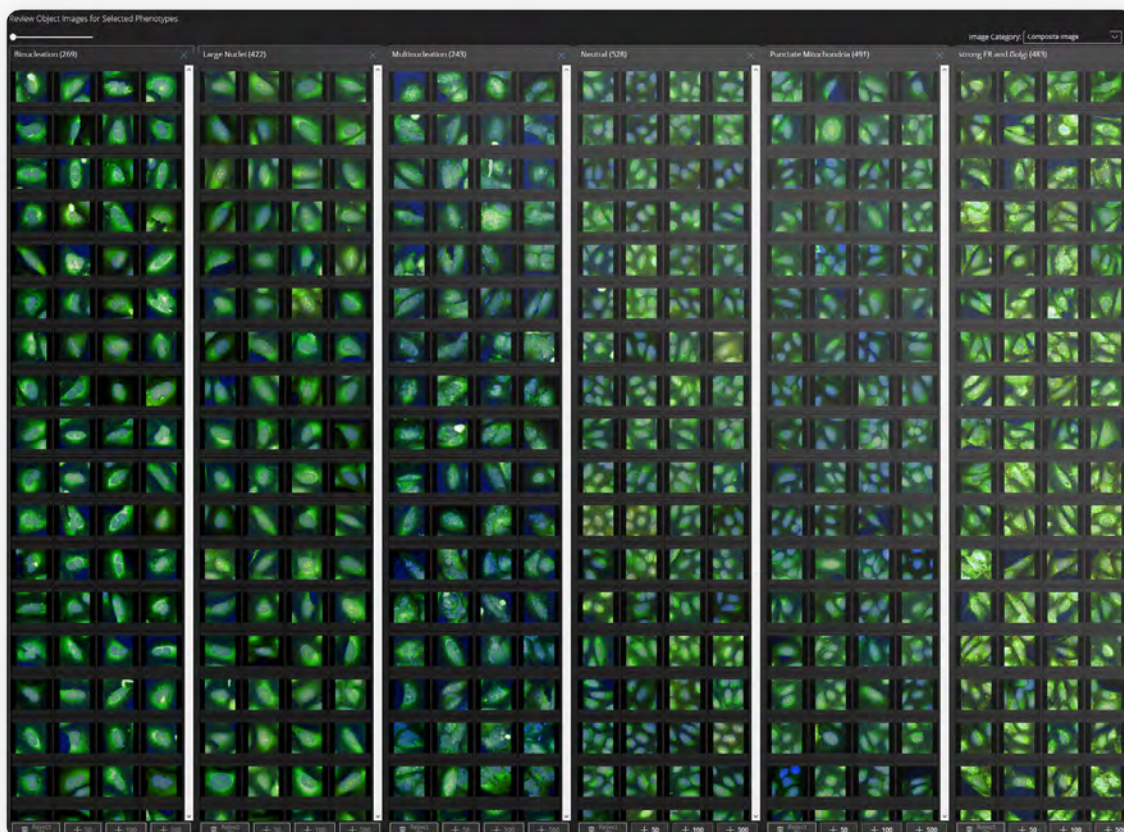
Reliability

Deep learning helps to eliminate the lack of consistency across experiments run in series or under slightly changing conditions. Consistent application of the same trained network to new screening batches secures reproducible and reliable HCS image analysis despite batch-to-batch variability. Moreover,

the incremental learning data enrichment protocol allows you to readjust the network to compare data from different experimental conditions. Through this heightened level of consistent analysis, Imgence ensures confidence in your research output.

Solution of Choice

Genedata Imgence is the first commercially available solution for deep learning-based HCS image analysis. Its leadership in the field is recognized with Bio-IT World's Best of Show and Best Practices Awards. Independent of the instruments used, Genedata Imgence allows harmonization and standardization of workflows across the entire organization. This vendor-agnostic software is cost-effective, scalable, and shortens project cycle time, boosting research productivity.



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Genedata Imgence® is part of the Genedata portfolio of advanced software solutions, which digitalize and automate data-rich and complex biopharma R&D processes. From early discovery all the way to the clinic, Genedata solutions maximize the ROI in R&D expenditure.