

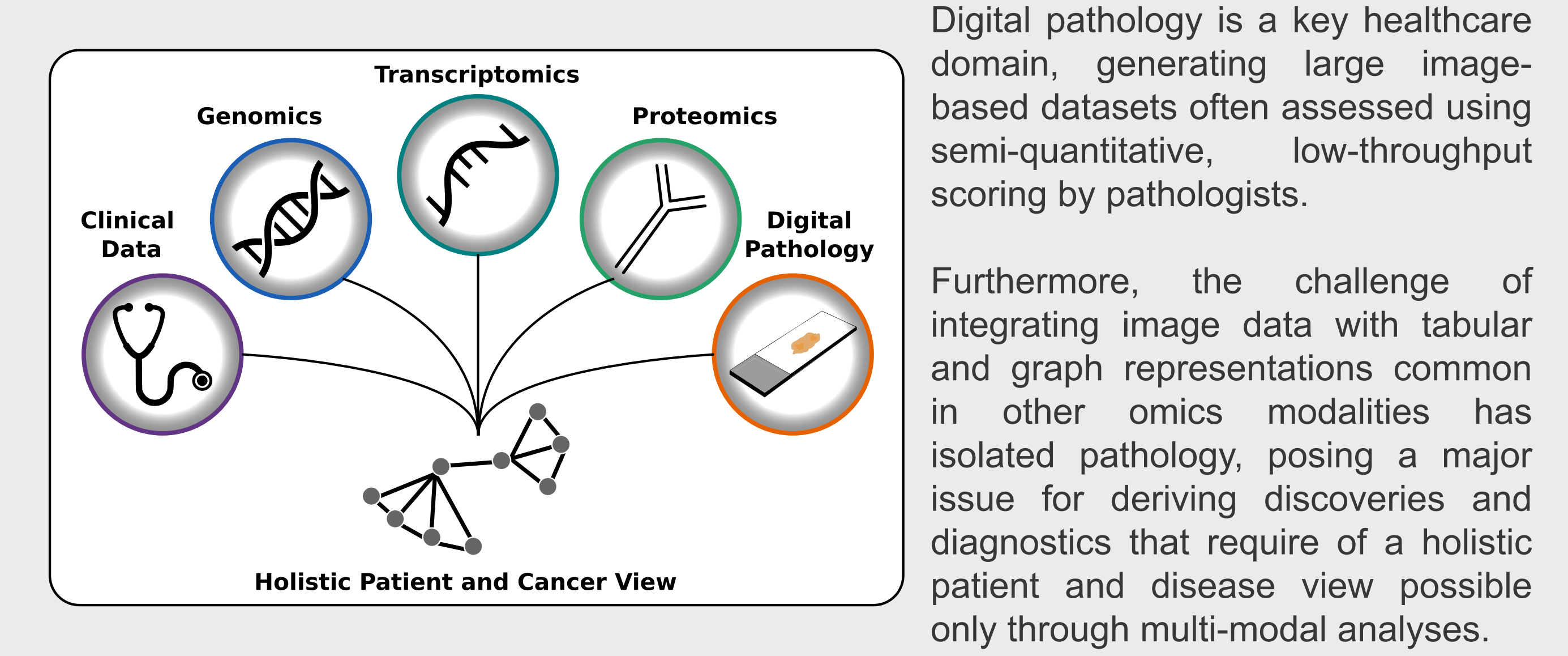
In-house and Commercial Platforms for Integrated Discovery and Diagnostics in Pathology

FPN: 226P

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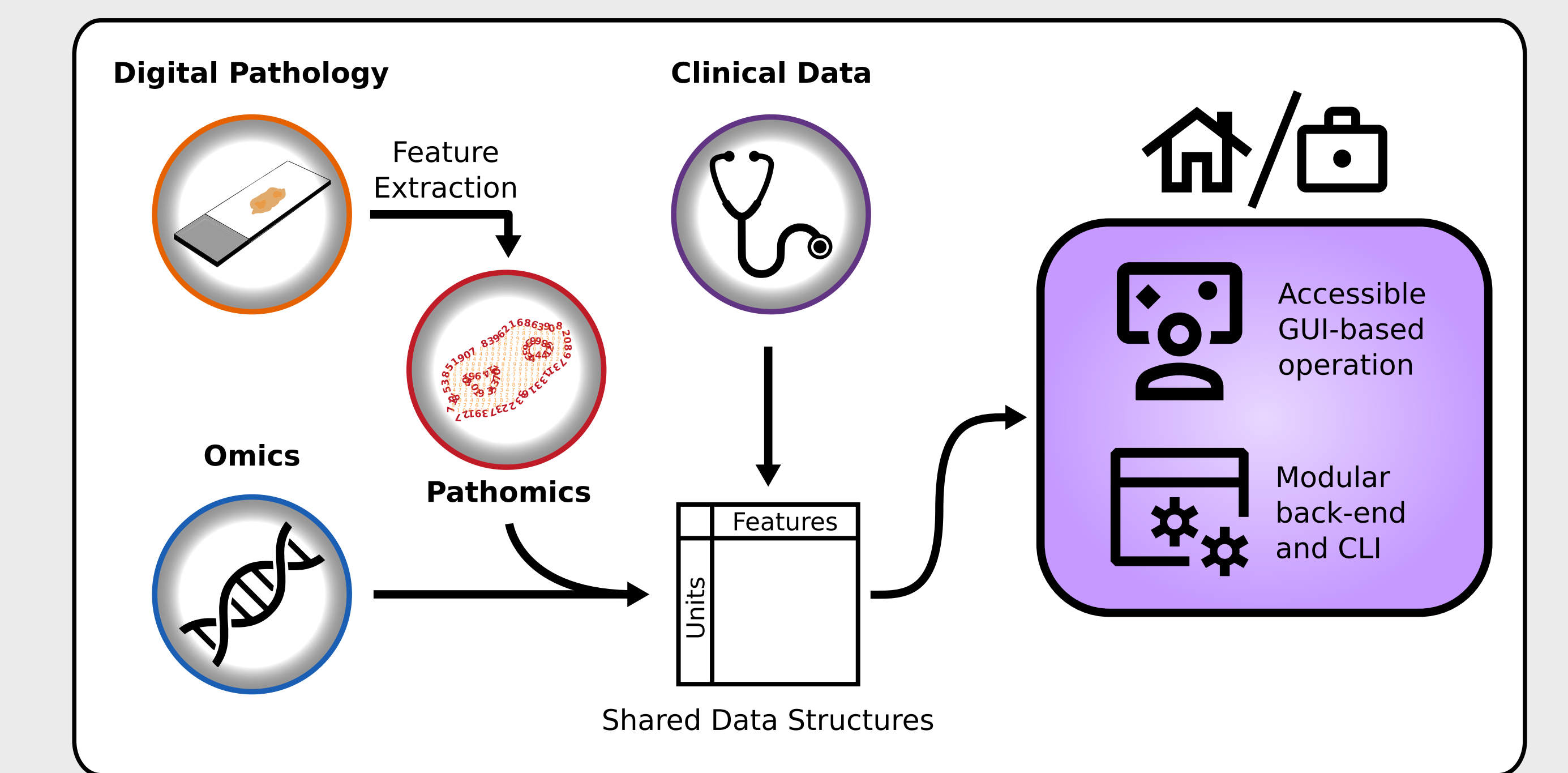
*: These authors contributed equally

The Role of Pathology in Integrated Discovery and Diagnostics



Therefore, with limited scalability and expanding cohort sizes, frameworks are needed to assemble high-dimensional pathomics datasets and enable discovery of data-driven biomarkers beyond traditional DP within both research and clinical settings.

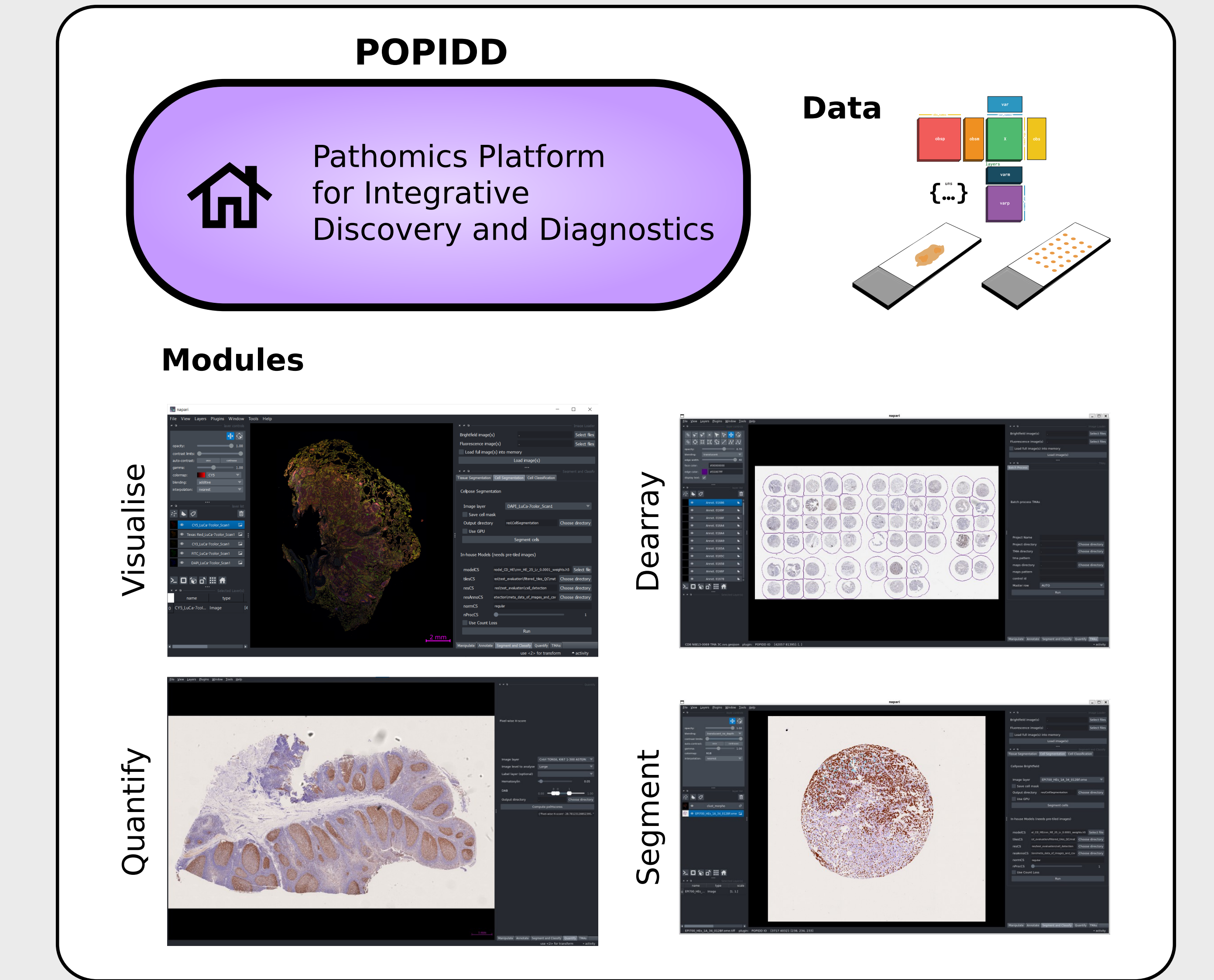
Modular and Accessible Computational Frameworks for Pathomics



These computational frameworks must include feature extraction pipelines (e.g. cell segmentation, stain quantification) that convert digitised histopathology images into continuous quantitative pathomics datasets. Utilising shared data architectures facilitates integration and increases cohesivity for downstream analyses. Equally important is usability, with a graphical user interface (for exploration and visualization) and a modular programmatic backend (to ensure scalability and adaptability).

Our work exemplifies two complementary frameworks: one developed in-house and another built on a commercial platform.

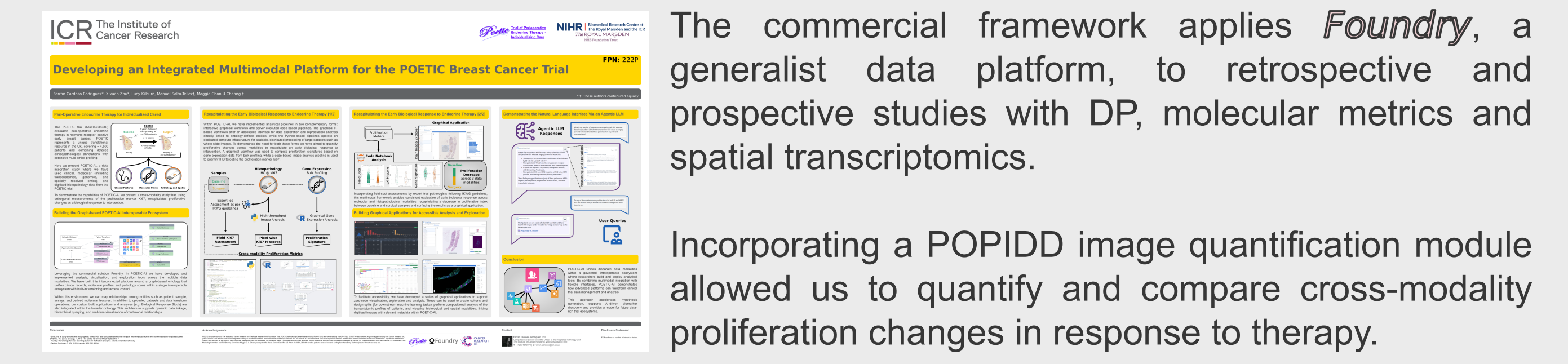
In-house Platform: The POPIDD Framework



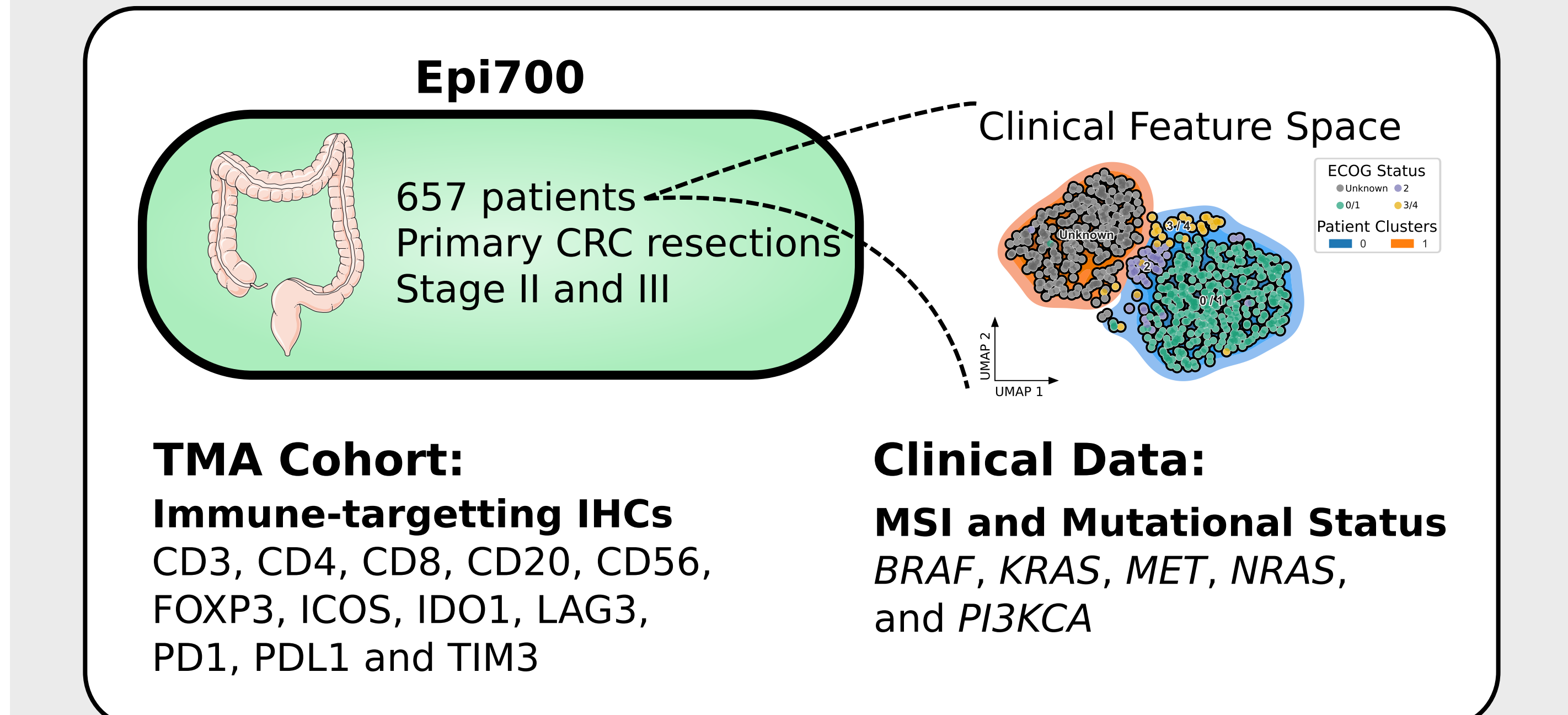
The Pathomics Platform for Integrated Discovery and Diagnostics (POPIDD) is our modular in-house framework. POPIDD identifies, aligns and annotates TMA cores, links them with patient metadata, and supports pixel-, cellular- and regional-level analyses.

The modular structure facilitates the incorporation of in-house modules (e.g. TMAAP and pyhscore) and of external tools and ecosystems (e.g. cellpose and AnnData), helping standardise image and clinic-molecular data into shared data structures. Great emphasis has been put towards accessibility by developing modular napari plugins that are assembled to build POPIDD's custom napari interface.

Commercial Platform: Poster FPN22P

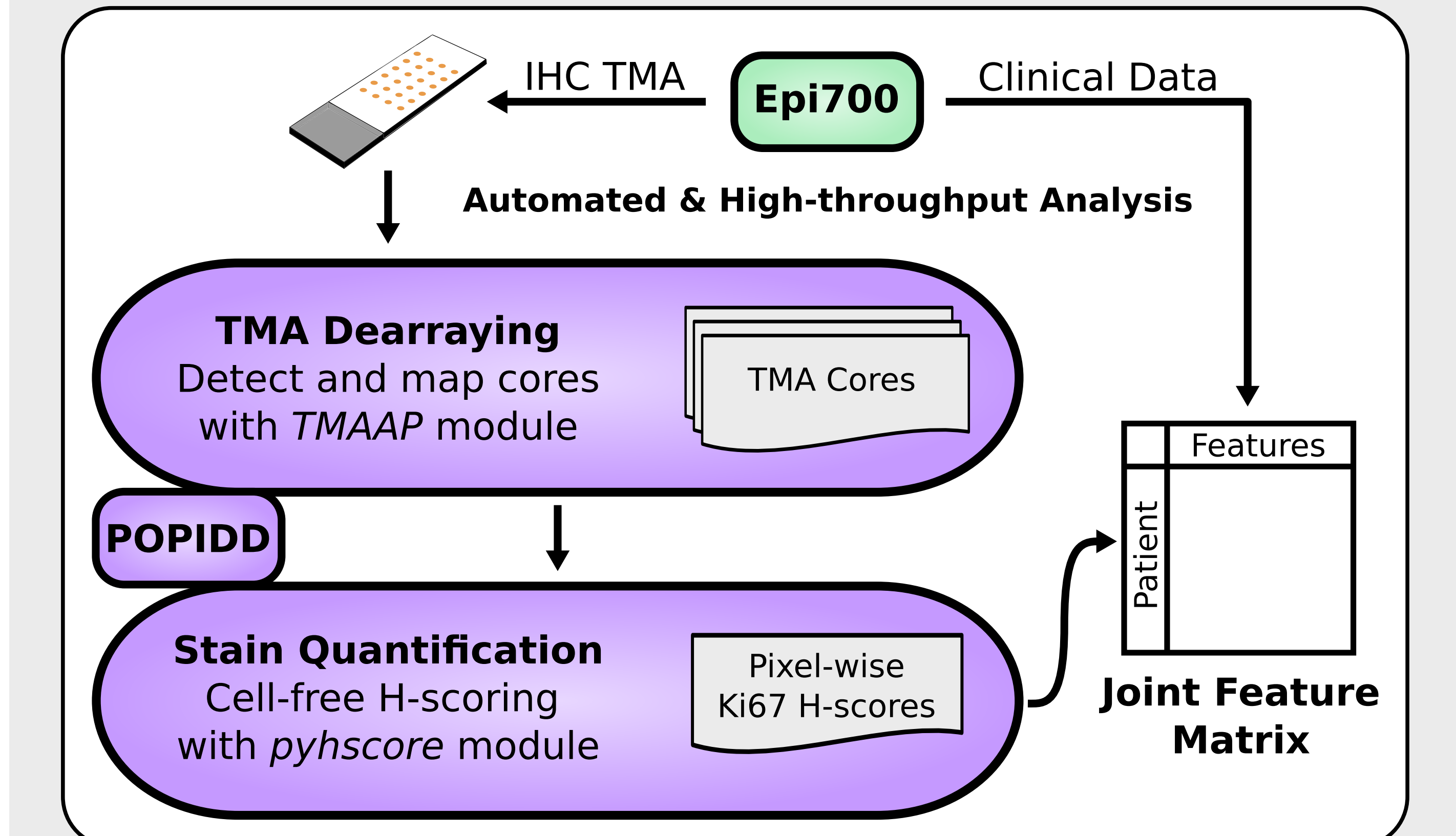


High-throughput Analysis of a TMA CRC Cohort with POPIDD [1/2]

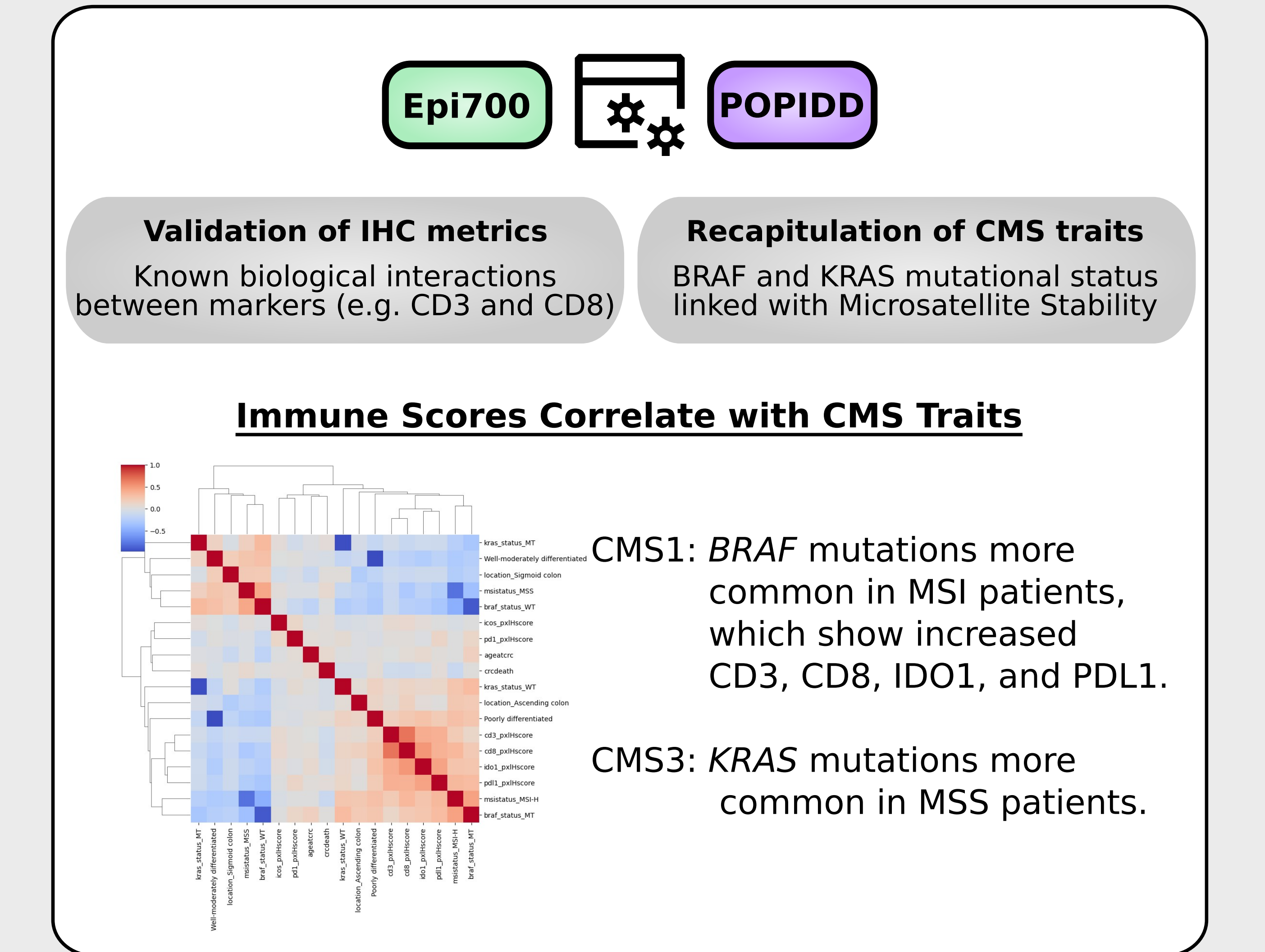


To demonstrate POPIDD's capabilities we have applied it to Epi700, a colorectal cancer cohort with over 600 patients, clinical and molecular information, and a TMA design with immune-targeting immunohistochemistry cores. This large TMA cohort represents a unique opportunity to highlight POPIDD's ability to perform a high-throughput automated analysis.

First, the TMAAP dearraying module accurately identifies and maps the thousands of cores with the relevant sample and patient identifiers, requiring of no other user input during the process. Then, we use an IHC quantification module to generate pixel-wise H-scores across the thousands of core images at scale. Finally, the resulting image-based features are integrated with the clinical and molecular data from Epi700 to facilitate downstream analyses.

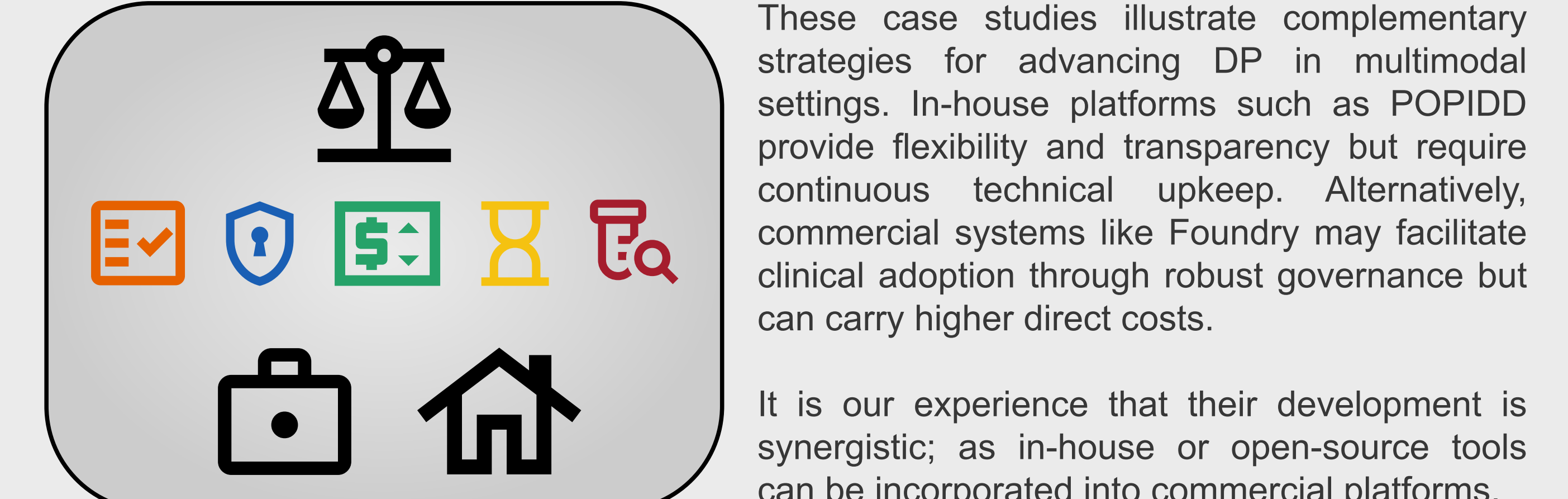


High-throughput Analysis of a TMA CRC Cohort with POPIDD [2/2]



Following analysis of the data generated with POPIDD, we recapitulate known clinical and molecular features across the patients in Epi700 patients. Using correlation analysis and subsequent hierarchical clustering of IHC score aggregates and clinical metadata features, we show expected biological interactions between IHC targets and greater degrees of immune involvement in microsatellite instable and BRAF mutant tumours.

Conclusion



References

- The napari team. DOI 10.5281/zenodo.3555620 (2019)
- Cardoso Rodriguez, F. DOI 10.5281/zenodo.12531732 (2024)
- Craig, S.G., Humphries, M.P., Alderdice, M. et al. Br J Cancer 123, 1280–1288 (2020)
- Foundry: The Ontology-Powered Operating System for the Modern Enterprise. palantir.com/platforms/foundry

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Disclosure Statement

FCR confirms no conflicts of interest to declare.

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