Supplementary Materials

Table S1. Analytical methods for detection of *Candida albicans*.

UN SDG	Title	Scientific Relevance of Rapid Candida albicans Detection
SDG 3	Good Health and Well-Being	Rapid molecular diagnostics of C. albicans enable timely clinical interventions, reduce morbidity and mortality in immunocompromised patients, and contribute to improved public health outcomes.
SDG 9	Industry, Innovation and Infrastructure	Implementation of advanced diagnostic platforms (e.g., real-time PCR, FRET-based melting curve analysis) fosters biomedical innovation and strengthens healthcare diagnostic infrastructure.
SDG 12	Responsible Consumption and Production	Early pathogen detection supports rational antifungal stewardship, minimizing unnecessary drug use, reducing selective pressure for resistance, and promoting sustainable clinical practices.
SDG 17	Partnerships for the Goals	Development and validation of rapid diagnostic assays rely on multidisciplinary and international collaborations between academia, clinical laboratories, and industry, thereby enhancing global health partnerships.

Table S2. Comparative analysis of Python versus alternative computational platforms in analytical chemistry.

Feature	Python	MATLAB	Julia	R	C++/Fortran
Ease of Learning	High	Good	Moderate	Moderate	Low
Library Ecosystem	Vast (General + Scientific)	Specialized (Toolboxes)	Strong	Excellent (Statistics)	Minimal (Low-level)
Execution Speed	High (JIT/accel)	Moderate	High	Moderate	Ultra-High
Parallel Computing	Improved (multiprocessing)	Excellent	Native & excellent	Good	Native
Use in Chemistry	Automation, data analysis	Signal/spectral processing	High-speed	Chemometrics	Core engines
Cost	Open-source (Free)	Commercial (Expensive)	Open-source (Free)	Open-source (Free)	Open-source (Free)

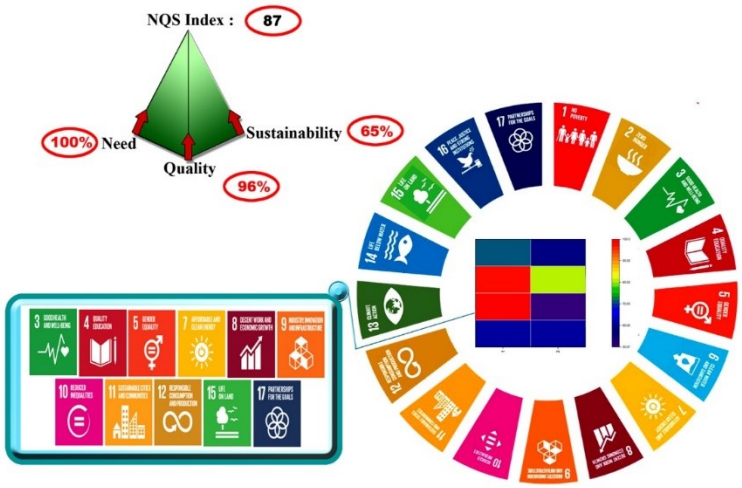

Fig S1: Statistical Workflow for Sustainability Evaluation Using the Need–Quality–Sustainability (NQS) Index within Koel's Pyramid Framework and the UN Sustainable Development Goals (SDGs).

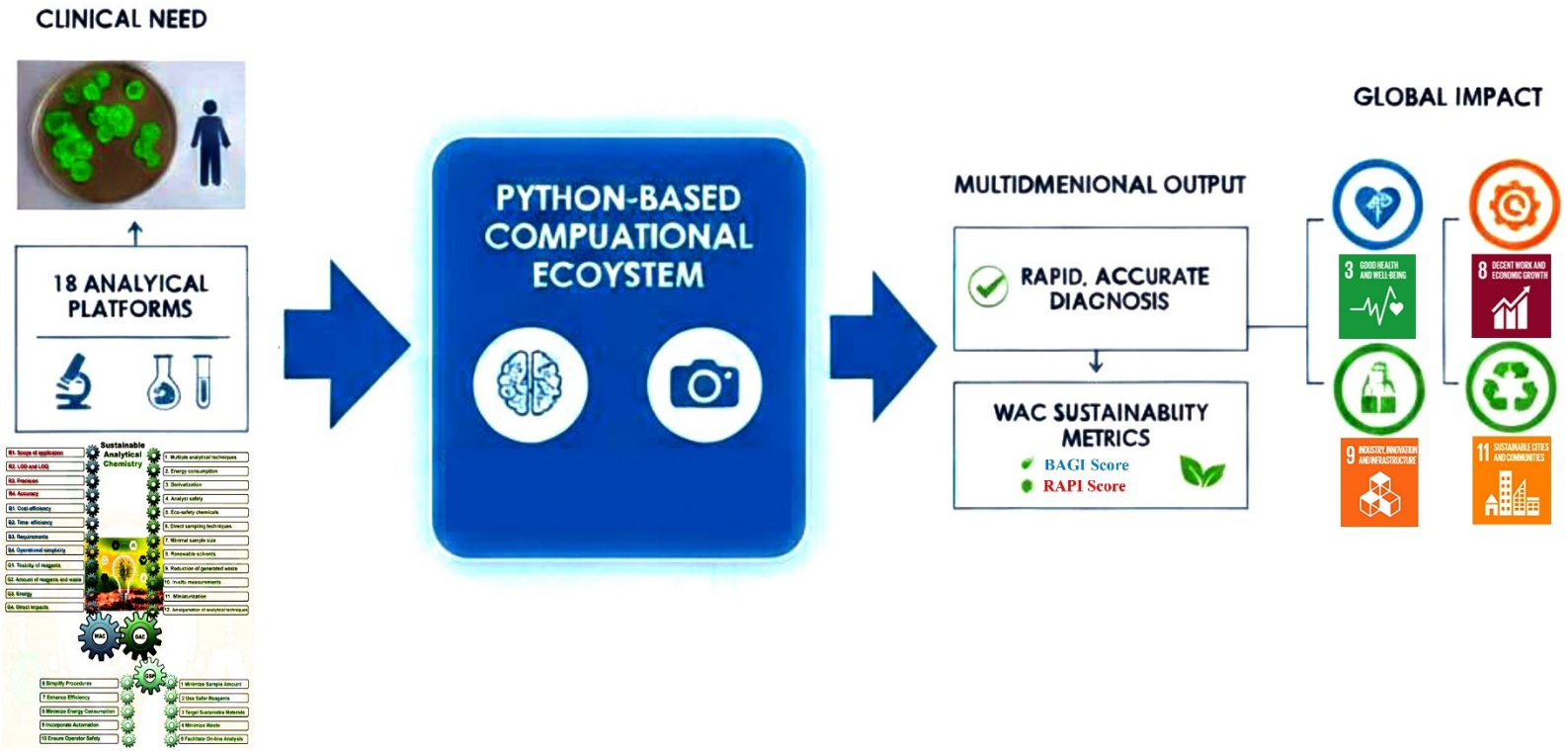

Fig S2: The Python-AI Diagnostic Roadmap for *C. albicans*: From Clinical Need to SDG Impact.