

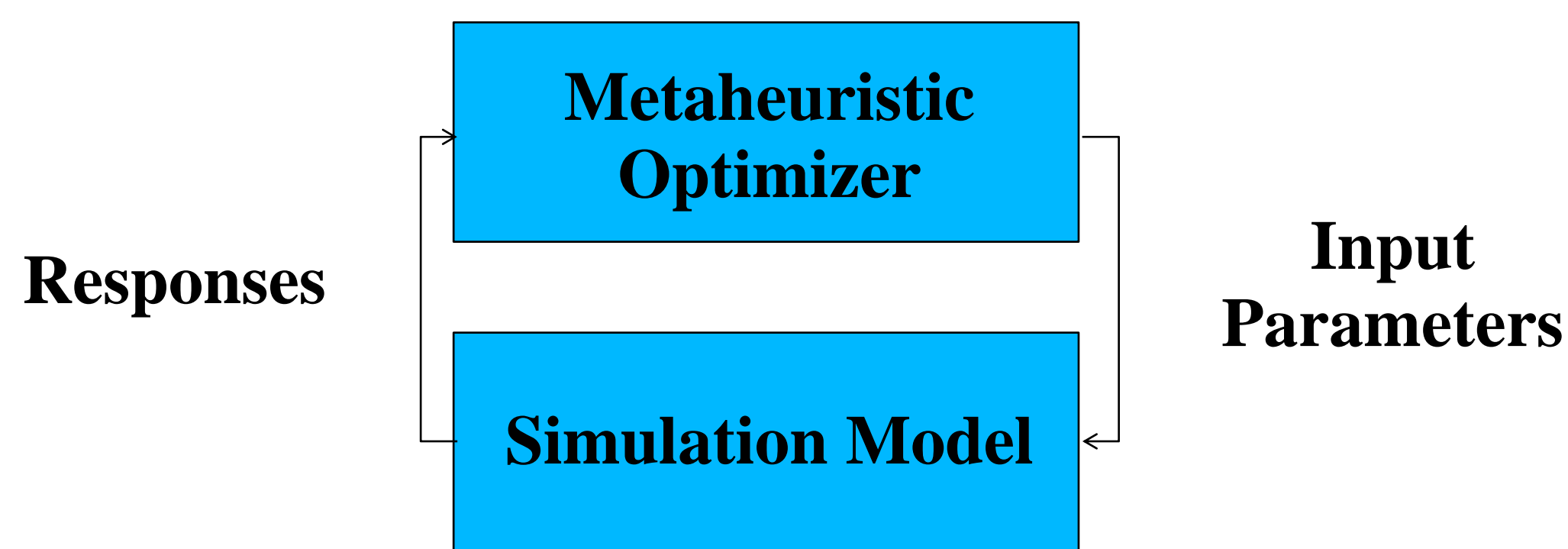
Overview

This poster presents the **HeurisTest** platform, carried out in Java, to test the performance of heuristics on benchmark sets :

- Designed following the *Simulation Optimization* model described in [APRIL and al., 2003b]
- Separates the optimization problem into two main blocks : an **optimization metaheuristic** and a **simulation model**
- Allows to select a heuristic and a test function and simulate the function optimization with this heuristic
- **Generates** the convergence graphs and statistics to evaluate the performance of this heuristic on this function
- Completely **modular** : dynamically integrates new optimization heuristics, new benchmarks or new experimental protocols

Simulation Optimization Model

- The metaheuristic approach to simulation optimization is based on viewing the simulation model as a black box function evaluator

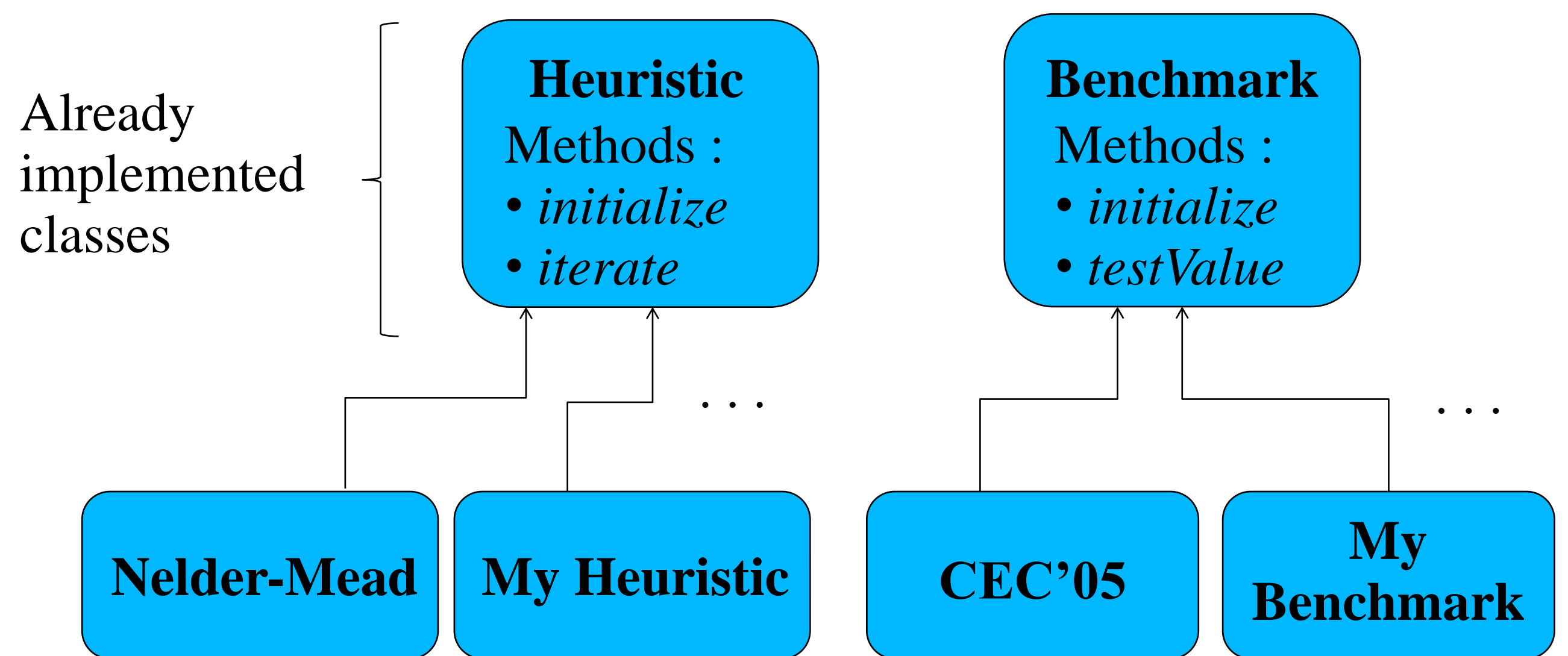


Black box approach to simulation optimization

- The metaheuristic optimizer chooses a set of values for the input parameters (i.e., factors or decision variables) and uses the responses generated by the simulation model to make decisions regarding the selection of the next trial solution
- This methods separates the optimization problem into step by step procedure. The metaheuristic optimizer is thus able to run only one iteration at a time

Conception of HeurisTest Platform

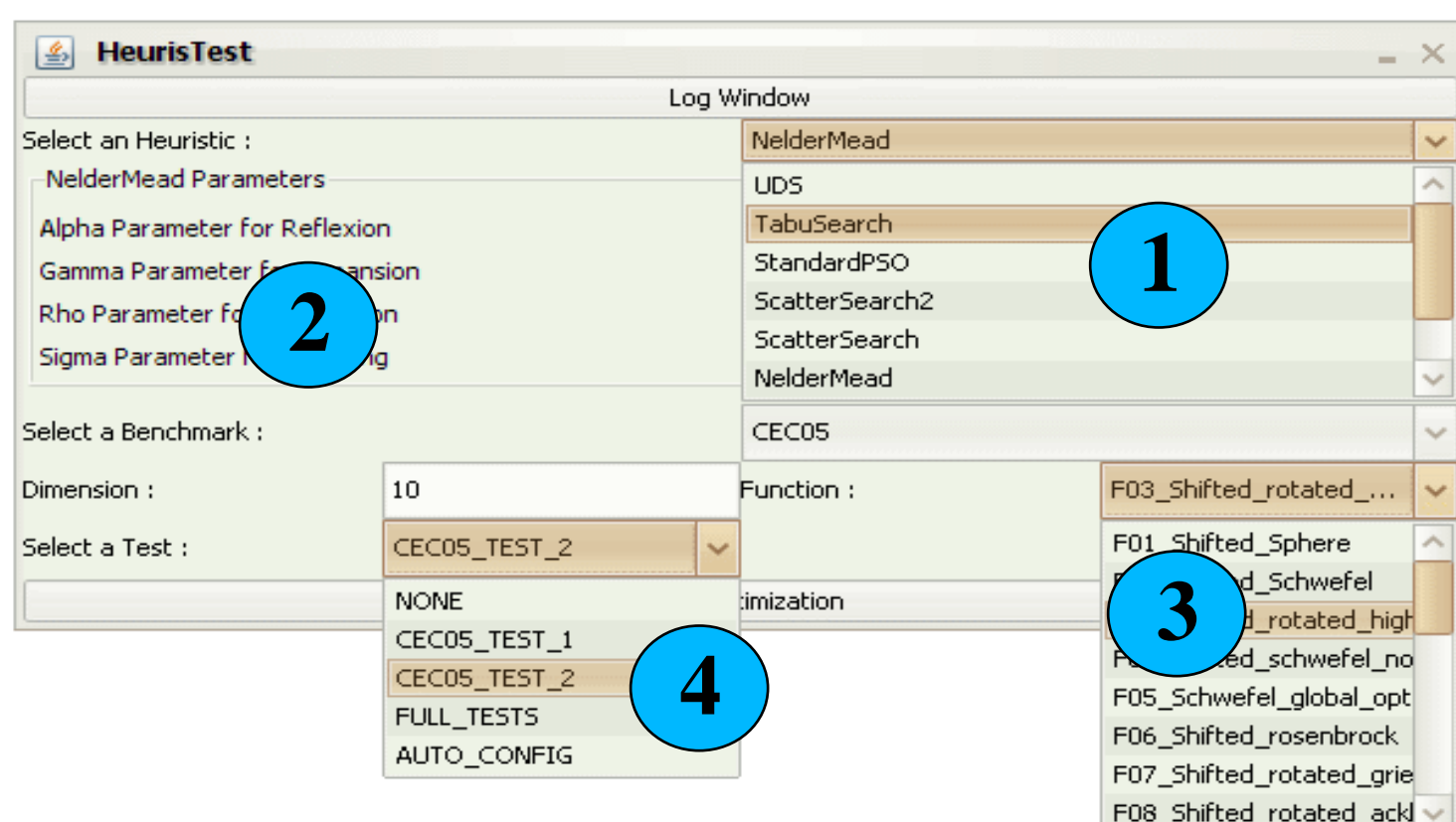
- Using experimental protocols described in [SUGANTHAN and al., 2005] and taken from the CEC'05 conference
- Dynamic class loading : load your own heuristic, benchmark or experimental protocol
- Open source : change or add code to the platform



Conception of the platform : classes inheritance

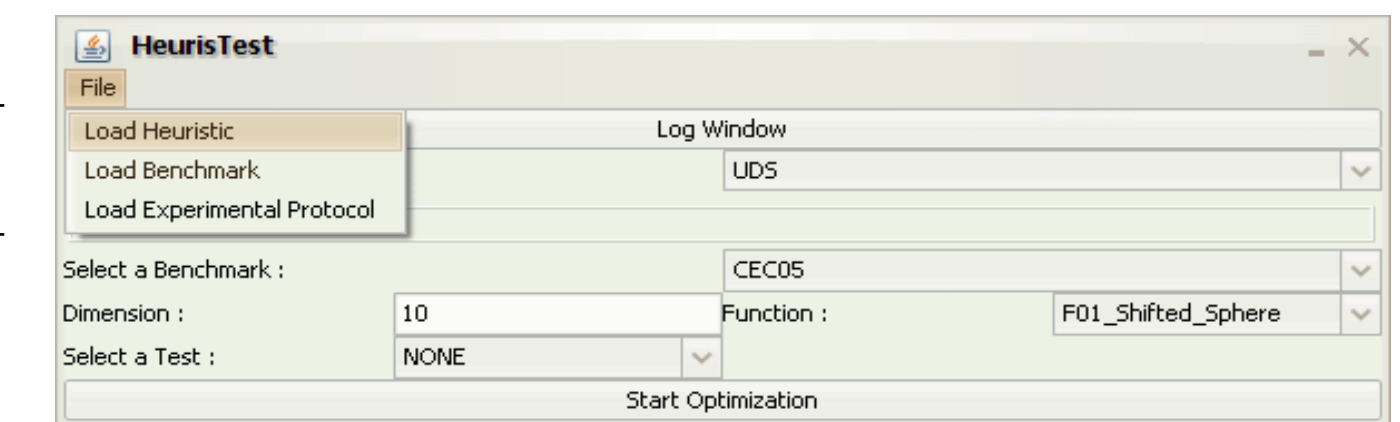
Getting Started

- Easy to handle : Simple UI



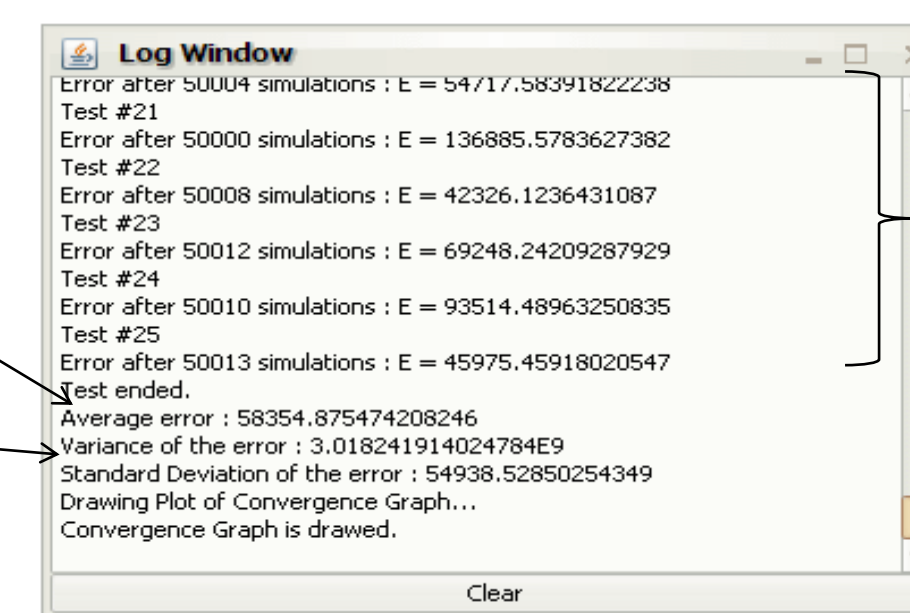
- 1 : Select an Heuristic from database or loaded by user
- 2 : Set parameters for the Heuristic or let default ones
- 3 : Select a benchmark and a function from database or loaded by user
- 4 : Select a simulation protocol

- Load your heuristics, benchmarks or EPs from your class files



- When simulation is started : a Log Viewer can be opened to have more details about current simulation and results

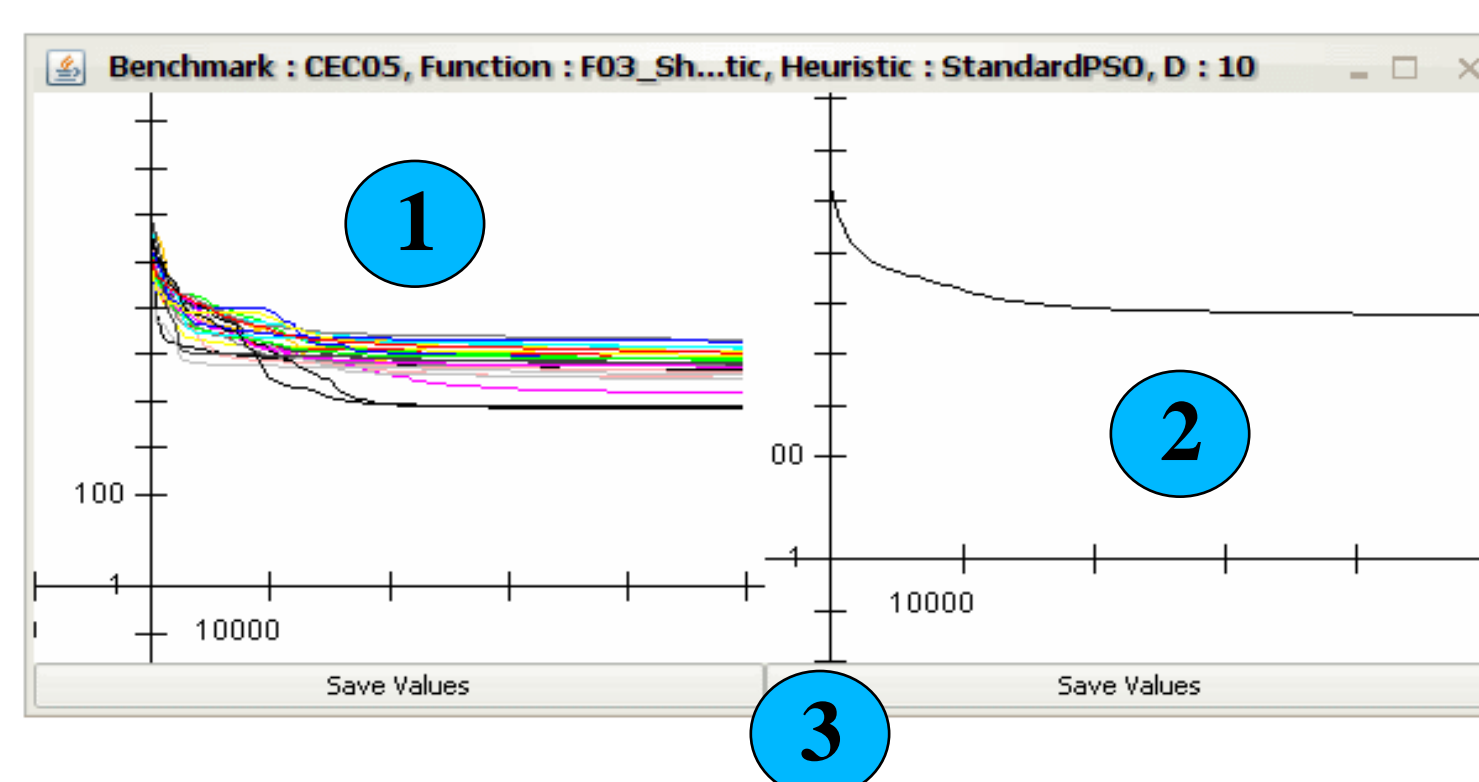
Global Mean Error
Standard Deviation



Results for each run

Output Display

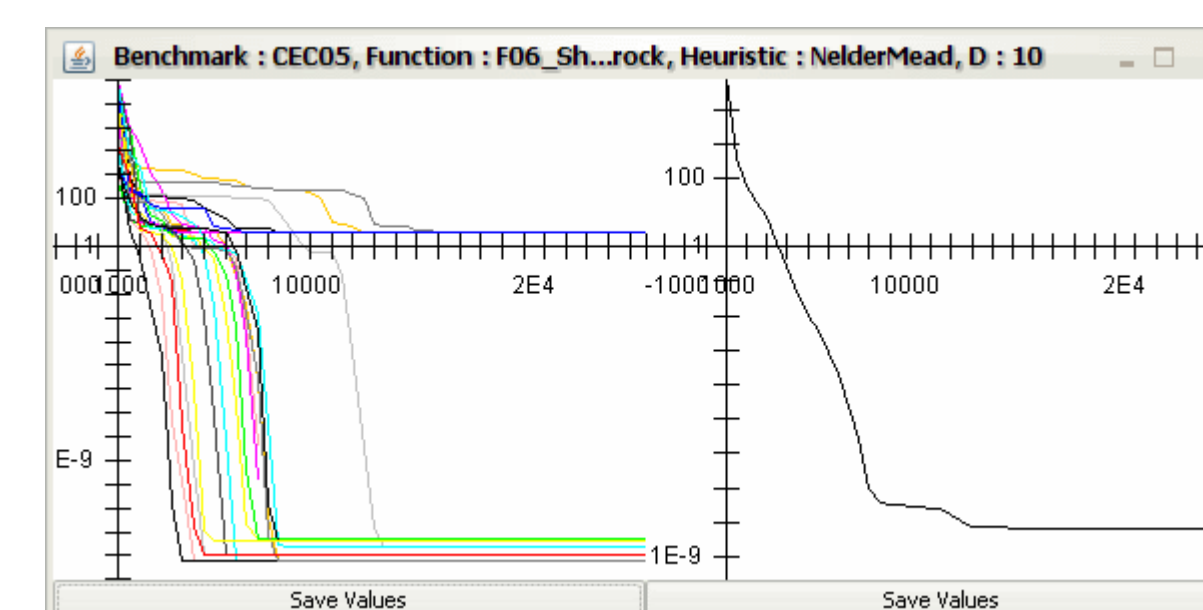
- After a simulation, **convergence graphs** are generated for each run (25 runs per simulation) and the Log Viewer contains **error calculation**



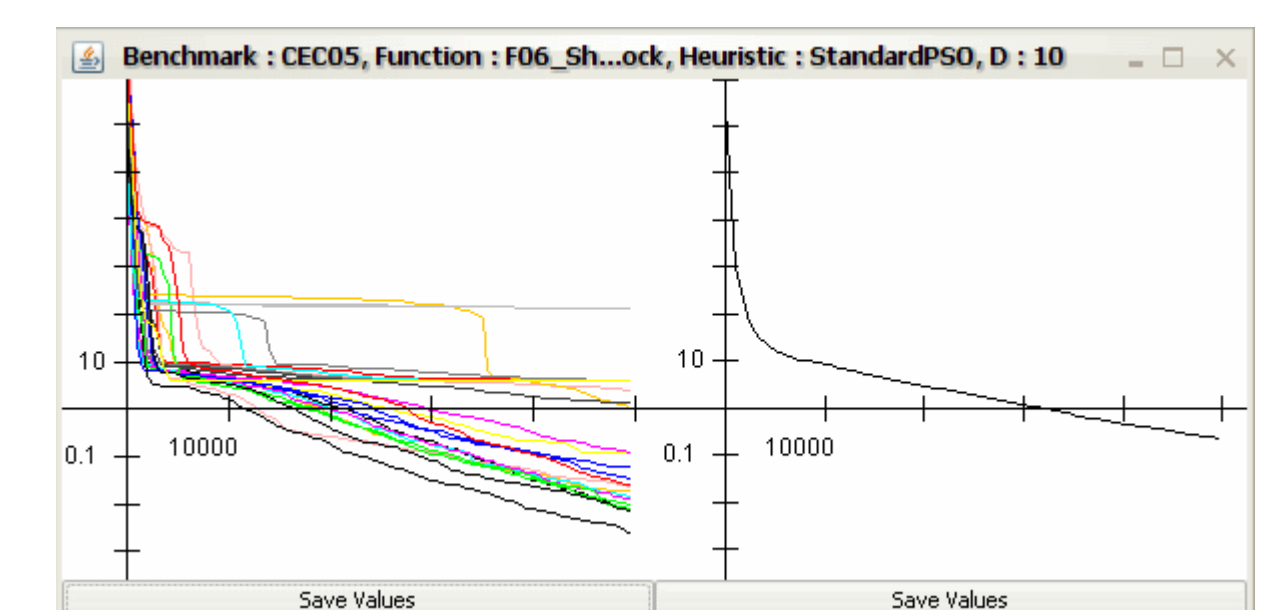
- 1 : Zoomable and Scrollable graph with color for each of 25 runs
- 2 : Zoomable and Scrollable mean graph of 25 runs
- 3 : Possibility to record points in a format readable by SciLab application

Output Display Comparison

- Example : Testing PSO and Nelder-Mead (NM) heuristics on *Shifted Rosenbrock* function for 10-Dimension :



Convergence graph (Nelder-Mead)



Convergence graph (PSO)

	Mean Error	Std. Deviation
NM	2.93e-11	1.78e0
PSO	2.68e-1	3.34e1

Conclusion and Future Work

- **Simple** and **modular** platform to compute heuristics performances
- Results computation : **convergence graphs** and **error calculation**
- Results comparison : quickly done due to different computed results
- Results of a study, presented in an article submitted to the **ISDA'09** conference, were obtained using this platform
- Future work : implementing multi-objective, dynamic and constrained problems
- For further information concerning the platform, visit : <http://www.eisti.fr/~vg>

References

- [APRIL and al., 2003] APRIL, J., GLOVER, F., KELLY, J., and LAGUNA, M. *Practical introduction to simulation optimization*. Simulation Conference, 2003, *Proceedings of the 2003 Winter*, pages 71–78
- [SUGANTHAN and al., 2005] SUGANTHAN, P. N., HANSEN, N., LIANG, J. J., DEB, K., CHEN, Y.-P., AUGER, A., and TIWARI, S., *Problem Definitions and Evaluation Criteria for the CEC 2005 Special Session on Real-Parameter Optimization*, Technical Report, Nanyang Technological University, Singapore, May 2005, IIT Kanpur, India