Before dwelling on the technical details, let us briefly mention some relevant characteristics of Reactive Search Optimization when applied in the context of local search-based processes.

Learning on the job Real-world problems have a rich structure. While many alternative solutions are tested in the exploration of a search space, patterns, and regularities appear. The human brain quickly learns and drives future decisions based on previous observations. This is the main inspiration source for inserting online machine learning techniques into the optimization engine of RSO.

Rapid generation and analysis of many alternatives Often, to solve a problem one searches among a large number of alternatives, each requiring the analysis of what-if scenarios. The search speed is improved if alternatives are generated in a strategic manner, so that different solutions are chained along a trajectory in the search space exploring wide areas and rapidly exploiting the most promising solutions.

Flexible decision support Crucial decisions depend on several factors and priorities which are not always easy to describe before starting the solution process. Feedback from the user in the preliminary exploration phase can be incorporated so that a better tuning of the final solutions takes the end user preferences into account.

Diversity of solutions The final decision is up to the user, not the machine. The reason is that not all qualitative factors of a problem can be encoded into a computer program. Having a set of diverse near-best alternatives is often crucial for the decision maker.

Anytime solutions The user decides when to stop searching. A first complete solution is generated rapidly, better and better ones are produced in the following search phases. The more the program runs, the bigger the possibility to identify excellent solutions, but if you want a solution fast you are going to get it!

Methodologies of interest for Reactive Search Optimization include machine learning and statistics, in particular neural networks, artificial intelligence, reinforcement learning, active or query learning.