



*Málaga, Mes de 2013*

## Executive Summary

**TITLE:** **D2.4.2: Design of new operators for evolutionary algorithms based on landscape's theory.**

**PAPERS RELATED:**

- F. Chicano, G. Luque, E. Alba, Problem Understanding through Landscape Theory, Workshop of Problem Understanding and Real-World Optimization in GECCO 2013, GECCO companion, pp. 1055-1062, Amsterdam, Netherlands
- F. Chicano, D. Whitley, A. M. Sutton, Efficient Identification of Improving Moves in a Ball for Pseudo-Boolean Problems, GECCO 2014 (accepted for publication)

**ABSTRACT:** In these works we propose practical applications of Landscape Theory. For Test Suite minimization we suggest an local search operator that uses pre-computed statistics in a Ball of arbitrary radius to decide the exploration depth. For pseudo-Boolean functions in general, we provide a method to find improving moves in a Ball in a time that is independent of the number of variables.

**GOALS:**

1. Practical applications of landscape theory to outperform search algorithms applied to combinatorial optimization problems.

**CONCLUSIONS:**

1. We have provided an algorithm to efficiently identify improving moves in a Hamming ball of radius  $r$  around a solution of a  $k$ -bounded pseudo-Boolean optimization problem that can be written as a sum of subfunctions.
2. We provide expressions to exactly compute the average and the standard deviation of the fitness of the solutions in a Ball of arbitrary radius around a given one.

**RELATION WITH PAST**

**DELIVERABLES:**

PRE: D2.4.1 (advisable reading)