Carlo Poloni - Compromise between cost and performances

Optimization techniques have been used in engineering design for decades maximizing a specific performance metric, ultimately cost of a product for a given performance. As a matter of fact most accepted theories of market efficiency for the past half century have focused on the single objective of maximizing the profit. The well known concept of Pareto Frontier has been used mainly to explain that at high risk corresponds a high reward and therefore any “non dominated” solution is equivalent.
More recently it has become widely accepted that a multi-objective approach is necessary for a more efficient decision making process about product development with sustainability in mind.
Engineering design in the current challenging environment is calling for improvements of product performance with minimization of costs and shorter time to market. Process complexity is growing as the whole design team concurs to improve all product performance metrics of interest, and handle opposing objectives, like increasing efficiency and durability while reducing weight and cost.
The design practice has therefore become an iterative process where decision making is performed on the basis of the compromise solutions quantitatively determined or estimated.
By comparing quantitative metrics of different aspects of any complex problem it should be possible to draw conscious decision looking always for the right compromise between costs (financial or environmental) and performances.

Illustrating briefly few examples of industrial relevance general considerations will be drawn.