The process of dividing the objective space into subspaces for multi-objective optimization in the described grid system involves several key steps:

1. \*\*Determination of Grid Intervals\*\*: Each objective dimension is divided from the ideal solution to the nadir point into equal intervals. This is done to create a structured grid over the objective space, facilitating the categorization of solutions based on their performance across multiple objectives.

2. \*\*Calculation of Grid Coordinates\*\*: Solutions are assigned grid coordinates based on their objective values, effectively placing them within specific subspaces of the entire objective space.

3. \*\*Use of Dominance Relations\*\*: The concepts of subspace dominance (SD), strong subspace dominance (SSD), and weak subspace dominance (WSD) are employed to establish hierarchical relationships between subspaces. These relationships help in identifying subspaces with potentially superior solutions that better balance the trade-offs between objectives.

4. \*\*Allocation of Evolutionary Opportunities\*\*: Based on the dominance relationships and the quality of solutions within subspaces, evolutionary opportunities (i.e., chances for selection, reproduction, and mutation in the context of evolutionary algorithms) are dynamically allocated. This strategic allocation aims to enhance both the convergence to optimal solutions and the maintenance of diversity among solutions.

5. \*\*Guidance by Subspace Characteristics\*\*: Characteristics such as the subspace corner point (SCP) and subspace direction vector (SDV) are used to further refine the search process within and across subspaces, guiding the evolutionary algorithm towards regions of the objective space that are likely to yield better trade-offs between objectives.

This multi-faceted approach allows for a more nuanced and effective optimization process, leveraging the structure imposed by the grid system to explore and exploit the objective space efficiently.