# Seminari del Departament d'Estadística i Investigació Operativa

# Universitat Politècnica de Catalunya

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**Title**: The Top Trading Cycles Algorithm and Respecting Improvement in Kidney Exchange Programs

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**Abstract:** The paper studies the design of allocation rules in Kidney Exchange Programs (KEPs), introducing and analyzing the "respecting improvements" property, which ensures that patients benefit when bringing better or additional donors. Building on the foundational Shapley-Scarf housing market model and the Top Trading Cycles (TTC) algorithm, the authors provide game-theoretic insights and efficient optimization formulations. They highlight that while TTC satisfies the incentive property under strict preferences, standard transplant-maximizing objectives may violate it. The study also includes simulations showing that core allocations strike a good balance between transplant quantity/quality and incentivizing patient participation. The work underscores the importance of patient-donor incentives and proposes core allocations as a promising and practical alternative.

**About the Author**: Flip Klijn is Director and Scientific Researcher at the Institute for Economic Analysis (IAE-CSIC) and a Research Professor at the Barcelona School of Economics (BSE). His current research centers on the design of centralized mechanisms for markets involving the allocation of indivisible goods to economic agents, as well as for markets where goods or services are exchanged without monetary transfers.