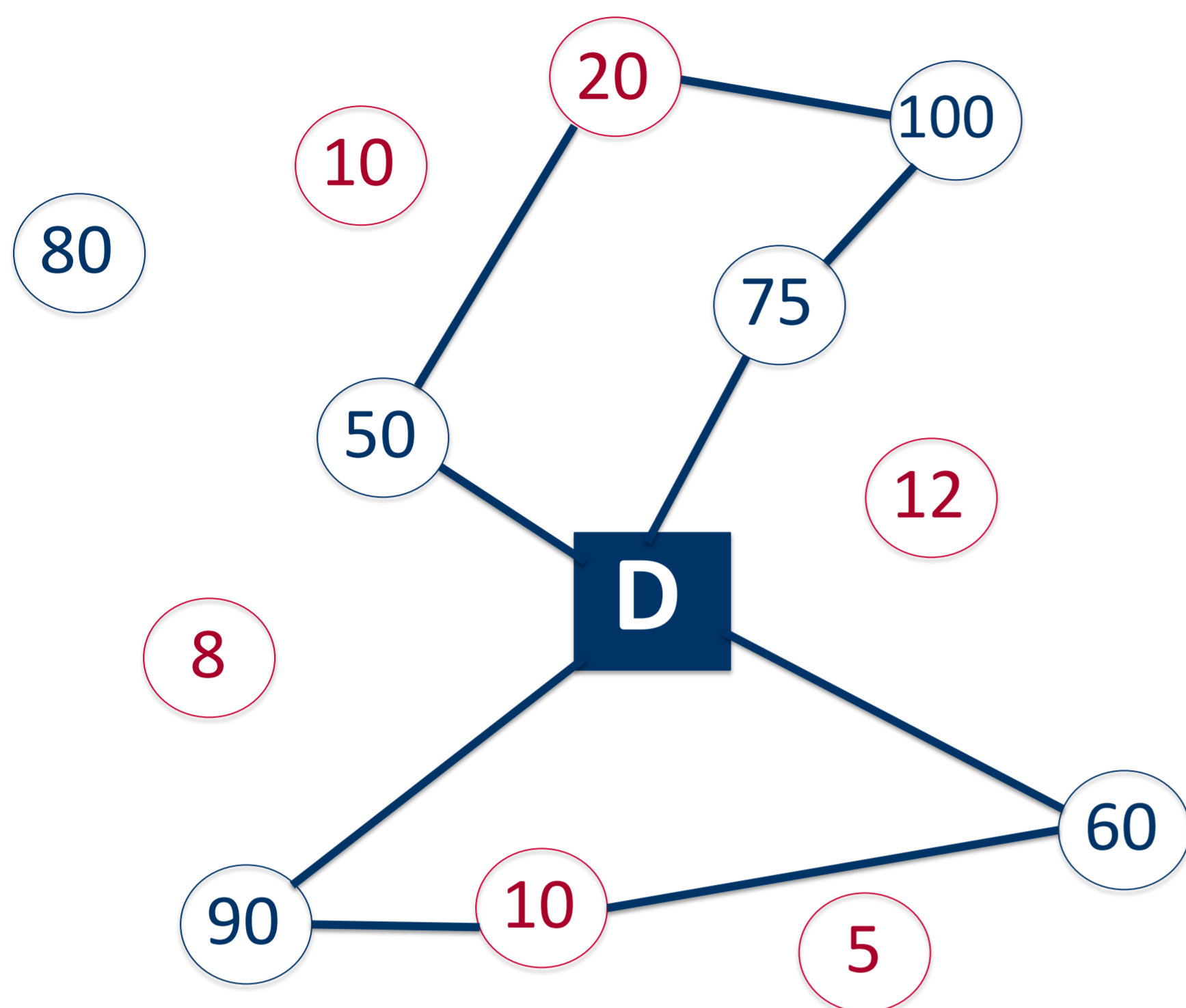




The Collaborative Team Orienteering Problem

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- X Clients of partner A
- X Clients of partner B
- X compensation for non-delivery (CND)

Min{total CND}
s.t. Maximal vehicle distance
Given number of vehicles

Research Context

Existing Routing algorithms	↔	Collaborative Routing
A single company		Multiple companies
A single market environment		Multiple market environments
A single strategy		Different strategies

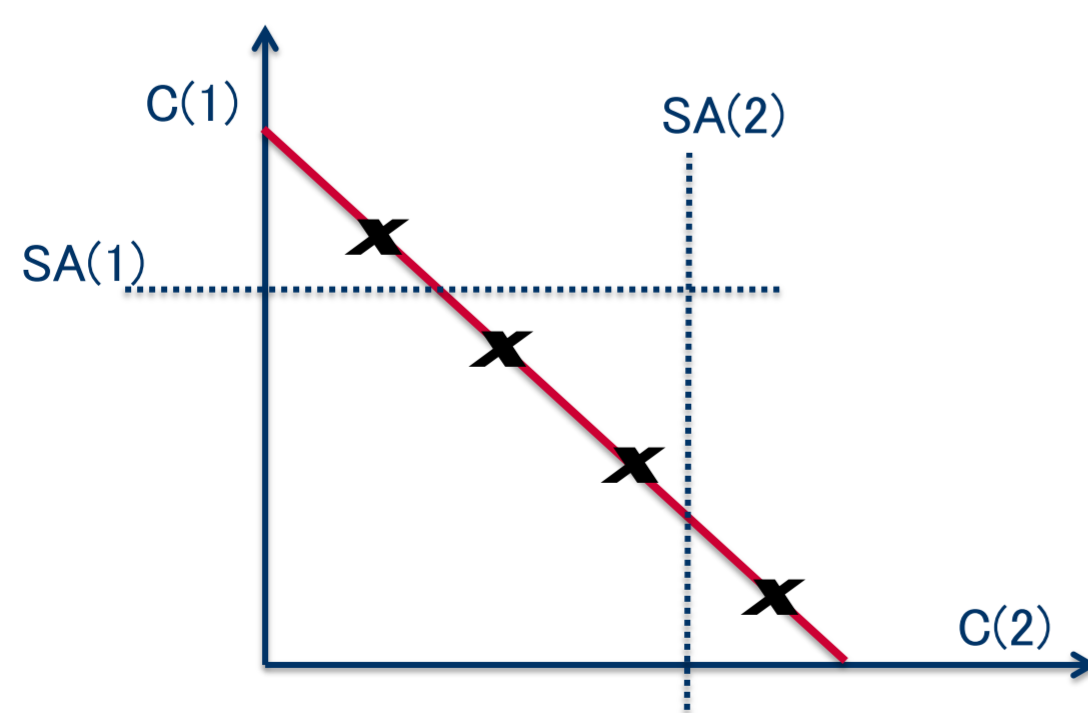
Research Questions

- How to define this problem in a collaborative way? Can we construct a **collaborative framework**?
 - Single-objective problem :
 - * Pool partners together as if they act as one single company
 - * Solve the *non – collaborative* problem
 - * Integrate an appropriate allocation mechanism
- How to give the right incentives by means of a good cost (or profit) allocation mechanism?
 - * Incorporate the cost (profit) allocation into the algorithm
 - * Flexibility of a partner needs to be rewarded

Flexibility = a low CND (no priority for your clients)

Research Methodology

- Development of a **metaheuristic** that solves the orienteering problem for the grand and the sub – coalition(s)
- Study of the behaviour of different allocation mechanisms for alternating flexibility
- Proposal of an alternative cost allocation method for the collaborative team orienteering problem, taking into account the **flexibility** of a partner in terms of his 'CND – policy'



Results

- A **multi-start variable neighbourhood metaheuristic** for solving the instances
- An alternative **cost allocation mechanism** based on
 - * The marginal cost of each client in the tour
 - * The CND of the clients that were chosen

$$a_i = M_i + \frac{CND_i}{CND_{total}} (TotalCost - \sum_i M_i)$$

- By requiring stability, the flexibility benefits will drop by increasing **dissimilarities** between collaborating partners.
 - * Stand-alone cost / stand – alone efficiency
 - * CND – policy in collaboration
- The **partner choice has a large impact** on the properties of a collaboration

Further Research

- Translation of the results in useful guidelines for companies that consider a horizontal collaboration
- Include the **collaborative** element in other routing problems by using the same framework