Reg. No: 2015/18/E/ST6/00456; Principal Investigator: dr hab. Jarosław Byrka

The drive to minimize costs in logistics, and supply-chain networks in particular, results in the need to aggregate traffic both in space and over time. This motivates the study of the underlying combinatorial optimization problems. The two biggest challenges are the intractability resulting from the presence of combinatorial constraints such as unsplittability of shipments, and the uncertainty of the future demand.

State-of-the-art solution methods for a number of the fundamental network design and management problems are still far from being best possible and are often complex compositions of routines developed for more restricted settings. Also the issue of scheduling of shipments on the existing network leaves many unresolved questions, especially in the online case where shipment requests arrive over time.

The particular directions we consider are: 1) to develop direct algorithms for a number of hierarchical network design settings based on rounding solutions to strong convex relaxations of the studied problems, 2) resolve the possibility to aggregate traffic on multilevel networks in the online request arrival model, 3) take temporal aspects of the anticipated demand into account at the stage of designing a network, possibly allowing designs with non-standard topologies.