

Series Editor
Jean-Paul Bourrières

From Logistic Networks to Social Networks

Similarities, Specificities, Modeling, Evaluation

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Color Section

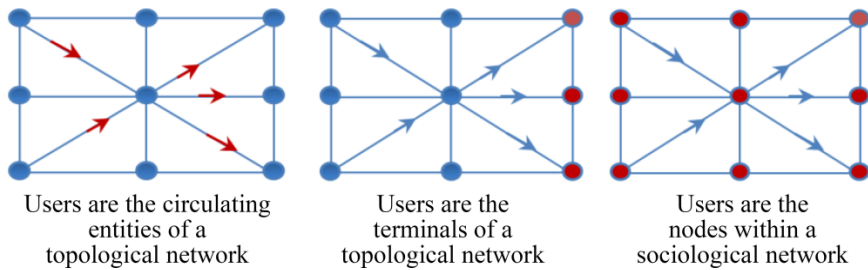


Figure 1.1. *Ways of including users in a network*

| Actors | Description level | | Classification of networks | | | |
|---|-------------------|-------------------|---|---------------------------|--|---|
| Users | Service | Nature of service | Individual transport | Collective transportation | Product distribution recycling | Fluid and energy distribution Sanitation |
| | | User inclusion | Mobile Flow element | | Fixed Network termination | Fixed Network termination |
| Logistics operators | Organization | | N/A | Transporters | Producers Distributors Carriers Communities | Producers Distributors Communities |
| Providers and integrators of technology | Infrastructure | | General transport infrastructure (road, rail, sea, air) | | | Dedicated distribution infrastructures (oil pipelines, gas, electricity, water, sanitation) |

Table 1.1. *Typology of material flow networks*

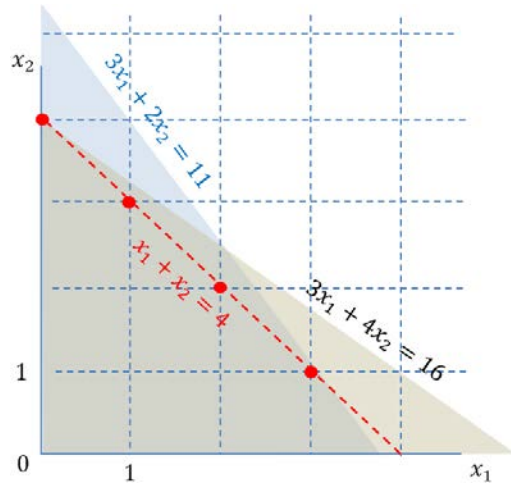


Figure 1.2. Example of ILP

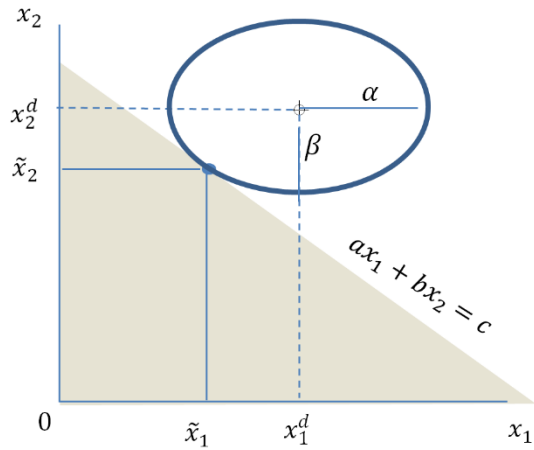


Figure 1.3. Example of a quadratic program

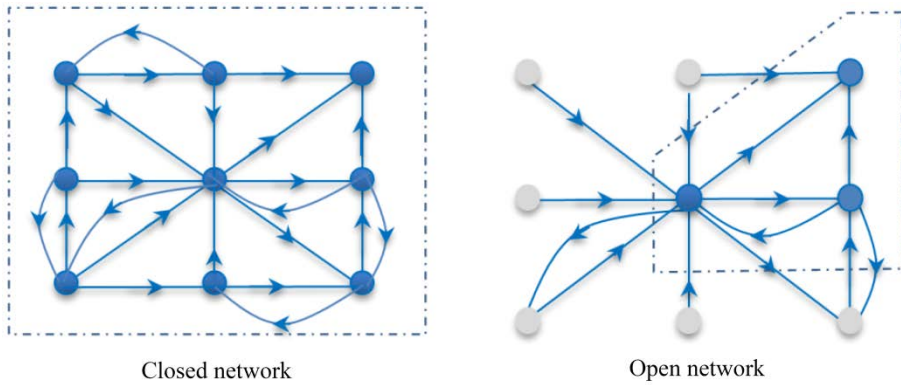


Figure 2.1. *Closed network versus open network*

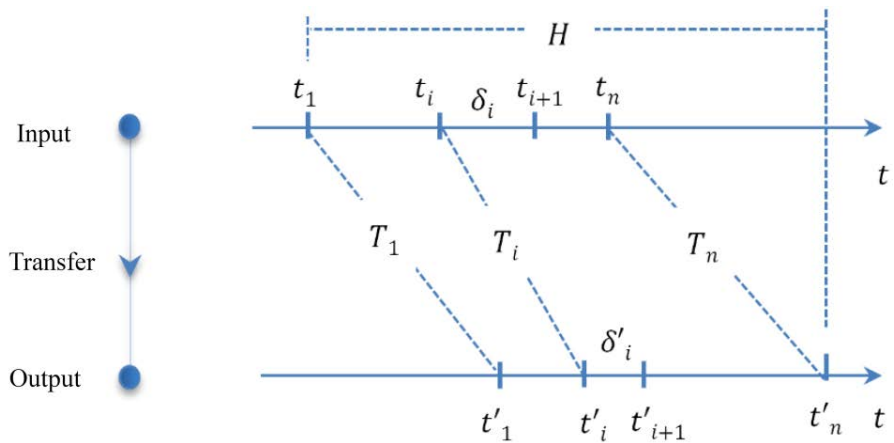


Figure 2.2. *Observation of a discrete flow in a pathway*

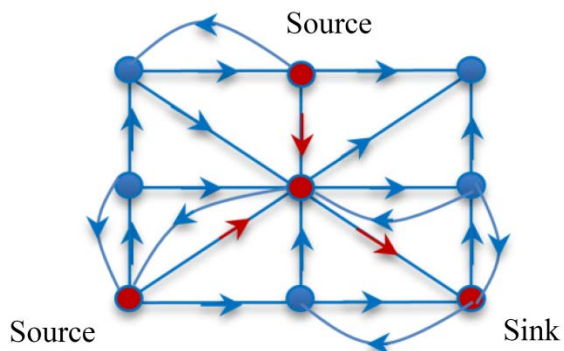


Figure 2.3. *Birth and death of flow entities within the network*

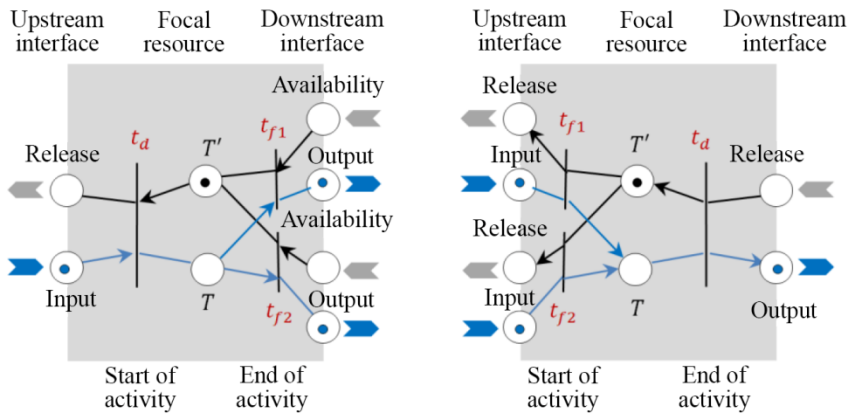


Figure 2.7. Convergence/divergence in the OR-type model

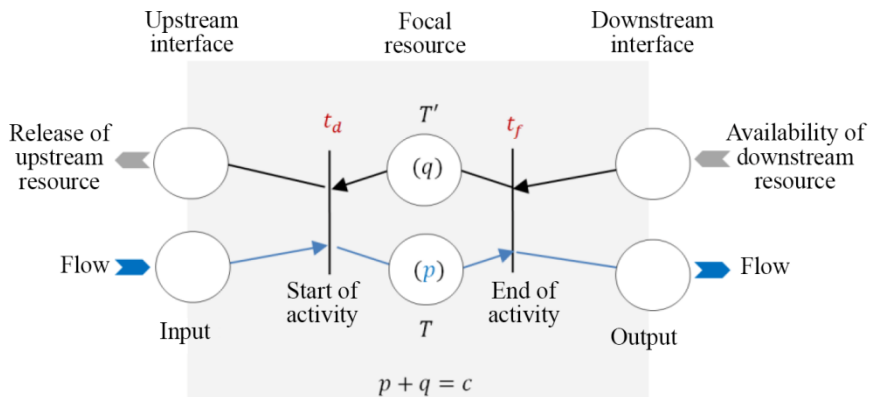


Figure 2.8. Synchronization of a multi-capacity resource



Figure 2.9. Linear resource association

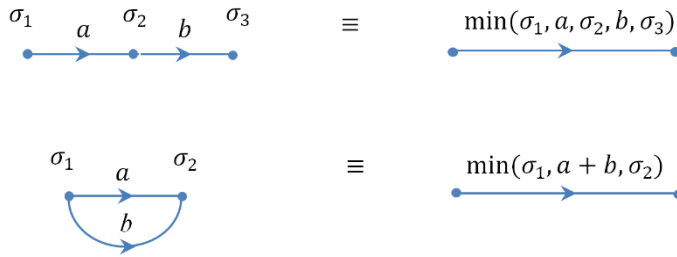


Figure 2.10. Flow networks. Combinations of edges in series and in parallel

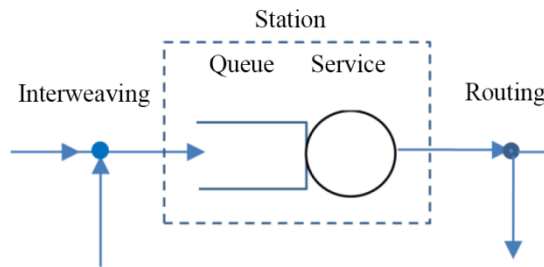


Figure 2.11. Modeling an active resource with a Markovian station

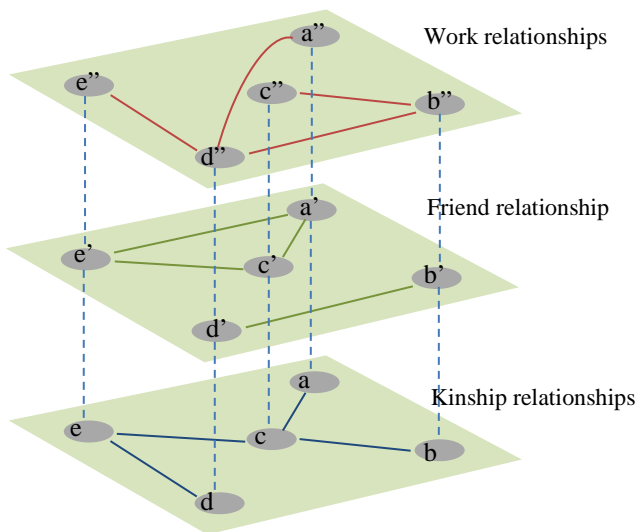


Figure 2.15. Example of a three-layered social network

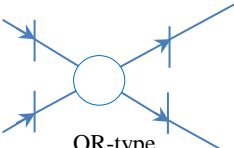
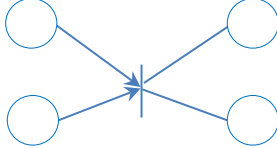
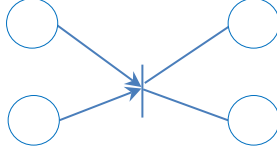
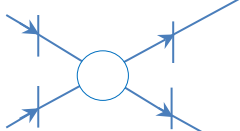
| | <i>Allowed</i> | <i>Not allowed</i> |
|--------------------|---|---|
| <i>State graph</i> |  <p>OR-type Convergence/divergence (additive flows)</p> |  <p>AND-type Convergence/divergence (synchronized flows)</p> |
| <i>Event graph</i> |  <p>AND-type Convergence/divergence (synchronized flows)</p> |  <p>OR-type Convergence/divergence (additive flows)</p> |

Table 3.1. *State and event graphs (Petri net formalism)*

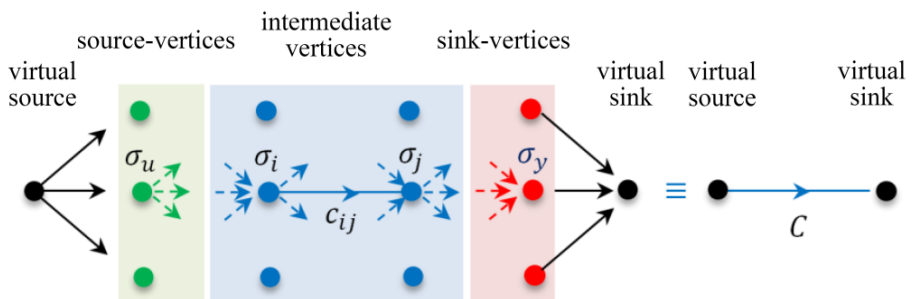


Figure 3.1. *The problem of maximum flow in an additive flow network*

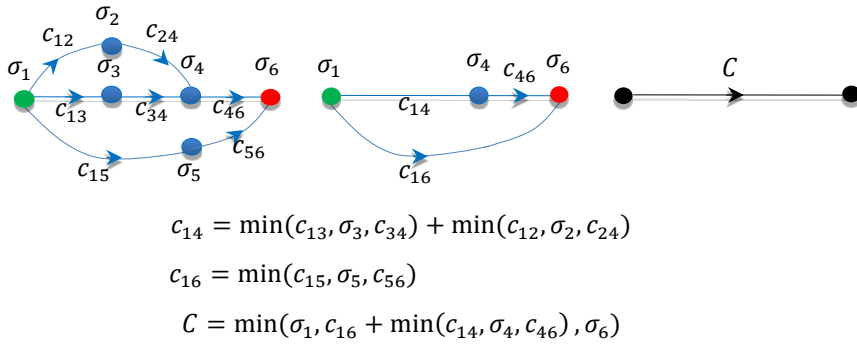


Figure 3.2. Two-terminal series-parallel graph with maximum flow

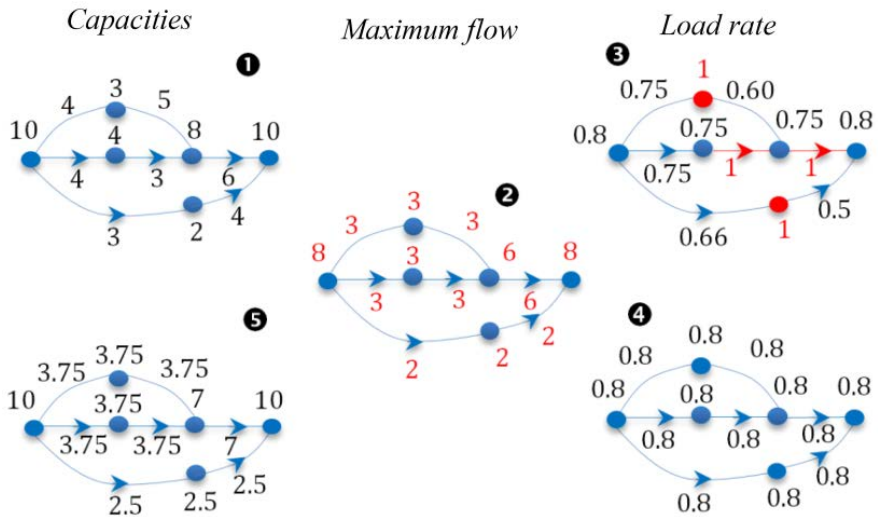


Figure 3.3. Maximum flow, load rate, capacity balancing

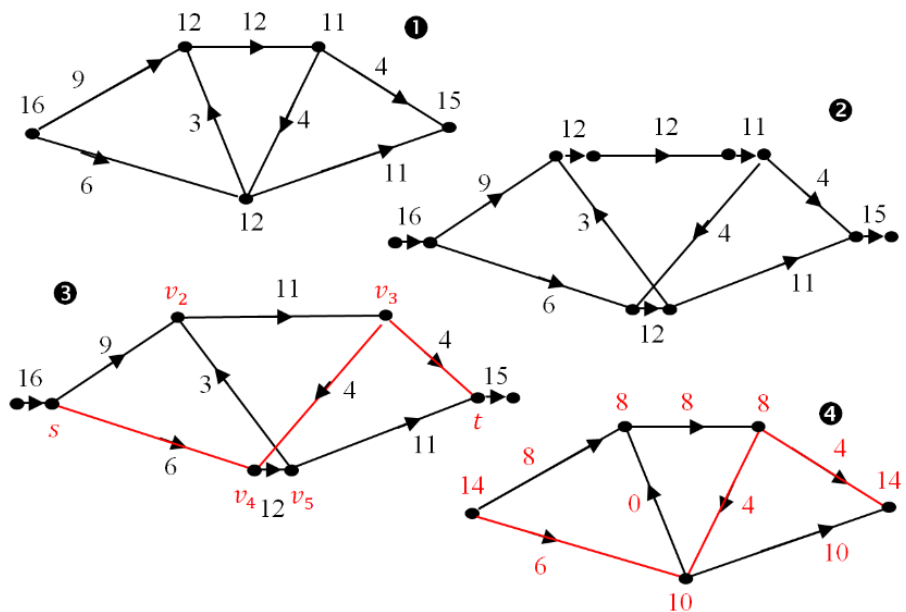


Figure 3.4. Determination of the maximum flow by searching for minimum cuts

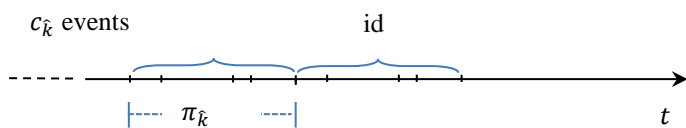


Figure 3.7. Steady state in a timed event graph with no external conditions

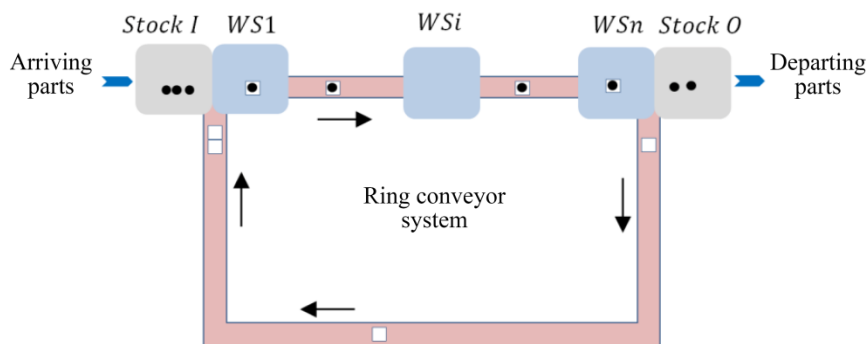


Figure 3.8. Flow-shop workshop

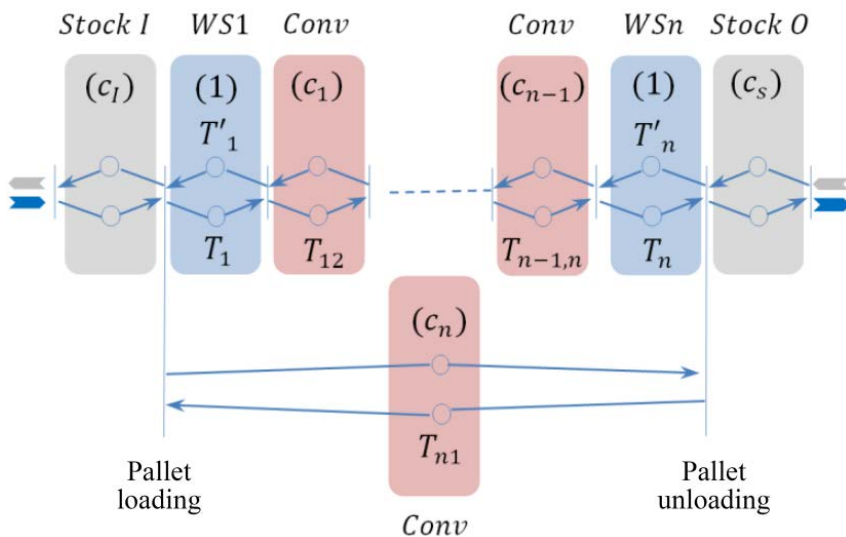


Figure 3.9. Flow-shop model using a timed event graph

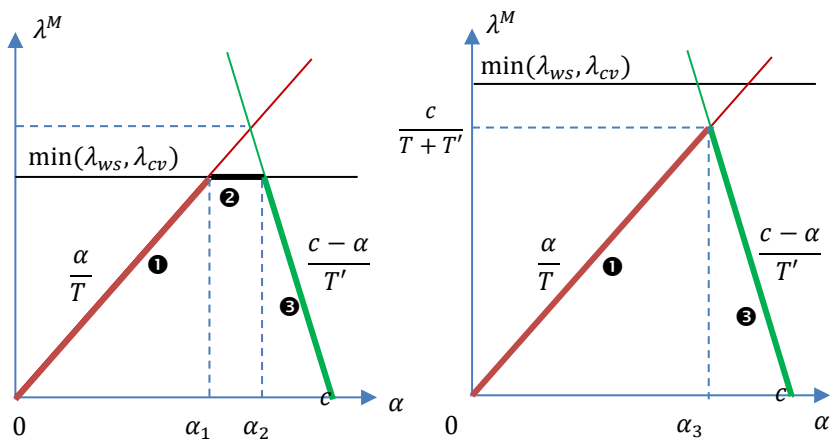


Figure 3.10. Average flow-shop production frequency according to the number of pallets

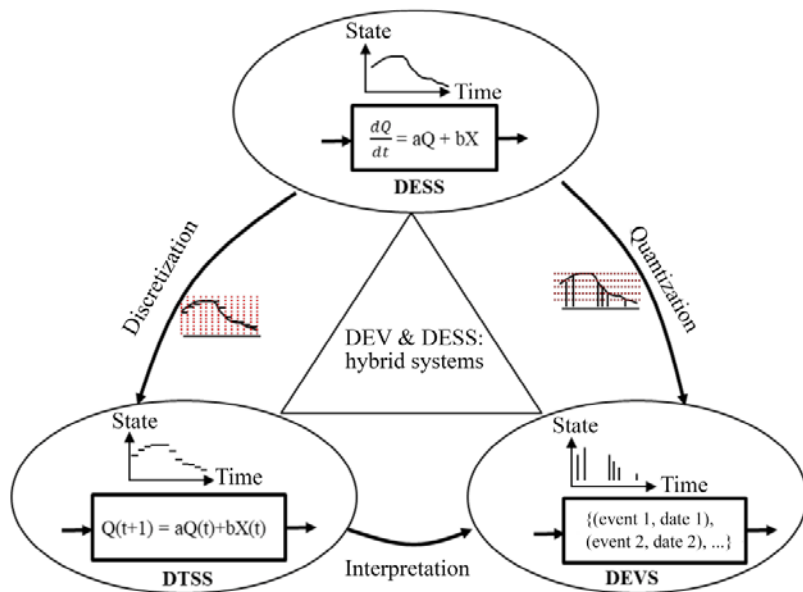


Figure 4.1. Modeling paradigms for simulation

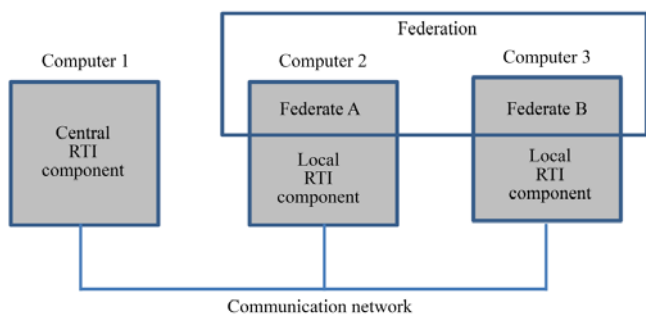


Figure 4.6. Two-federated high-level architecture

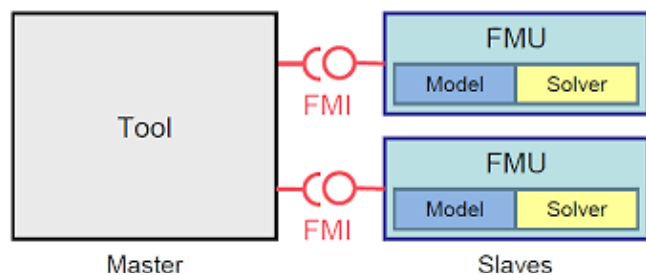


Figure 4.7. FMU structure and components

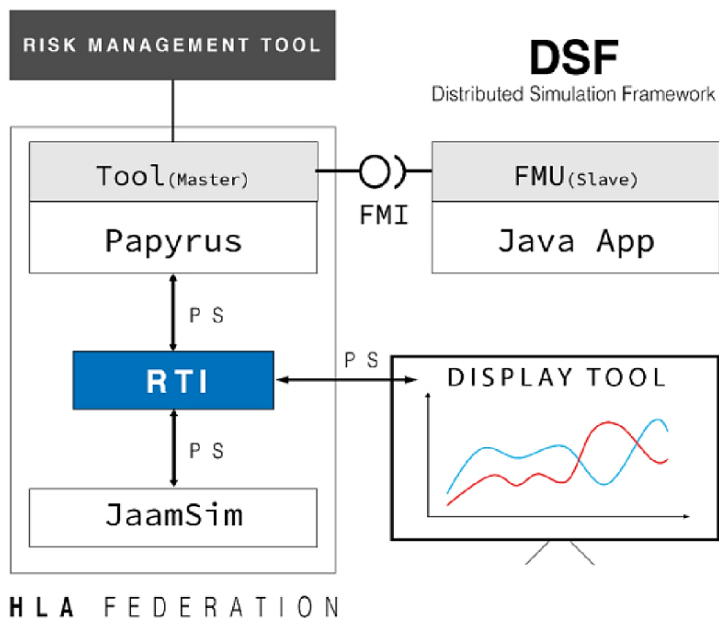


Figure 4.8. Example of HLA and FMI/FMU coupling (Gorecki et al. 2020)

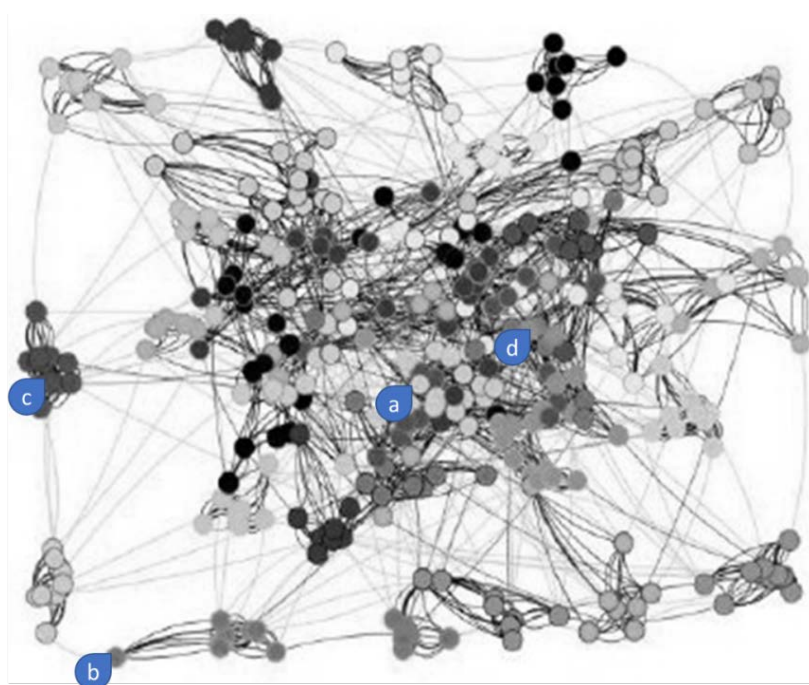


Figure 4.10. MSN from the professional network

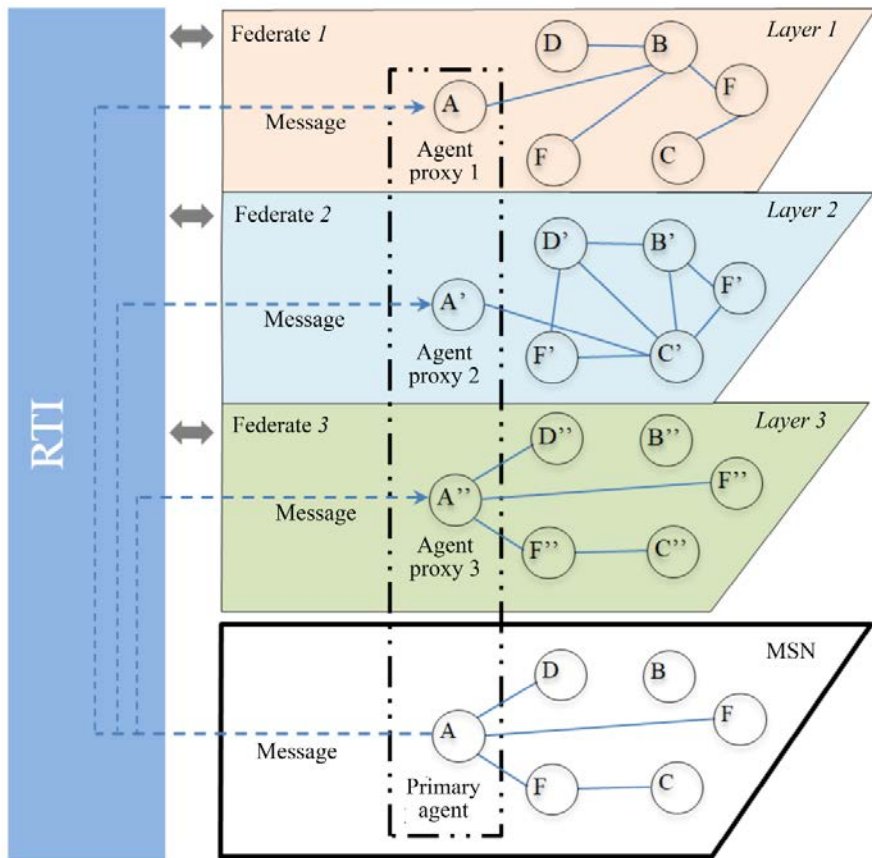


Figure 4.11. Distributed simulation of MSN (HLA architecture)

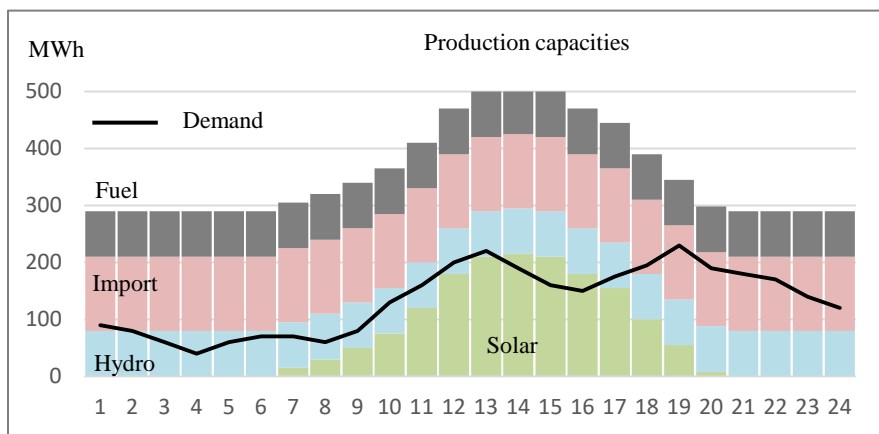


Figure 5.1. Hourly demand and capacities

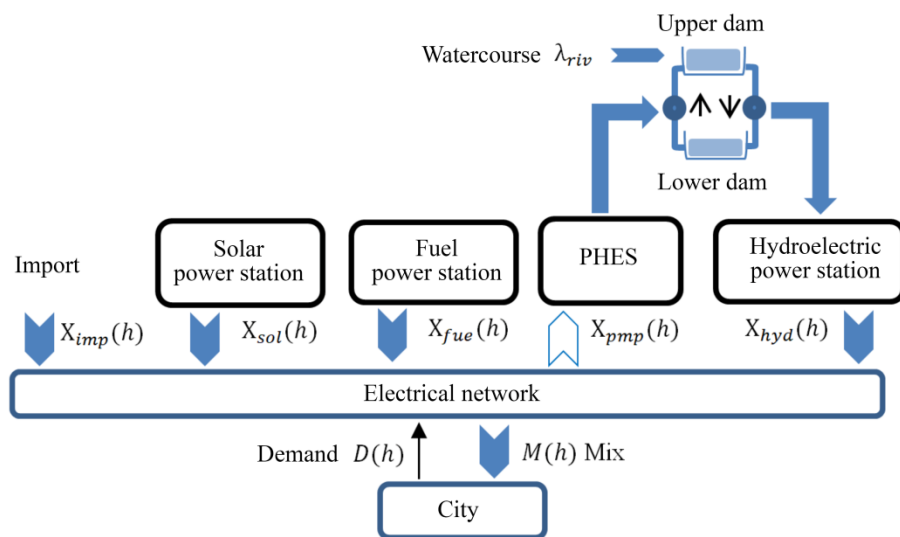
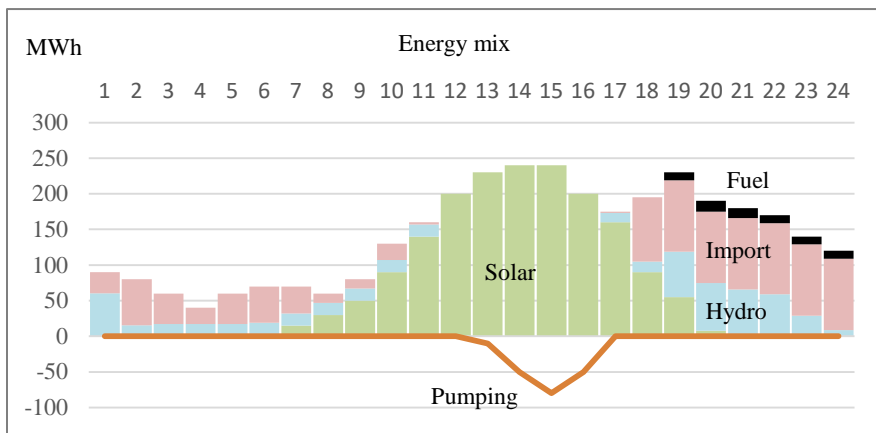
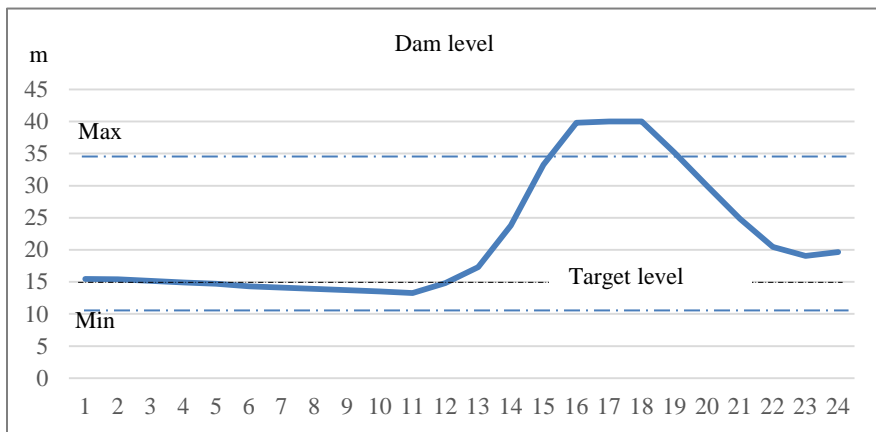


Figure 5.2. *Smart Grid flow chart*



a)



b)

Figure 5.3. a) Optimized energy mix; b) regulation of the final level of the dam

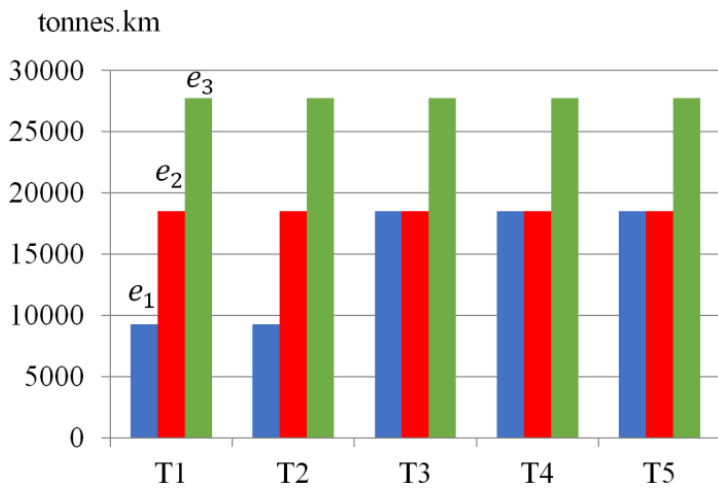


Figure 6.2. *Aggregate transport capacity*

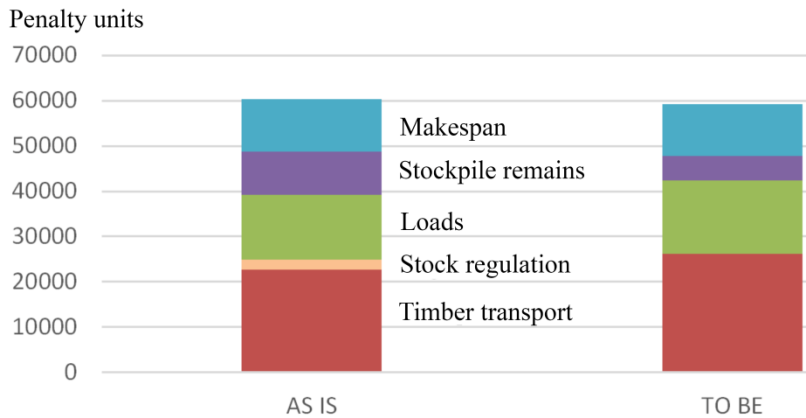


Figure 6.3. *Performance indicators*

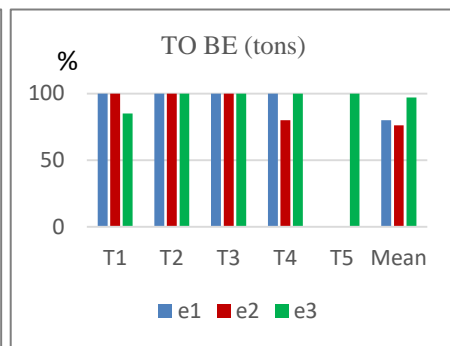
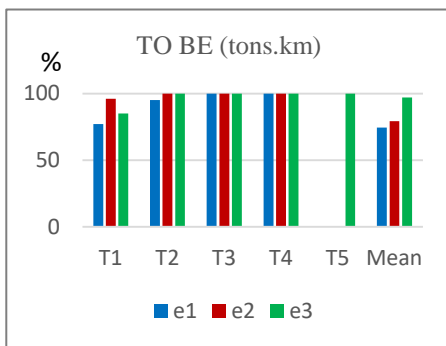
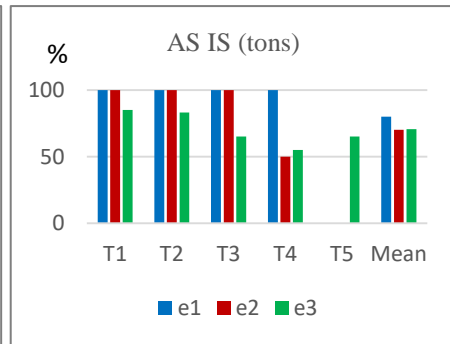
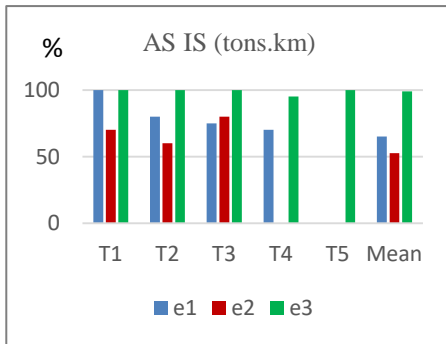


Figure 6.4. *Load rate of transport resources*

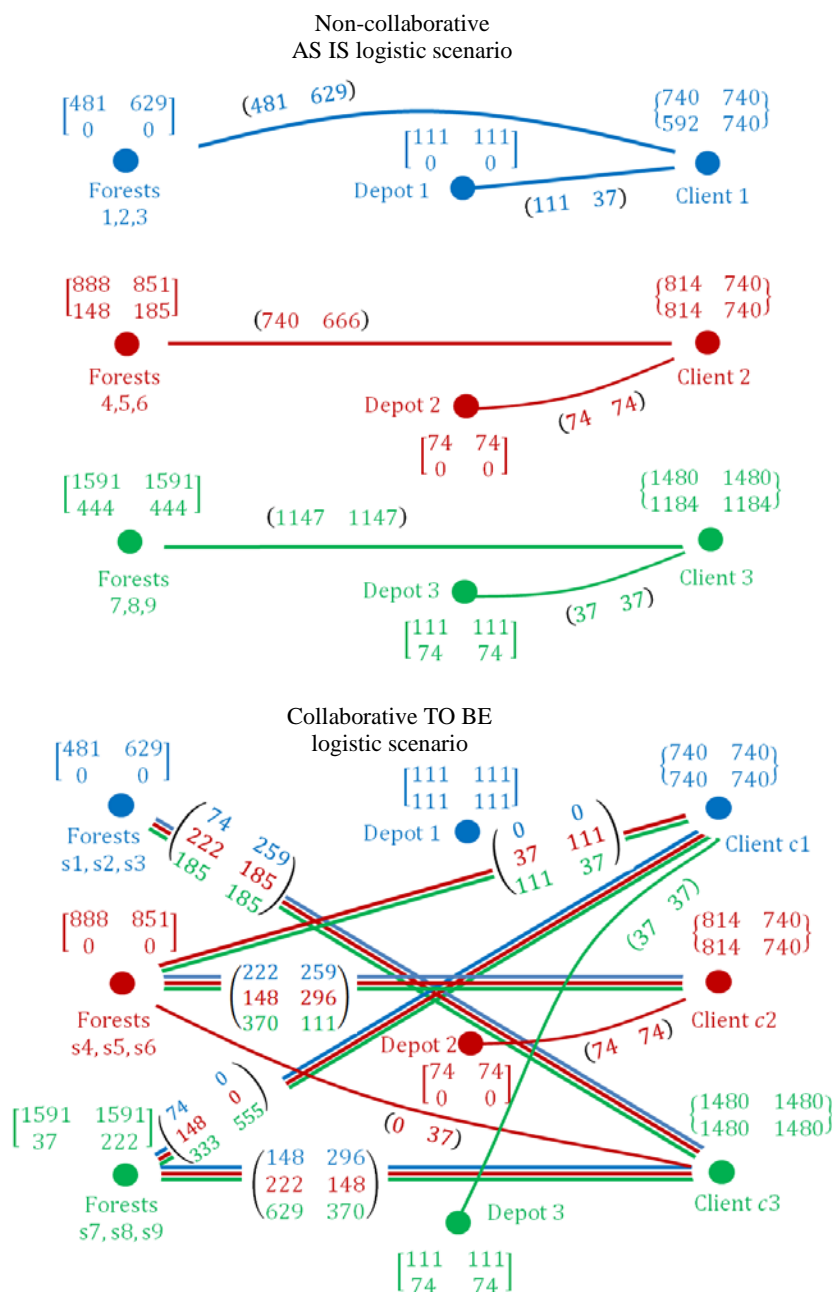


Figure 6.5. *Material supply flows*

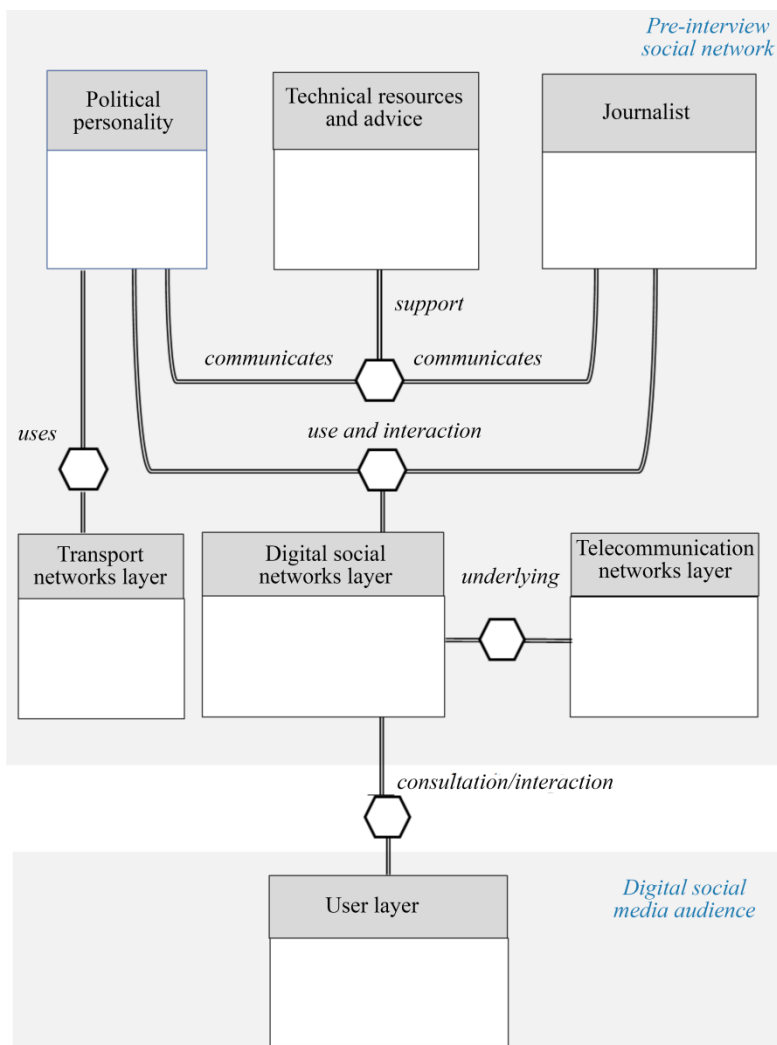


Figure 7.1. BPMN conversation diagram between the pre-interview social network and the digital social media audience

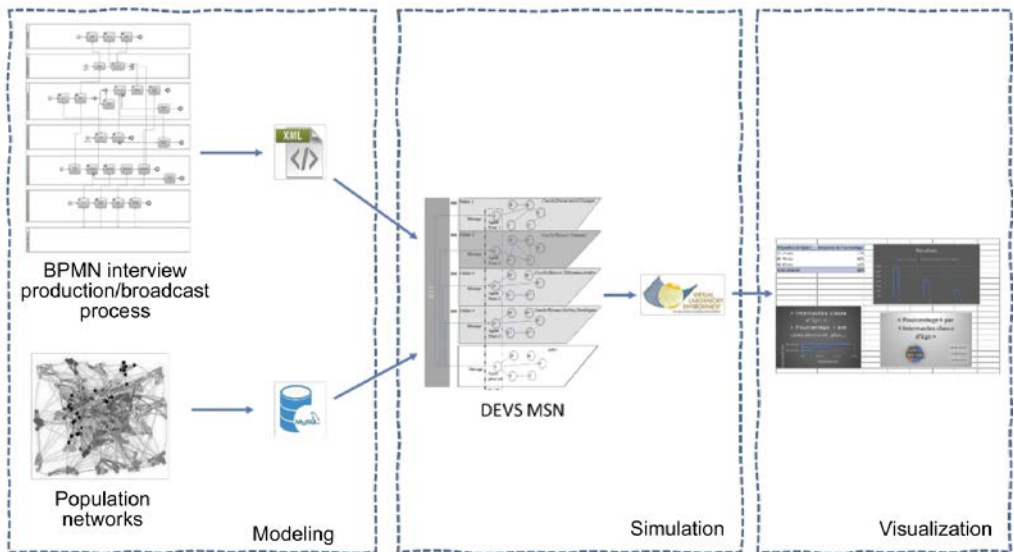


Figure 7.3. Actor-based agent modeling and simulation

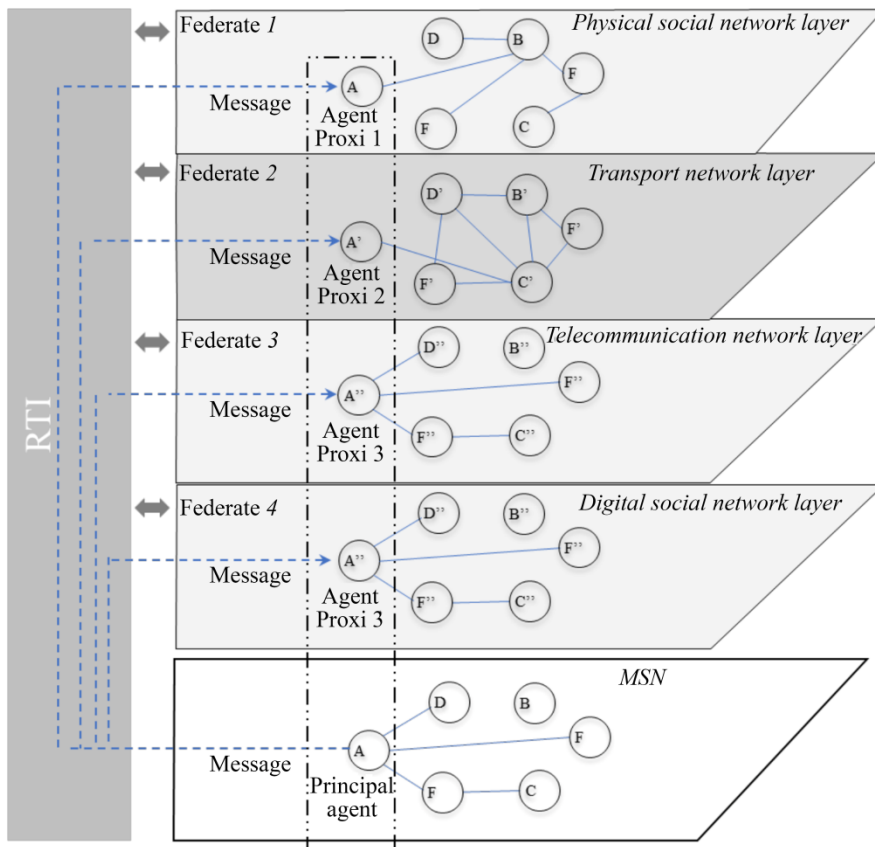


Figure 7.4. Multi-layer simulation network