FoodChain-Lab Introduction

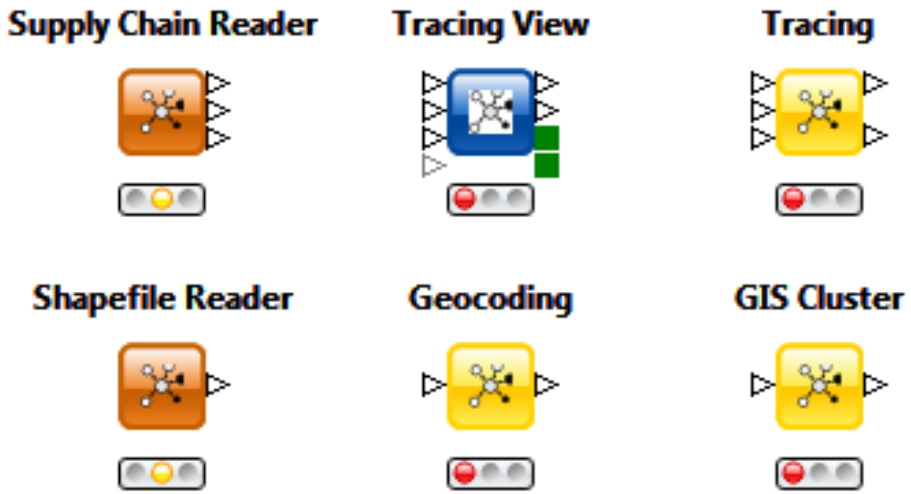
- **Delivery**: Something send from A to B at a certain date. A delivery can have preceding and subsequent deliveries (e.g. strawberry-delivery -> strawberry-cake-delivery).
- **Station**: Any food business operator, that sends and/or receives deliveries.
- **Trace**: The path a contamination can take. A station/delivery "B" is on the **forward trace** of a station/delivery "A", if a contamination at "A" can spread to "B" via the food chain network. If "B" is on the **forward trace** of "A", then "A" is on the **backward trace** of "B".

- **Weight**: Weights are assigned to stations/deliveries, that are involved in an outbreak (e.g. a restaurant where customers got sick). Different weights can be used to model differences between involved stations/deliveries (e.g. higher weight = higher likelihood that station is involved)..
- **Cross Contamination**: When it is applied at a station, its incoming deliveries contaminate its outgoing deliveries. When applied on delivery level, the selected incoming deliveries of station contaminate each others subsequent deliveries.
- **Score**: Is computed based on given weights and cross contamination. Should help to estimate the likelihood that a certain station is the origin of the outbreak (higher score = more/higher weighted stations on forward trace).

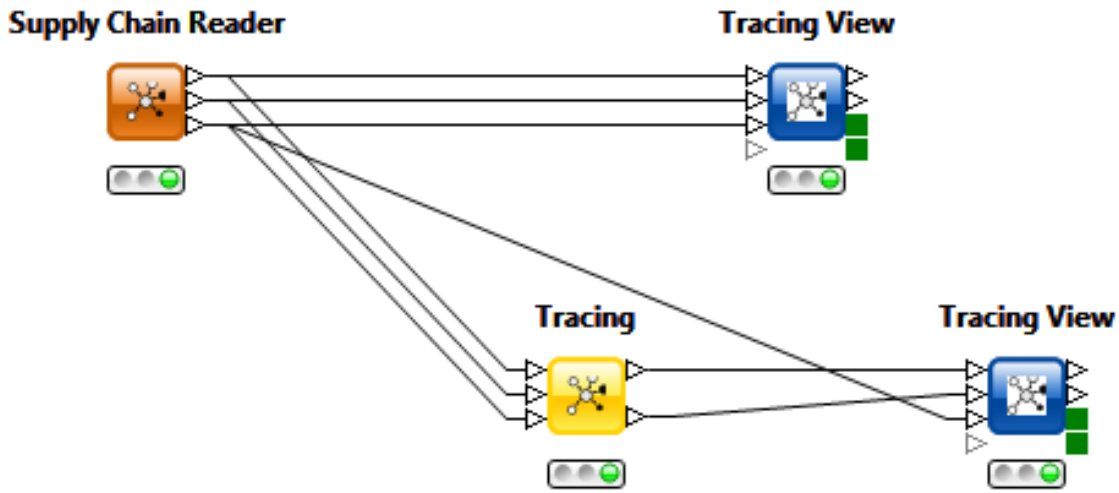
$$\mathrm{Score}(s_i) = \frac{\sum_{j=1}^{n} w_j t_{ij}}{\sum_{j=1}^{n} w_j}$$

- s_i is the i-th station or delivery
- w_j is the weight of the j-th station or delivery
- t_{ij} has a value of 1, if there is a trace from s_i to s_j and a value of 0 otherwise
- n is the total number of stations and deliveries

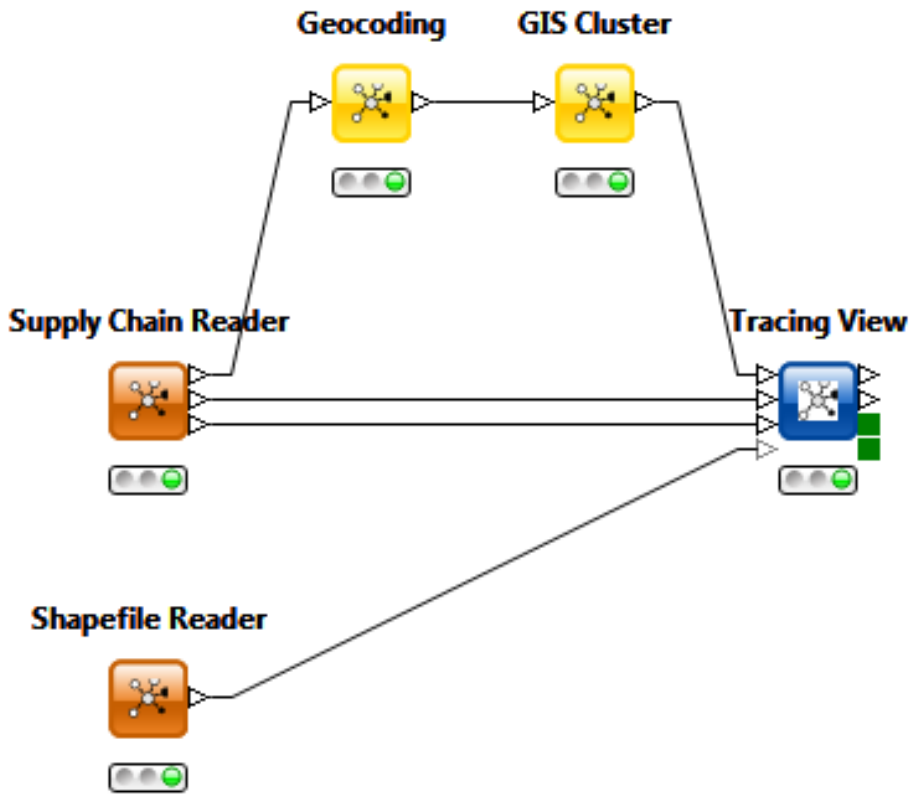
- KNIME is an open source data analytics platform, that allows users to assemble a data pipeline called "workflow".
- A workflow is built by dragging nodes from the **Node Repository** onto the **Workflow Editor** and connecting them (`https://tech.knime.org/workbench`).
- Nodes are processing units with input- and/or output ports.
- Data is transferred over a connection from an out-port to the in-port of another node.
- A comprehensive KNIME quickstart guide can be found at `https://tech.knime.org/files/KNIME_quickstart.pdf`.
- An introduction video is available at `https://www.youtube.com/watch?v=ft7Ksgss3Tc`.



- Detailed descriptions of all nodes are available in the **Node Description** view of the KNIME workbench (`https://tech.knime.org/workbench`).
- All inputs and outputs are either **data tables** (triangles) or **images** (green square). Therefore standard KNIME nodes (**Row Filter**, **Image Port Writer**, ...) can be used in FoodChain-Lab workflows.



- Supply chain data is read from the internal database via the **Supply Chain Reader**.
- This data can be visualized with the **Tracing View**. The **Tracing View** also allows to perform a tracing on the data.
- The **Tracing** node performs tracing without visualization. Its output can be used in the **Tracing View** (e.g. to perform some tracings as a preprocessing step)



- The **Geocoding** node allows to acquire latitude/longitude data from addresses.
- This data can be geographically clustered with the **GIS Cluster** node.
- The **Tracing View** allows geographical visualization, if GIS data is provided from the **Shapefile Reader**.