Simulation Health

At the end of the Analysis, InfoDrainage evaluates how "healthy" the simulation was (for each Storm and each Phase). To do this, InfoDrainage relies on a number of indicators calculated by the engine.

Flow Continuity	Comparison of the total incoming volume (including initial volume) and the total outgoing volume (including the final volume) at the end of the simulation. A discrepancy between the 2 volumes indicate that some volume has been either lost or created during the simulation. A significant value of Flow Continuity error implies a poor confidence in the flow results. Because the pollutant transport is dependent on the flow, a large Flow Continuity error normally results in a large Quality Continuity error.
Quality Continuity	Comparison of the total incoming pollutant mass (including initial mass) and the total outgoing pollutant mass (including the final mass) at the end of the simulation. A discrepancy between the 2 masses indicate that some pollutant mass has been either lost or created during the simulation. A significant value of Quality Continuity error implies a poor confidence in the concentration results.
Convergence	At each computational time-step, the engine uses an iterative procedure to calculate the updated hydraulic state. After each iteration, the engine checks for the "convergence" of the water levels within the system to determine if the new hydraulic state is acceptable or not. There is a maximum number of iterations allowed to reach convergence (8 iterations by default). If the convergence has not been reached after 8 iterations, the engine keeps the hydraulic state from the last iteration and moves on to the next time-step. However, in this situation there is a high chance that this hydraulic state is not physically valid.

Depending on which indicator is flagged by InfoDrainage as inappropriate, the possible ways of improving the simulation health are described below.

Flow Continuity Issues

Typically, the time-step is too large, or an outlet is ignored by the time-step condition.

Innovyze recommends that you consider selecting a shorter time step on the **Analysis Criteria**. This reduces the upper bound of the time-step. The engine still has the ability to adjust the time-step within the prescribed range according to the flow conditions.

Time-step range	Time-step lower bound (s)	Time-step upper bound (s)
Default	0.5	15
Reduced	0.5	5
Shortest	0.5	1

Quality Continuity Issues

If both the Flow Continuity and Quality Continuity error are high, then the Flow Continuity should be addressed first (see section above). In most scenarios that will also improve the Quality Continuity.

If the Flow Continuity error is low and the Quality Continuity is high, it is recommended to contact the Innovyze Support team for further investigation.

Convergence Issues

An object or structure within the project is making the convergence difficult. This should be addressed first, only then consider reducing the time-step range

The following checks or actions should be considered.

- Ensure that inflows into the system are gradually-varying, i.e. avoid a jump from zero inflow to 100 L/s over a short period of time for example.
- Simple Junction nodes should be used in places where the hydraulic conditions are fairly simple. Consider replacing a Simple Junction by a Manhole where more than 2 connections are meeting, or where a node becomes highly surcharged during the simulation.
- Outlets need to be treated with caution. The adaptive time-step condition currently ignores outlets (weirs, orifices, gates, etc). If an outlet is behaving badly, it is necessary to reduce the time-step range.

Further Help

In the case that none of the measures described in this page improve the simulation health, please contact the Innovyze Support team to get further help.