

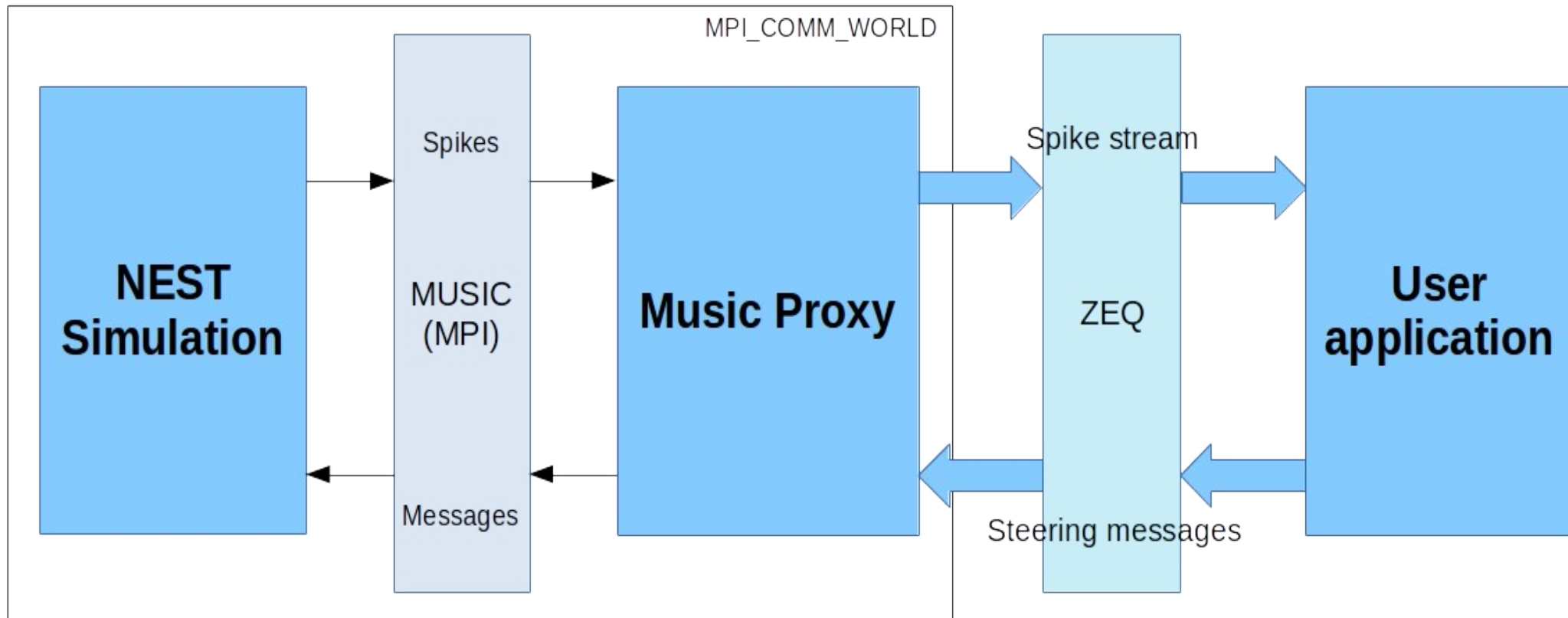
Interactive NEST

Blue Brain Project
Visualization Team

Interactive Supercomputing

- Wouldn't it be nice if you could analyze and visualize your data as it is being generated, without having to go through a file system? - So called „**Streaming**“
- And wouldn't it be cool to interact with the simulation, maybe even modifying parameters while the simulation is running? - So called „**Steering**“

General Overview



Software Components

- **NEST (C++ Application with python interface):**
 - Large-scale neural network simulator that can be run on distributed computing environments.
- **MUSIC (C++ Application & Library):**
 - Well-known data exchange library for neural simulators such as NEST, Neuron and Moose.
 - Can connect large scale neural neural networks and has an easy interface for coupling applications with the simulators.

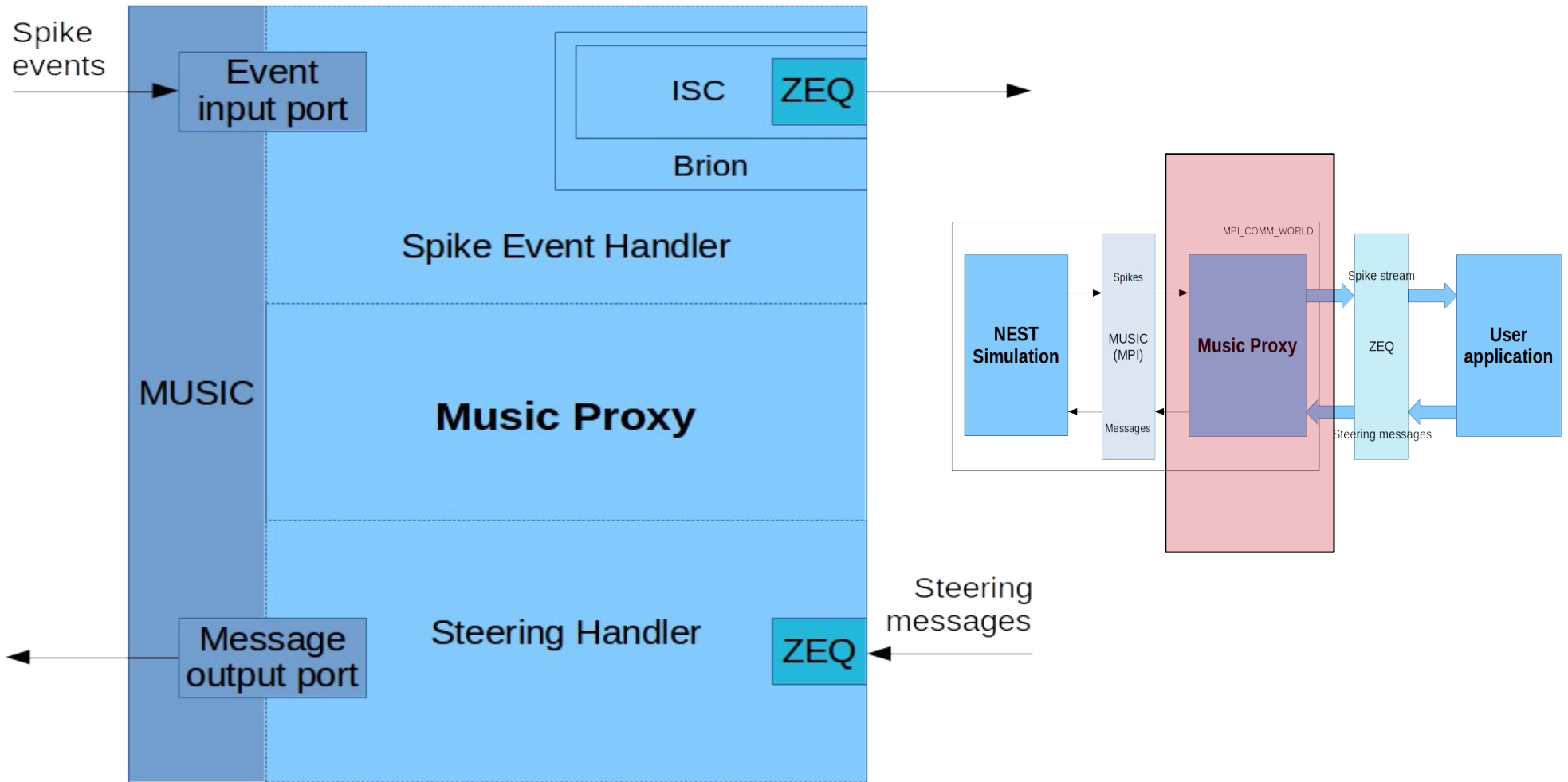
Software Components (In-house)

- **ZeroEQ (C++ library):**
 - Library for type-safe Event Based network communication (ZeroMQ, FlatBuffers) with peer auto-discovery (zeroconf).
- **Brion (C++ library):**
 - Low level IO interfaces and plugin mechanism for accessing BBP data.
- **ISC (C++ library & python scripts):**
 - Helps users to construct loosely coupled simulation-observer/controller pairs.
 - NESteer python class to process steering messages.

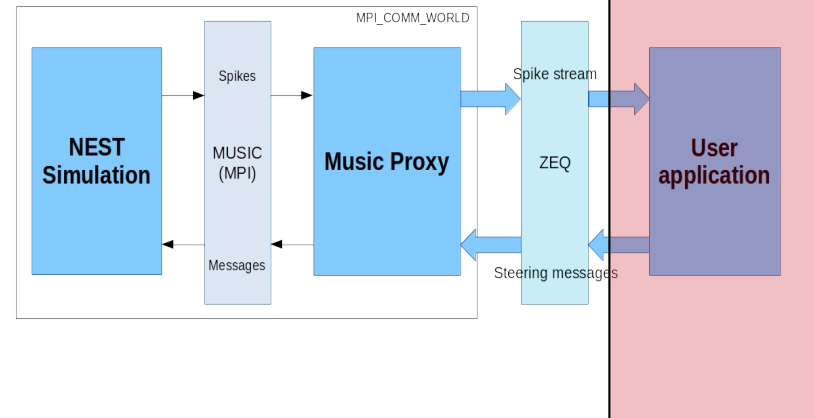
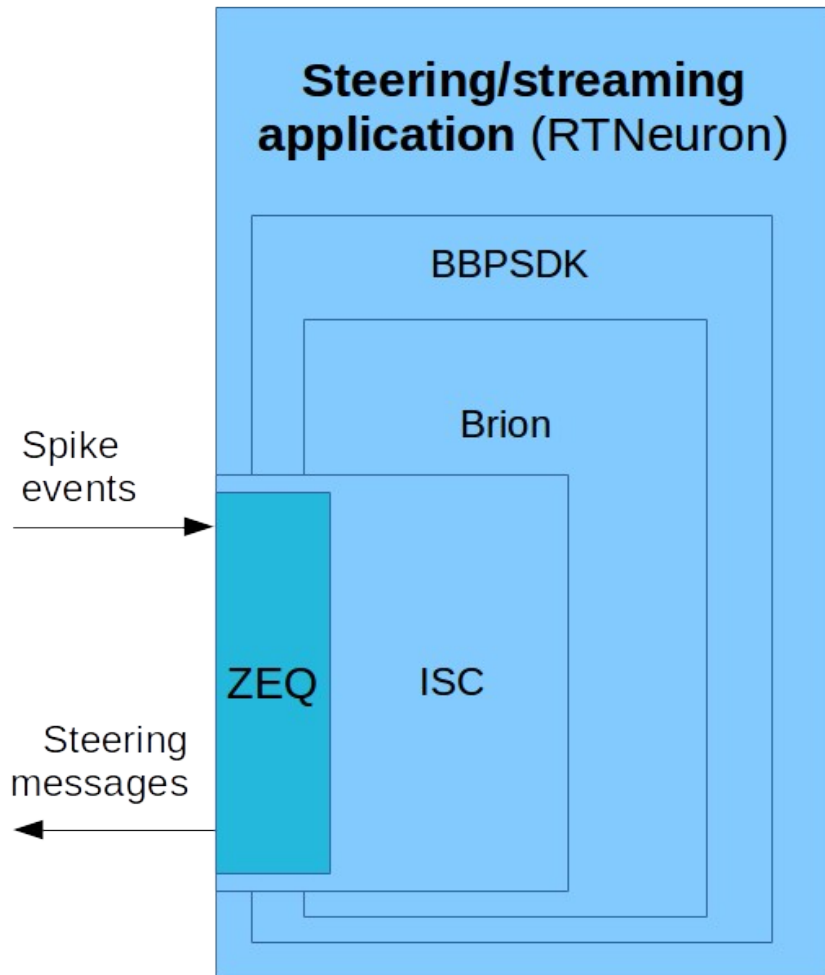
Software Components (In-house)

- **BBPSDK (C++ library):**
 - High level API for accessing BBP data using Brion.
 - Includes a Python wrapping.
- **MUSIC Proxy (C++ Application):**
 - Bridge between the static world of the simulator and dynamic world of the clients.
- **RTNeuron (C++ Application with python interface):**
 - BBP circuit visualization tool.
 - Has the features to connect to a running simulation and visualize spike events in the circuit.

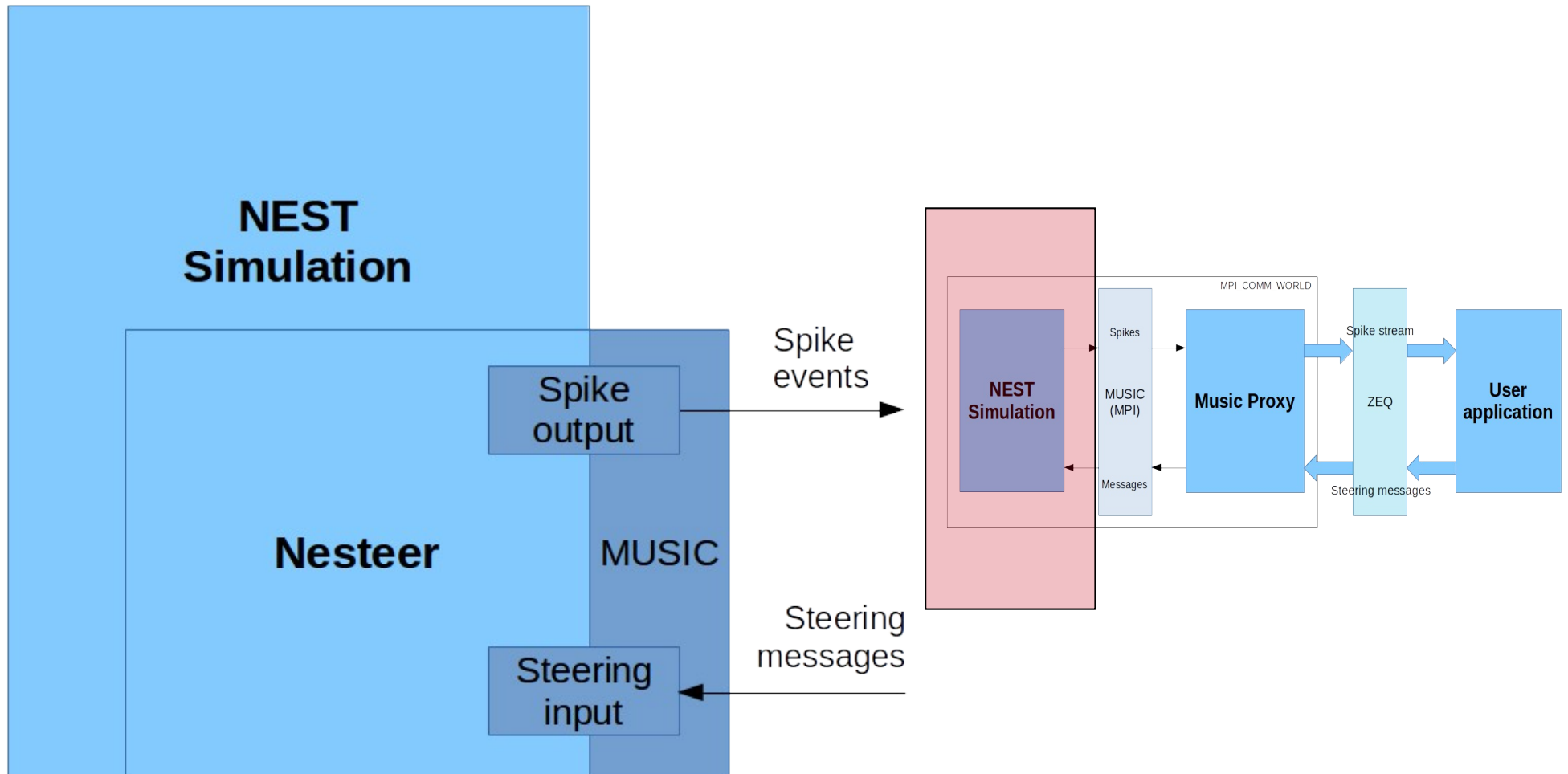
MUSIC Proxy



User Application



NEST Simulation



Open Questions

- **How do we interrupt and resume simulation ?**
 - Currently NEST is uninterruptable through the simulation time.
- **How do we receive arbitrary information from simulation ?**
 - Current NEST does not have a message output port. (But there is a patch ! Thanks to **Mikael Djurfeldt**)