

*u*<sup>b</sup>

# Technological Intricacies of XR

## A Case for Streamix

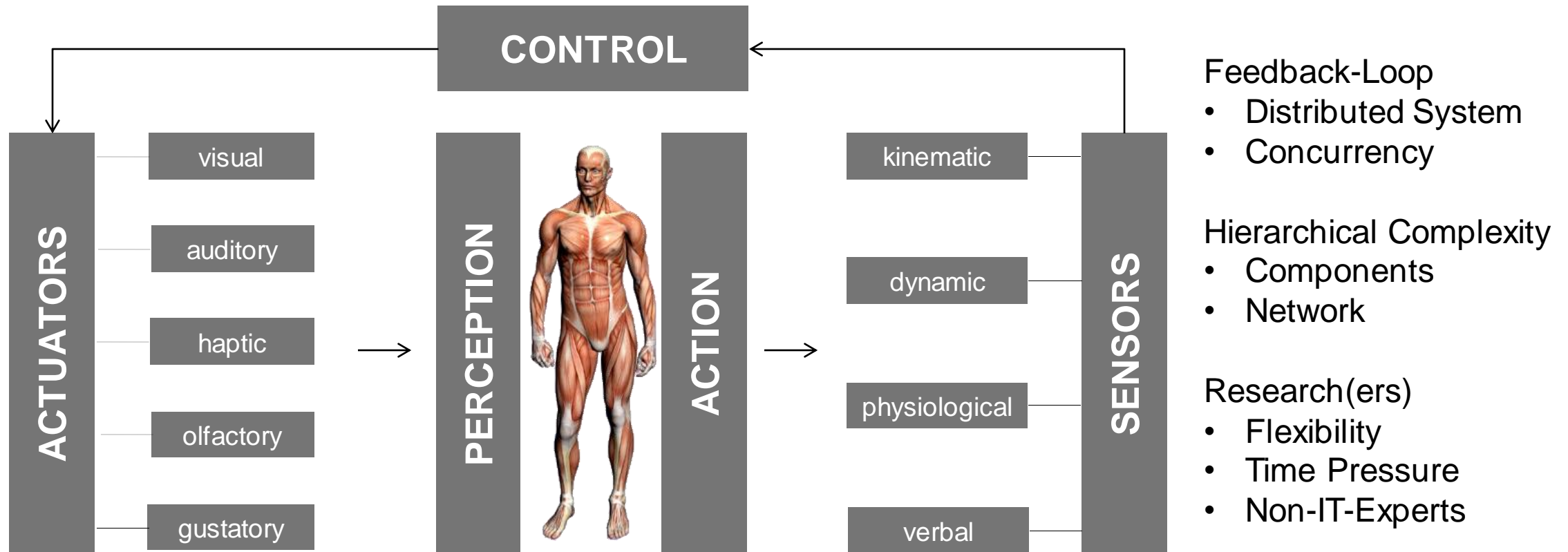
**Ralf Kredel**

1. Workshop DigiK-Fokusgruppe XR, 20.03.2023

$u^b$

# Problem Statement

## XR as concurrent Cyber-Physical System



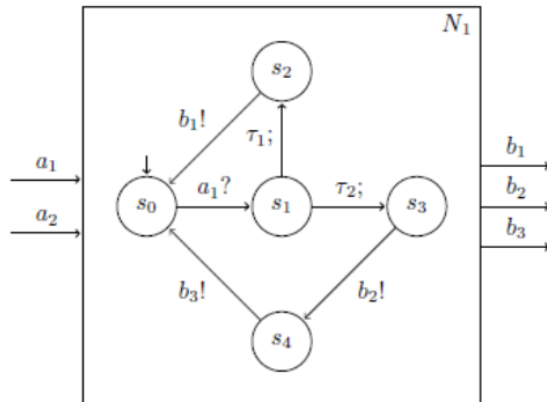
$u^b$ 

# Lab Modeling with Streamix (Maurer, 2018)

## A Modular Network of «Black-Boxes»

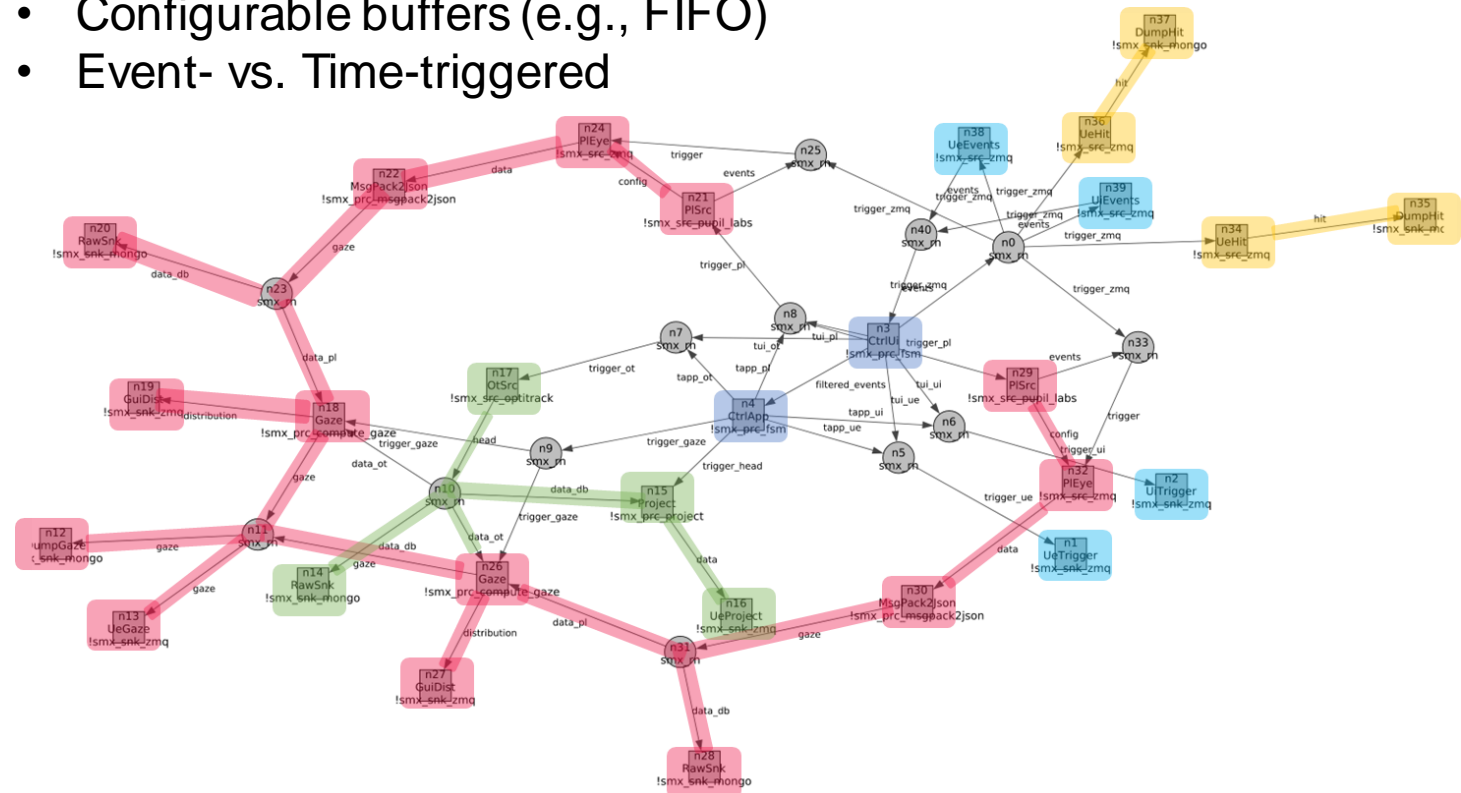
### Algorithmic: Components

- (Stateful) Process
- Reacting to input messages
- Producing output messages



### Coordination: Network

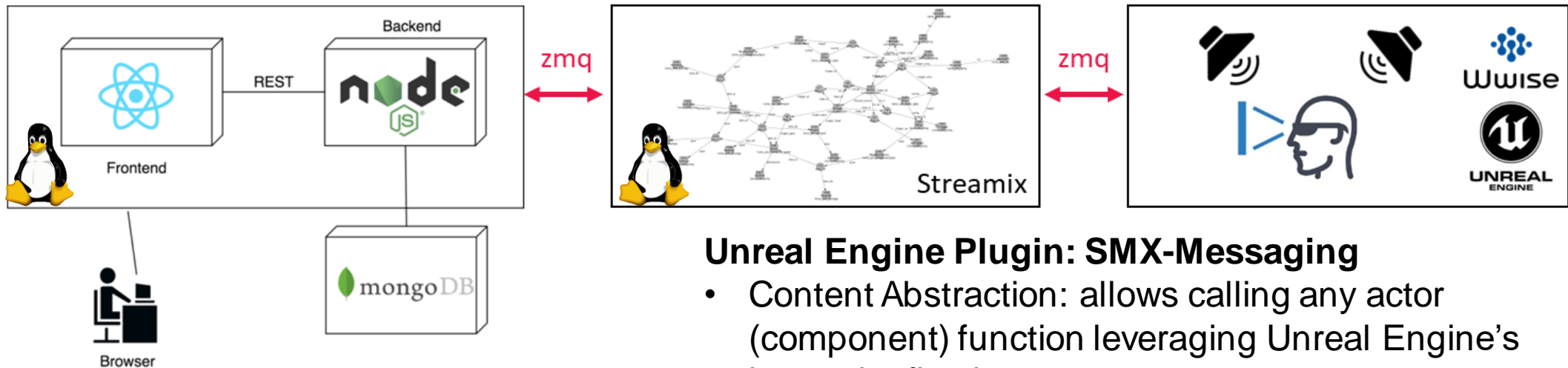
- Independent processes (threads)
- Configurable buffers (e.g., FIFO)
- Event- vs. Time-triggered



$u^b$

# XR with Streamix

## On the Shoulders of Giants



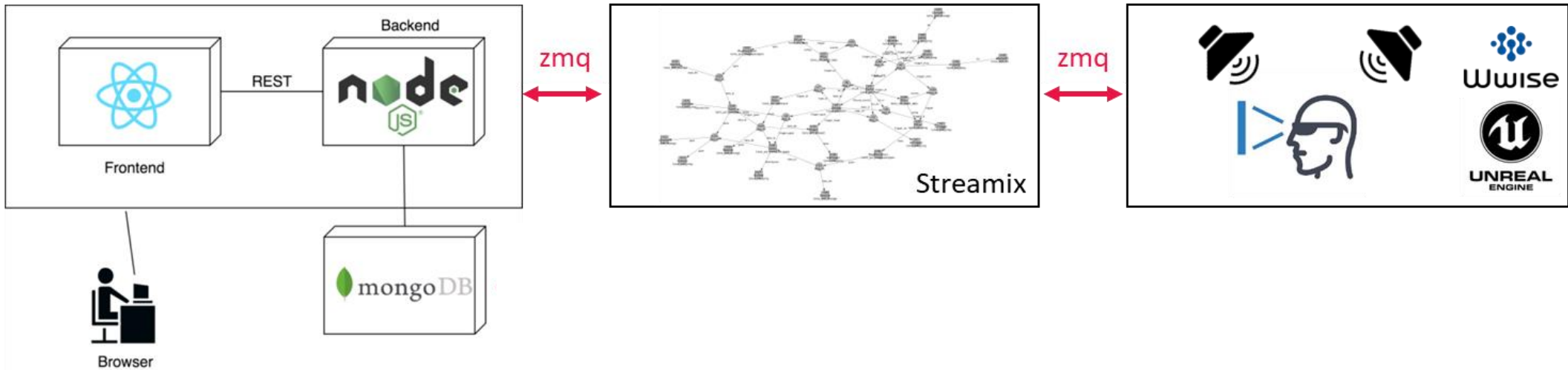
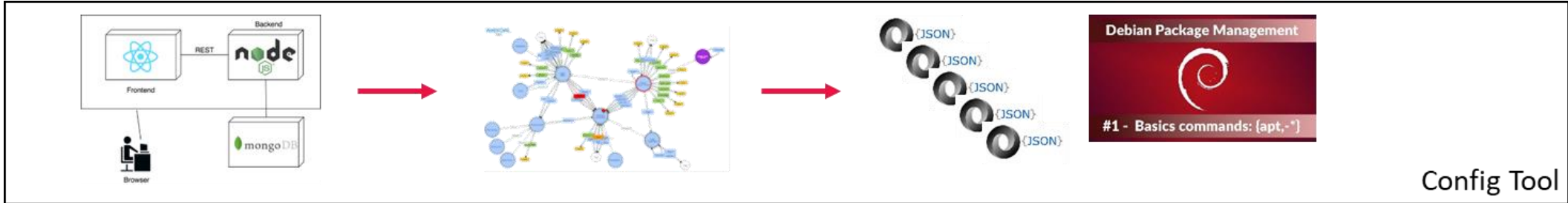
### Unreal Engine Plugin: SMX-Messaging

- Content Abstraction: allows calling any actor (component) function leveraging Unreal Engine's internal reflection system
- Hardware Abstraction: Mobile, HMD, PC, CAVE

$u^b$

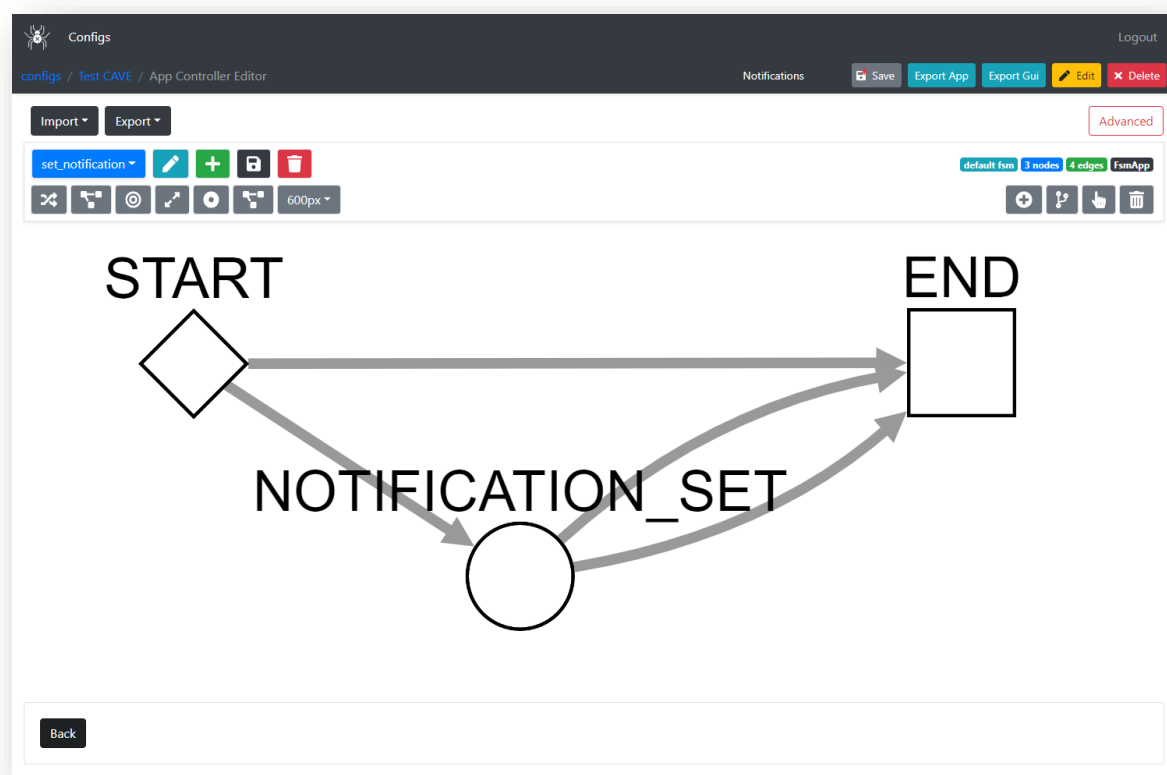
# XR with Streamix

## Coping with «Configuration Hell»



# XR with Streamix

## Coping with «Configuration Hell»



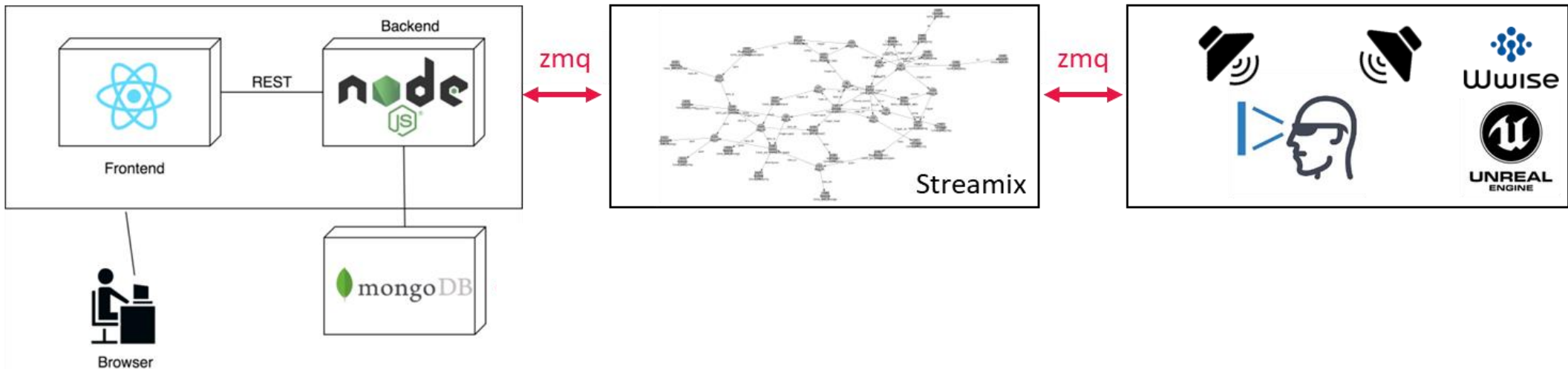
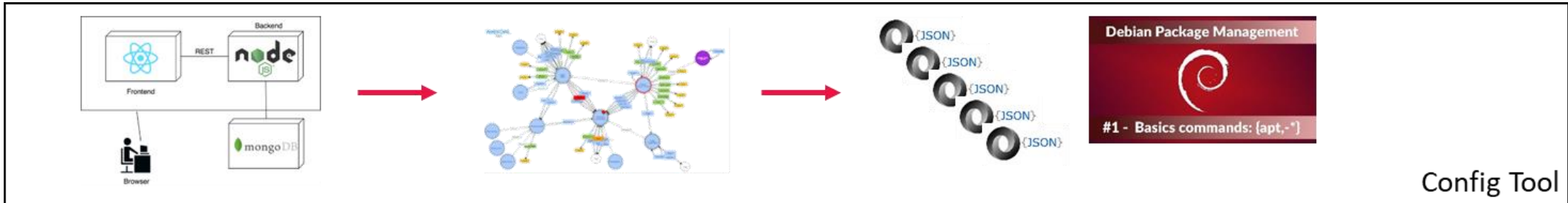
This screenshot shows the configuration panel for a specific transition labeled 'Transition t0:START->NOTIFICATION\_SET'. It is divided into two main sections: 'Events triggering this Transition' and 'Events produced on this Transition'. The 'Events triggering' section contains a list with one item 'smx\_app-try-trial\_start' and an 'Add' button. The 'Events produced' section contains a list with one item 'smx\_ui-try-set\_notification -> events' and a 'Create new Event' button. Below these sections are fields for 'Sleep Time' (set to 0) and 'Connected Nodes' (set to START -> NOTIFICATION\_SET). There is also a 'Duplicate Transition' button at the bottom.

This screenshot shows the configuration panel for a protocol named 'Demo Protocol'. It features a hierarchical view with 'Session 1' containing 'Block 1' and 'Block 2'. 'Block 1' contains two trials: 'Trial 1' (marked as 'blocking') and 'Trial 2'. Each trial and block has edit and delete icons. There are also buttons for 'Save', 'Export', 'Import', and '+ Protocol' at the top of the panel.

$u^b$

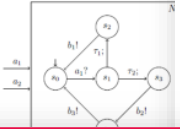
# XR with Streamix

## Providing a flexible Data Analysis API



# u<sup>b</sup> Lab Modeling with Streamix (Maurer, 2018) A Modular Network of «Black-Boxes»

- Algorithmic:** Component
- (Stateful) Process
  - Reacting to input messages
  - Producing output messages

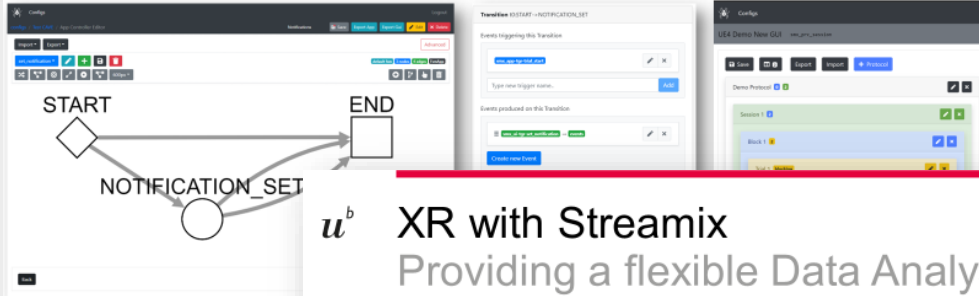


# u<sup>b</sup> XR with Streamix On the Shoulders of Giants

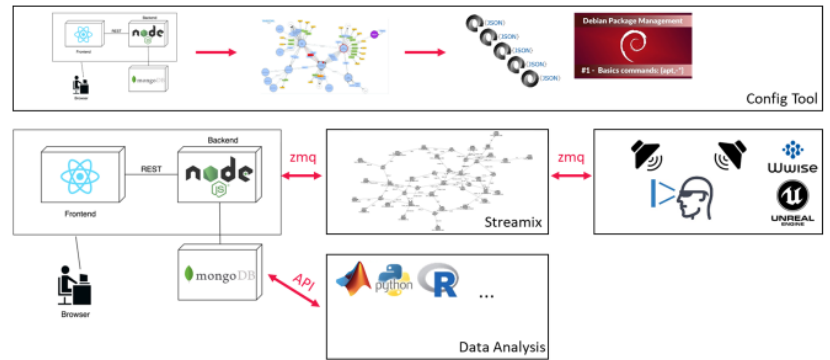


Work with Streamix  
for component function  
(internal reflection system)  
(e.g., HMD, PC, CAVE)

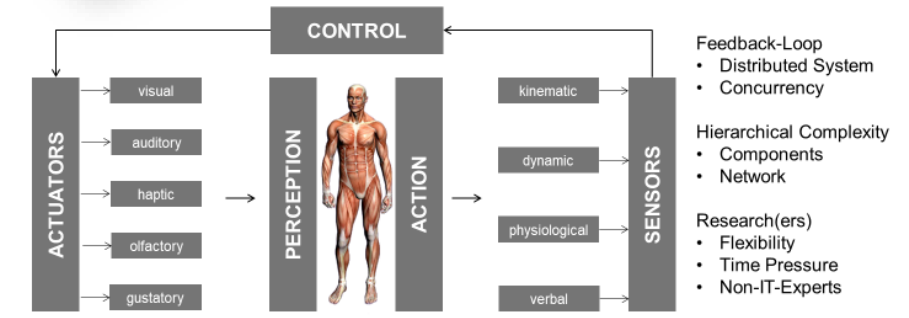
# u<sup>b</sup> XR with Streamix Coping with «Configuration Hell»



# u<sup>b</sup> XR with Streamix Providing a flexible Data Analysis API



# u<sup>b</sup> Statement X as concurrent Cyber-Physical System





# Contact



**Dr. Simon Maurer**

Phil.-Hum. Technology Platform

[simon.maurer@unibe.ch](mailto:simon.maurer@unibe.ch)

*u<sup>b</sup>*

---

*b*

**UNIVERSITÄT  
BERN**

13.00	14.00	Sensorimotor Lab Demo	Kredel (PHILHUM, ISPW)
14.00	14.15	Grusswort	Hossner (Präsident DigiK)
14.15	14.30	An Information Systems Perspective on Extended Reality	Matt (WISO, IWI)
14.30	14.45	www.visl.ch – Virtual Inselspital Simulation Lab: Medical Extended Reality in Emergency Medicine	Wespi/Sauter (MED, INSEL)
14.45	15.00	Networking for Immersive Communications	Hrabošová/Braun (PHILNAT, INF)
15.00	15.20	<i>Kaffeepause</i>	<i>alle</i>
15.20	15.35	Visualisation Needs and Challenges in Geosciences	Churakov (PHILNAT, GEO)
15.35	15.50	PlatformCommander - VR beyond ordinary game engines	Ertl/Mast (PHILHUM, PSY)
15.50	16.05	VR Applications for Patients with Neurodegenerative Diseases and Brain Injury	Nef (MED, ARTORG)
16.05	16.20	Spiritual Care and XR	Noth (THEO, IPT)
16.20	16.40	<i>Pause</i>	<i>alle</i>
16.40	16.55	Technological Intricacies of Interactive VR	Maurer (PHILHUM, TPF)
16.55	17.10	Overview of Digitalization Projects and Research in Medical Education	Guttormsen (MED, IML)
17.10	17.25	Complex Sensorimotor Control under Uncertainty	Zahno/Kredel/Hossner (PHILHUM, ISPW)
17.25	17.45	Diskussionsrunde	<i>alle</i>
17.45	19.00	<i>Networking and Apéro</i>	<i>alle</i>