

# “Breaking Down the Technical Barrier”

## Visual Programming Driven Dynamic Immersive Analytics using XROps



**Suemin Jeon**  
Korea University

**JunYoung Choi**  
Korea University  
VIENCE Inc.

**Haejin Jeong**  
Korea University  
VIENCE Inc.

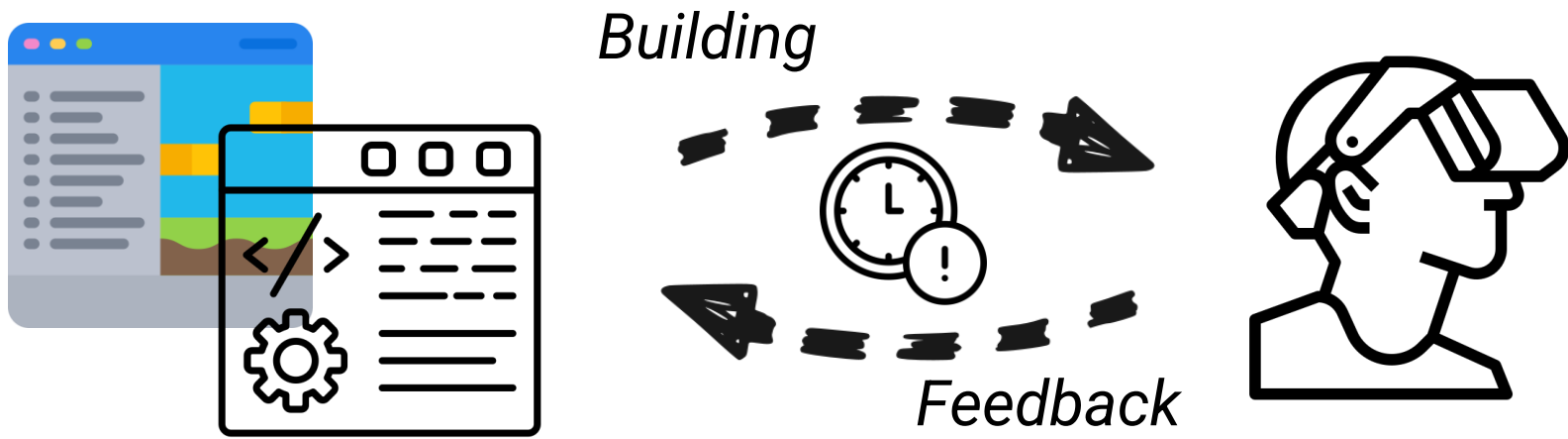
**Won-Ki Jeong**  
Korea University  
VIENCE Inc.



### Introduction

Immersive Analytics (IA) is recognized for enhancing data exploration and decision-making, but its utilization is restricted due to **domain-specific applications** and **steep learning curves**. Existing authoring toolkits suffer from following limitations:

- Difficulty in creating complex data processing workflows
- Inability to dynamically modify existing workflows
- Inefficiencies, including long building processes or offline low-level coding



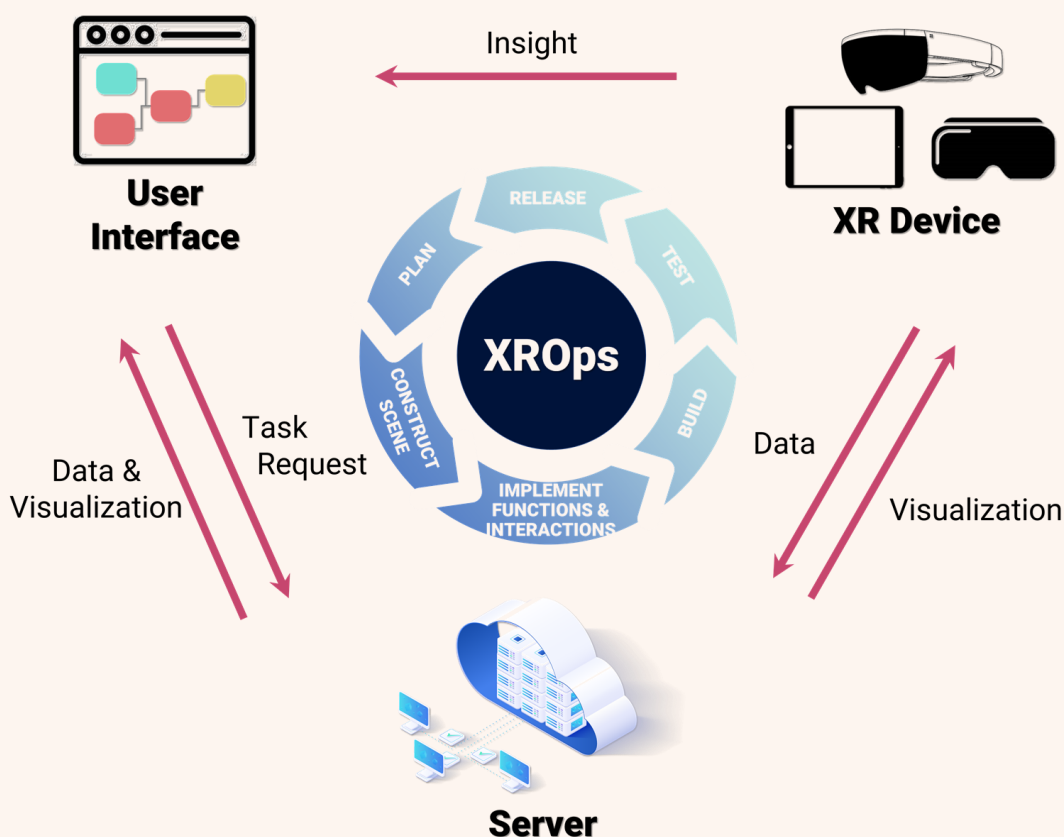
### XROps

XROps is a web-based visual workflow management framework for authoring IA applications.

#### Design Rationale

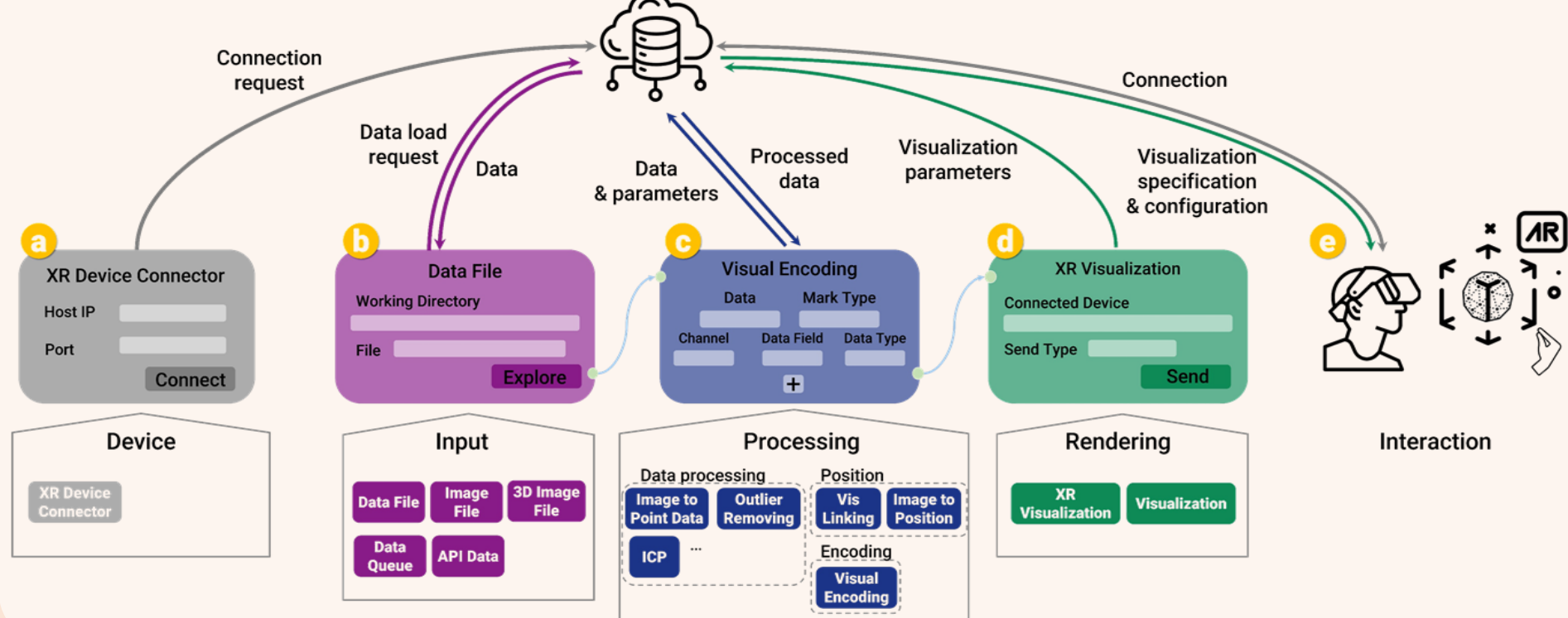
##### Managing the lifecycle of XR development

- Unified framework that handles the entire extended reality visualization development life cycle.
- Dynamic workflow modification



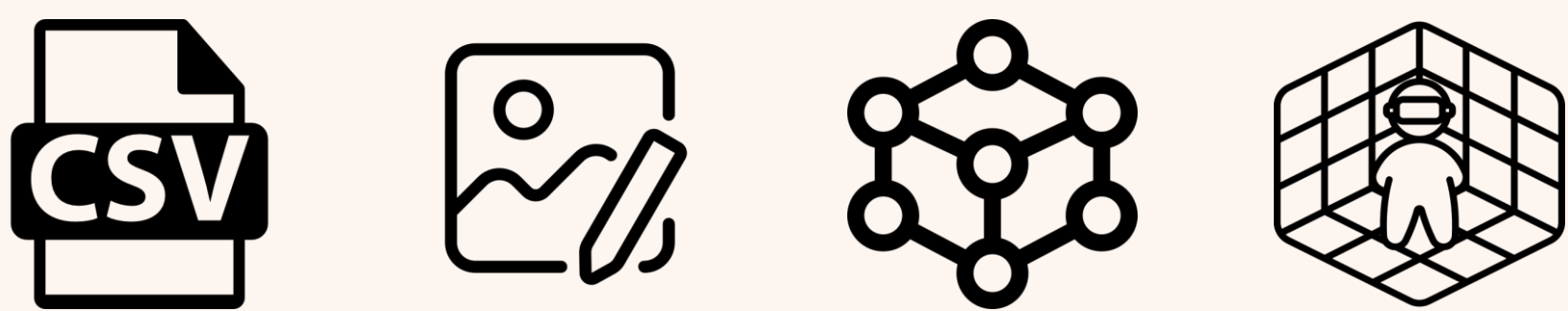
##### Lowering the technical barrier

- The web-based framework offers high accessibility to novice users
- Visualization through graph-based visual programming



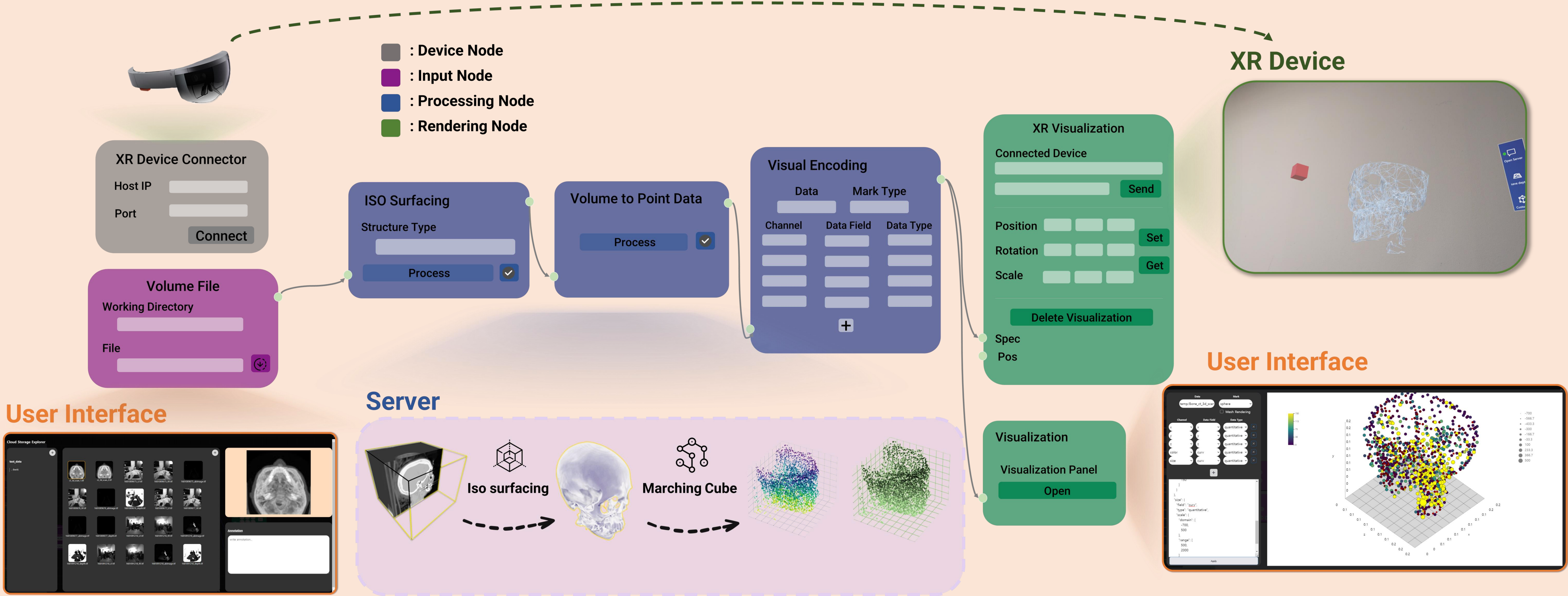
##### Powerful and flexible

- Visualization of diverse data types
- Massive computation through server-side data processing
- Flexible authoring with layered authoring hierarchy

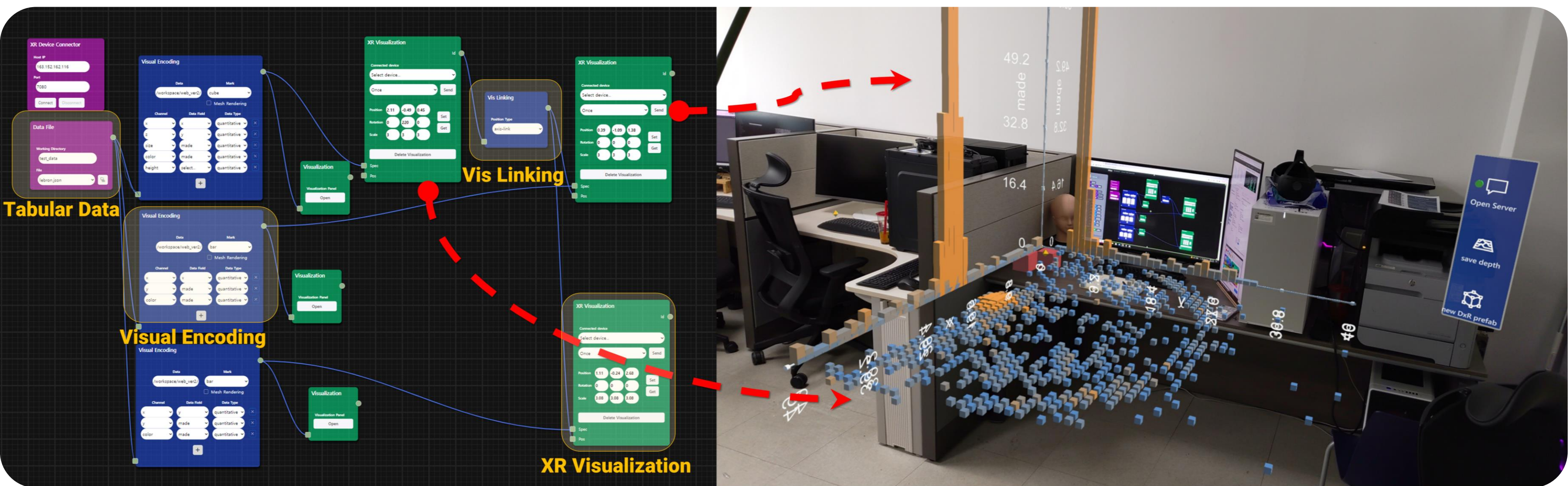


#### System Overview

- XROps framework consists for **three components**: **User Interface**, **XR Device**, and **Server**.
- IA system workflow is managed through visual programming of functional nodes.
- Each functional node is executed through networking between **three components**.



### Use Cases



### Conclusion

XROps enables

- **Flexible workflow management** that can dynamically update the workflow on-the-fly
- Development in IA environment even **without programming experience**
- Significant step to **expand the scope of XR technologies to a larger audience**

In the future

- We aim to develop and **diversify the functional nodes** for real-world applications