



Design Document

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Date	:	6/14/2022
Version	:	1
Status	:	Structure
Author	:	Rick van Ham



VERSION

Version	Date	Author(s)	Amendments	Status
0.1	3/25/2022	Rick van Ham	Add sketches, Pictures of the Designs, and simple UML diagram	Content
0.2	4/14/2022	Rick van Ham	Started giving structure to the documentation, Added UML for the Pipe System	Structure, Content
0.3	4/15/2022	Rick van Ham	Added MosCow	Content
0.4	5/24/2022	Rick van Ham	Update with New UMI Diagrams	Content
0.5	5/31/2022	Rick van Ham	Add New Diagram and Flowcharts	Content
1	6/14/2022	Rick van Ham	Final Submission	Content

Communication

Version	Date	To
0.1	3/29/2022	Jarno Verheesen

Contents

Version	1
MoSCoW	3
Designs	3
Testing Room	3
Gas Leak Room	4
Office Room	5
Pool Room	6
UML	6

MoSCoW

Functionalities	Must	Should	Could	Won't
VR-Compatible		X		
Work with multiple types of headsets				X
Retrieve sound source data to microphones	x			
Create Heatmap	x			
Create Spectrum	x			
Showcase Soundwave visualization				x
Beamforming algorithm for Far Field		X		
Near field Acoustic Holography for Near-field			x	
Usage guide		x		
Interactable Objects that can produce noise	x			
Locomotion		x		
Sound Reflection			x	
Echo			x	
Show Debugging Data			x	

DESIGNS

For the designs of the scenarios, I wanted to combine both real-life stuff that Sorama uses for testing their acoustic camera and scenarios that can focus on one aspect of the acoustic camera.

TESTING ROOM

The Testing room is a simple square room with some objects that will produce sound. These objects can be anything from a boombox playing music to a guy just casually speaking. The purpose of this room is to simply showcase the acoustic camera for the heatmap and spectrum function.

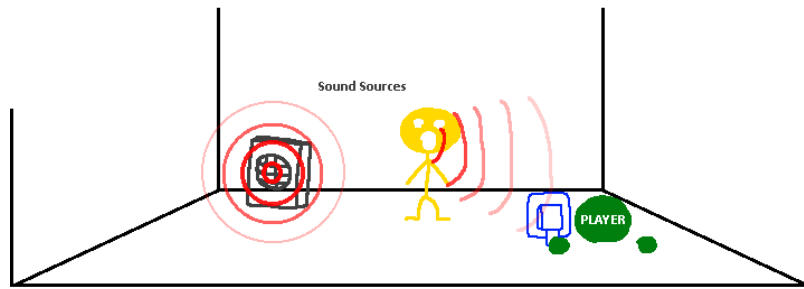


Figure 1: Sketch of the Testing room.

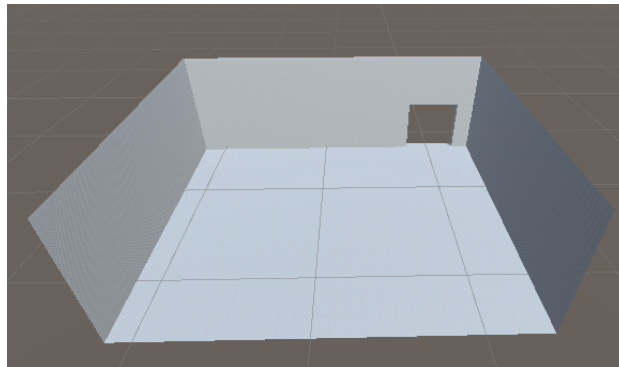


Figure 2: Simple prototype of the testing room made with Probuilder.

GAS LEAK ROOM

The Gas Leak Room is a testing room used by Sorama to test out acoustic cameras. It consists of a wall full of pipes. They have valves you can twist to open/close it and open endings where the gas leak will come from. The purpose of this room is to showcase the acoustic camera's functionality in a real-life scenario.

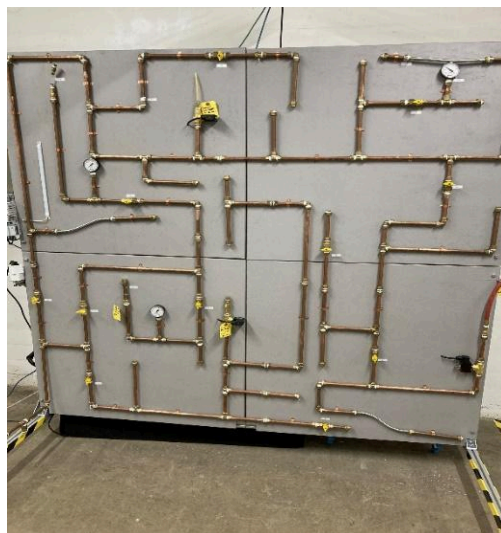


Figure 3: Reference example of the gas leak room.

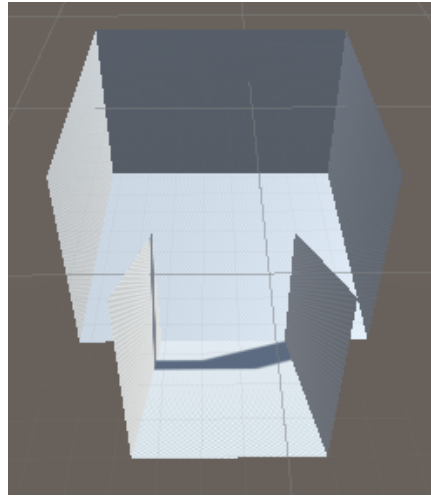


Figure 4: Simple prototype of the gas leak room made with Probuilder

OFFICE ROOM

The Office Room is a room that should resemble an office. The room contains one open area, an office room with desk, a supply closet, and an upstairs. The room contains doors that the player can open/close. The purpose of this room was mostly to test concepts like sound reflection. By standing below the hole and having a sound source above it, the sound wave would reflect on the walls and eventually get picked up by the acoustic camera.

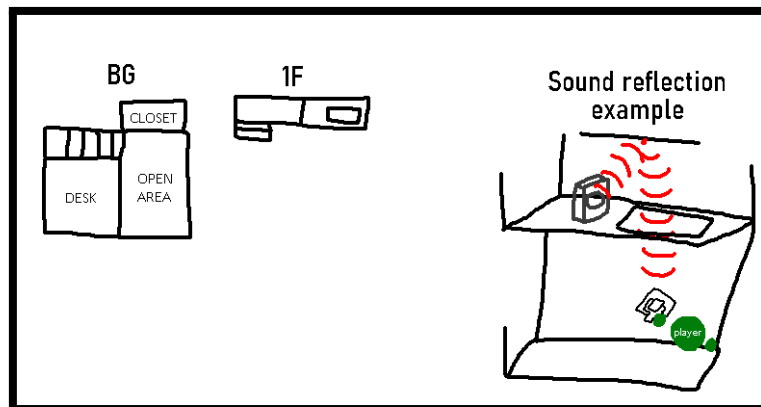


Figure 5: Rough sketch of the layout of the office room, along with a sketch of the sound reflection example.

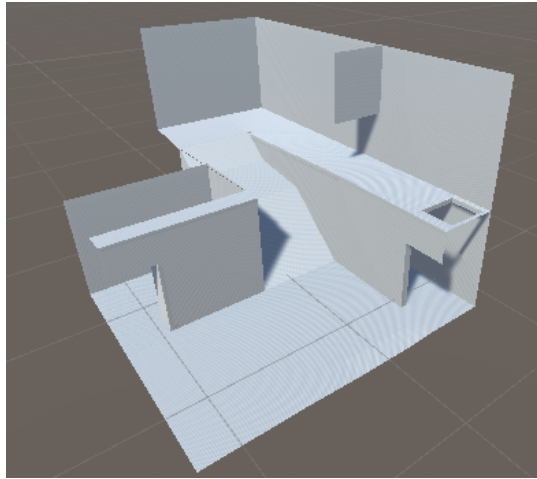


Figure 6: Simple prototype of the Office room made with Probuilder

POOL ROOM

The Pool Room is an indoor pool, containing some sound sources like speakers. The focus of this room is to showcase how sound waves worked underwater when the player gets inside the pool. (Maybe even showcase echo?)

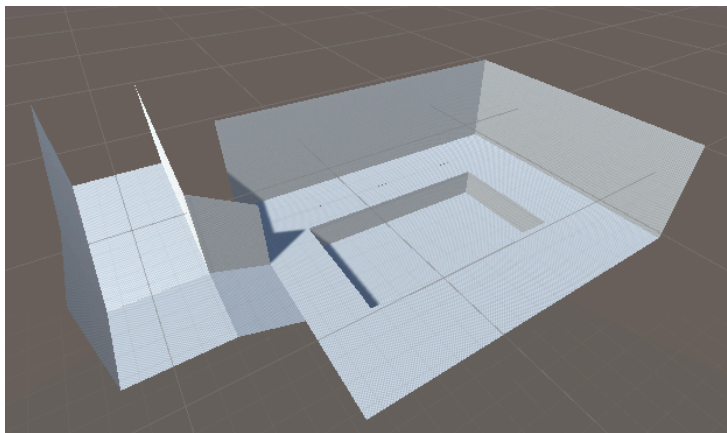


Figure 7: Simple prototype of the Pool Room made with Probuilder

UML

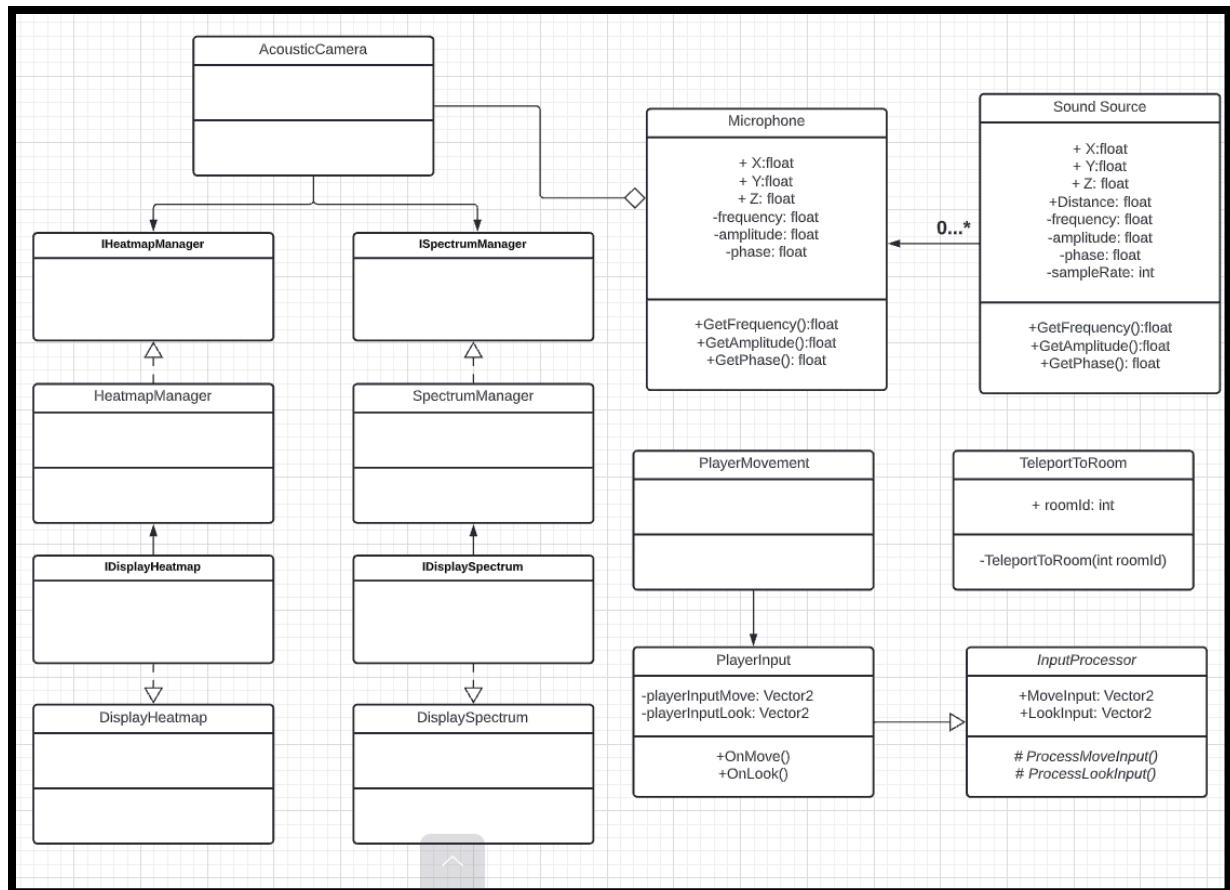


Figure 8: Simple abstract UML of the application that is not VR.

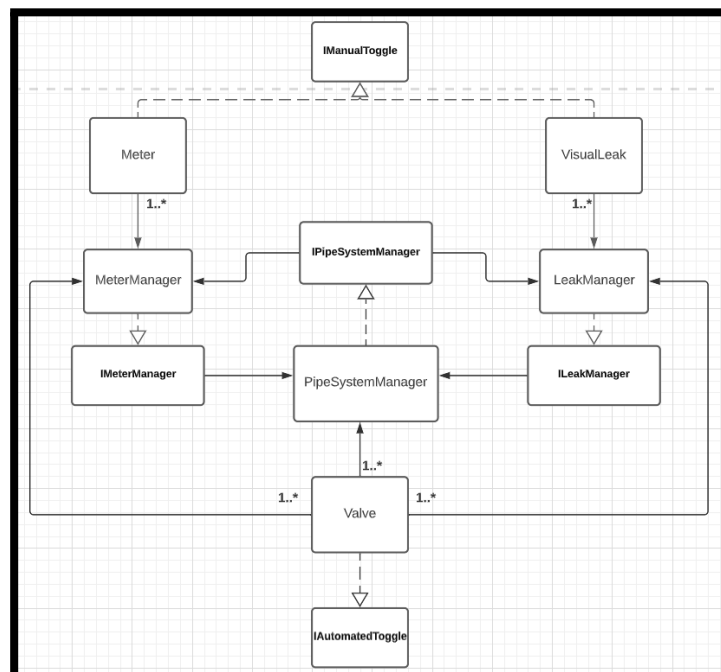


Figure 9: Simple UML of the functionality of the pipe system in Non-VR

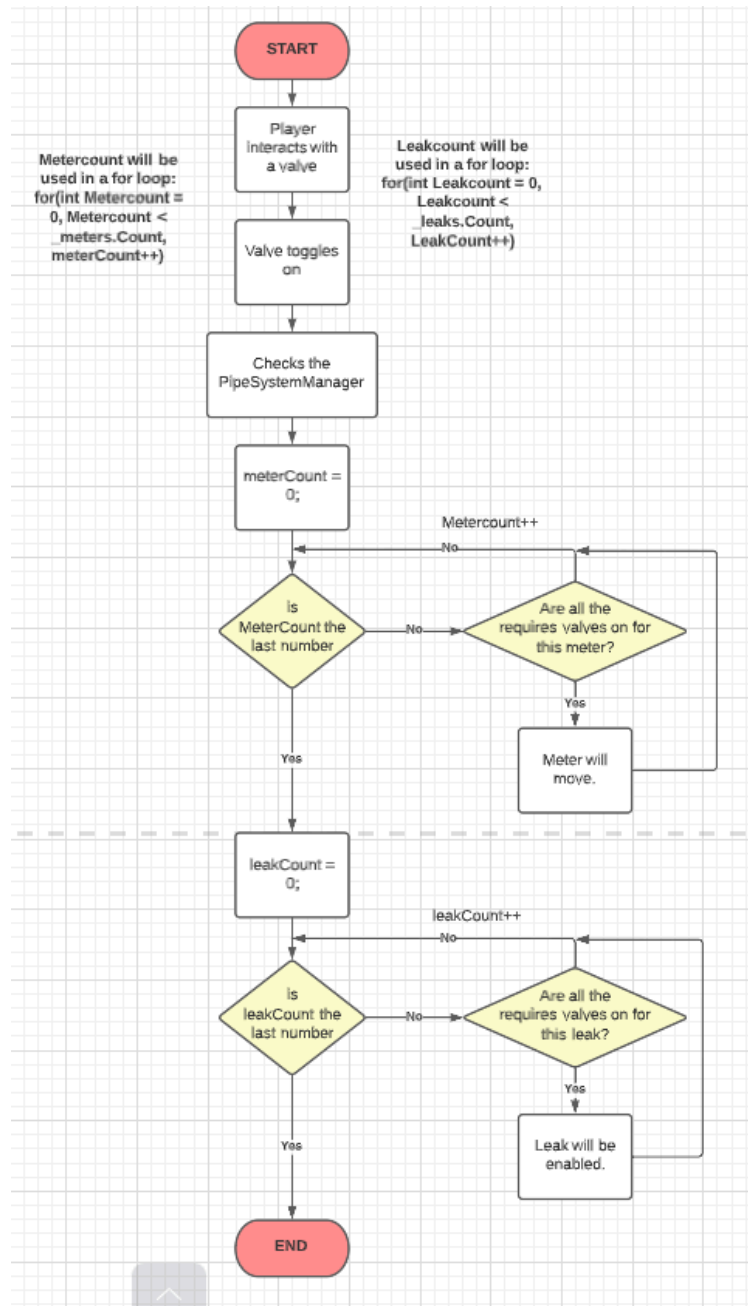


Figure 10: Flowchart of the Pipe System in Non-VR

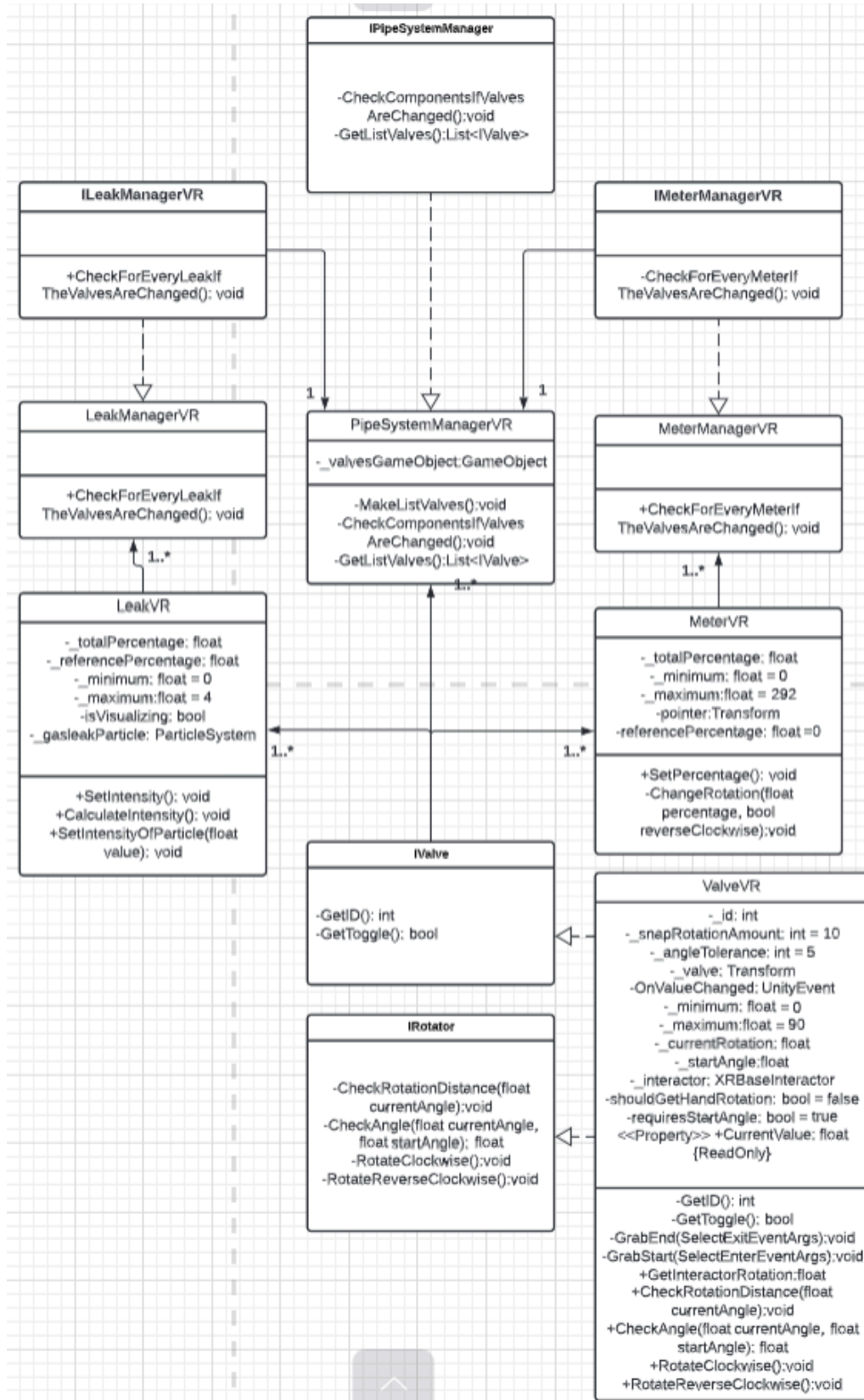


Figure 11: UML of the functionality of the pipe system in VR

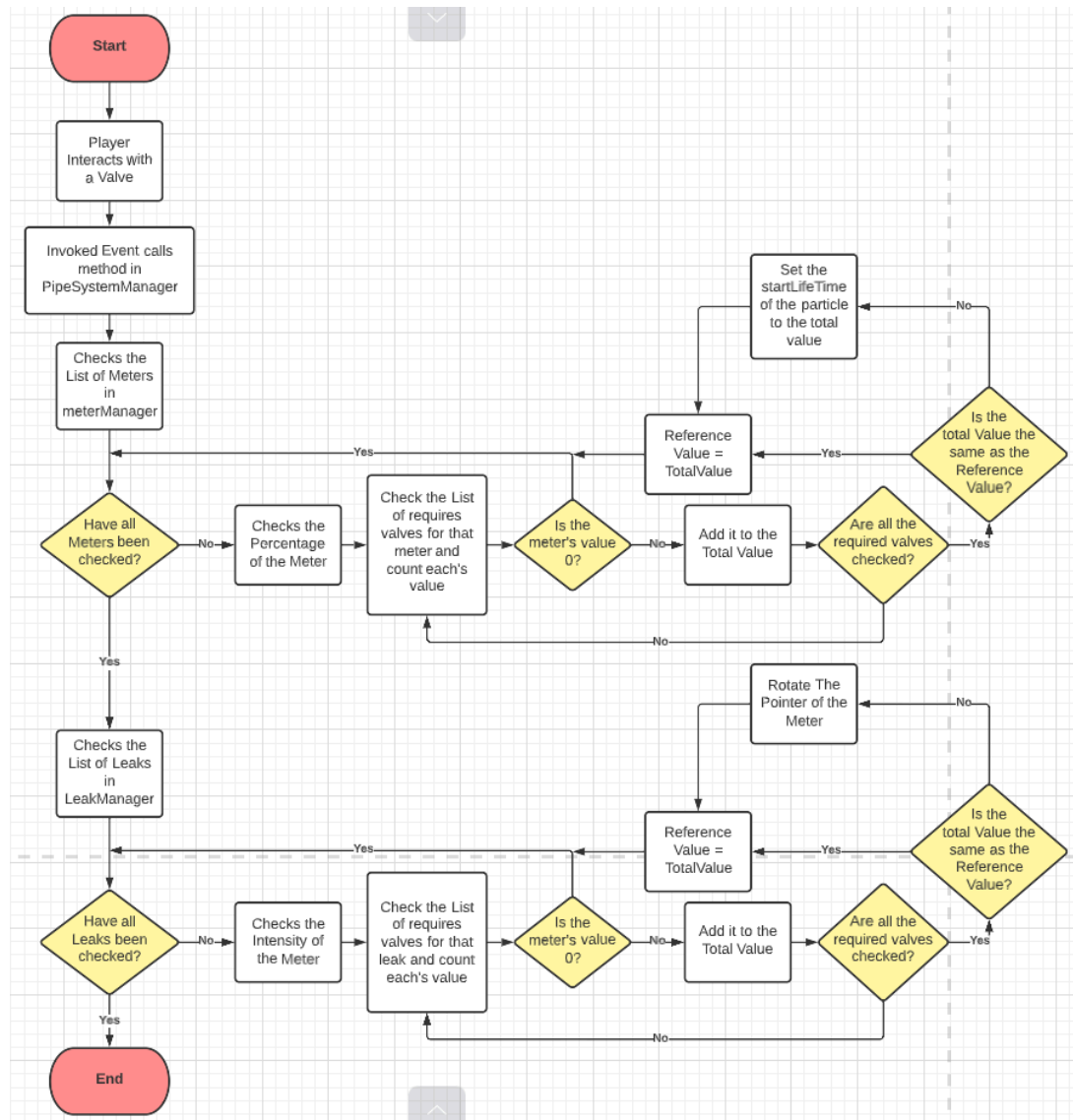


Figure 12: Flowchart of the Pipe System algorithm in VR

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