

Breaking the Silence: The Sound of *Hardspace: Shipbreaker*

Ben McCullough
Audio Director - Lynx Team, Blackbird Interactive

What is *Hardspace: Shipbreaker*?

- Sci-fi zero-g spaceship salvaging game
- Satirical future job simulator
- Blue collar aesthetic
- Physics-based gameplay
- PC Early Access now,
consoles soon(ish)



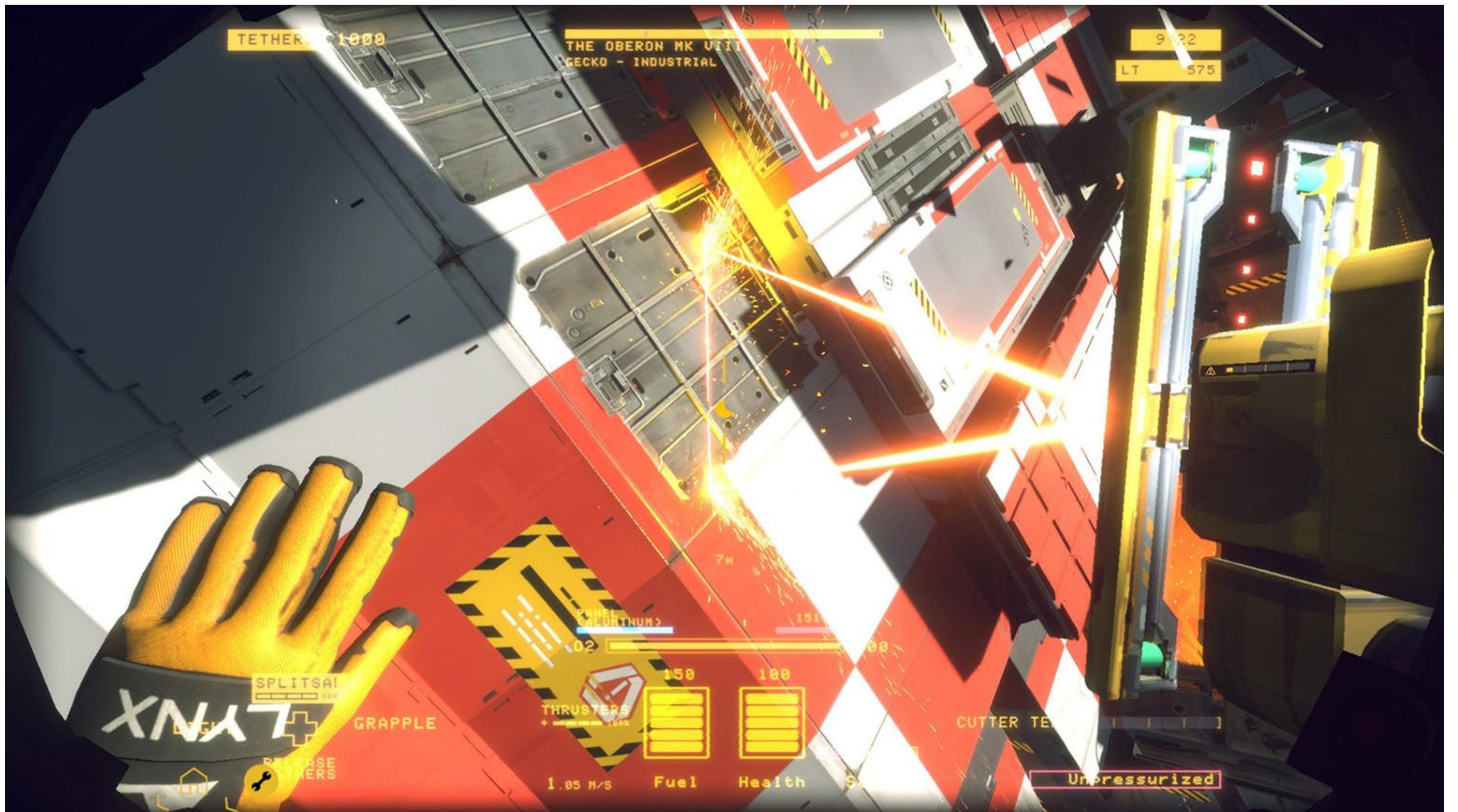
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What is *Hardspace: Shipbreaker*?

It's like shucking a husk of corn, if there were a chance the corn could explode in your face.

- Polygon

In this talk...

- Rules-based approach to the sound of HSSB
- Dealing with “there’s no sound in space”
 - My nemesis 

+3MP

9/435,000 MF

2:48

CUTR

83%

CUTTER

83%

GRPL

77%

DEMO

88%

STRUCTURE (TITANIUM)

27475 kg [7 kg]

CUT LVL

5m

0.89 M/S
THRUSTERS
+ 78%

PRESSURIZED

Cabin

+ CANCEL TETHERS

TETHERS 49

+  77%

GRAPPLE

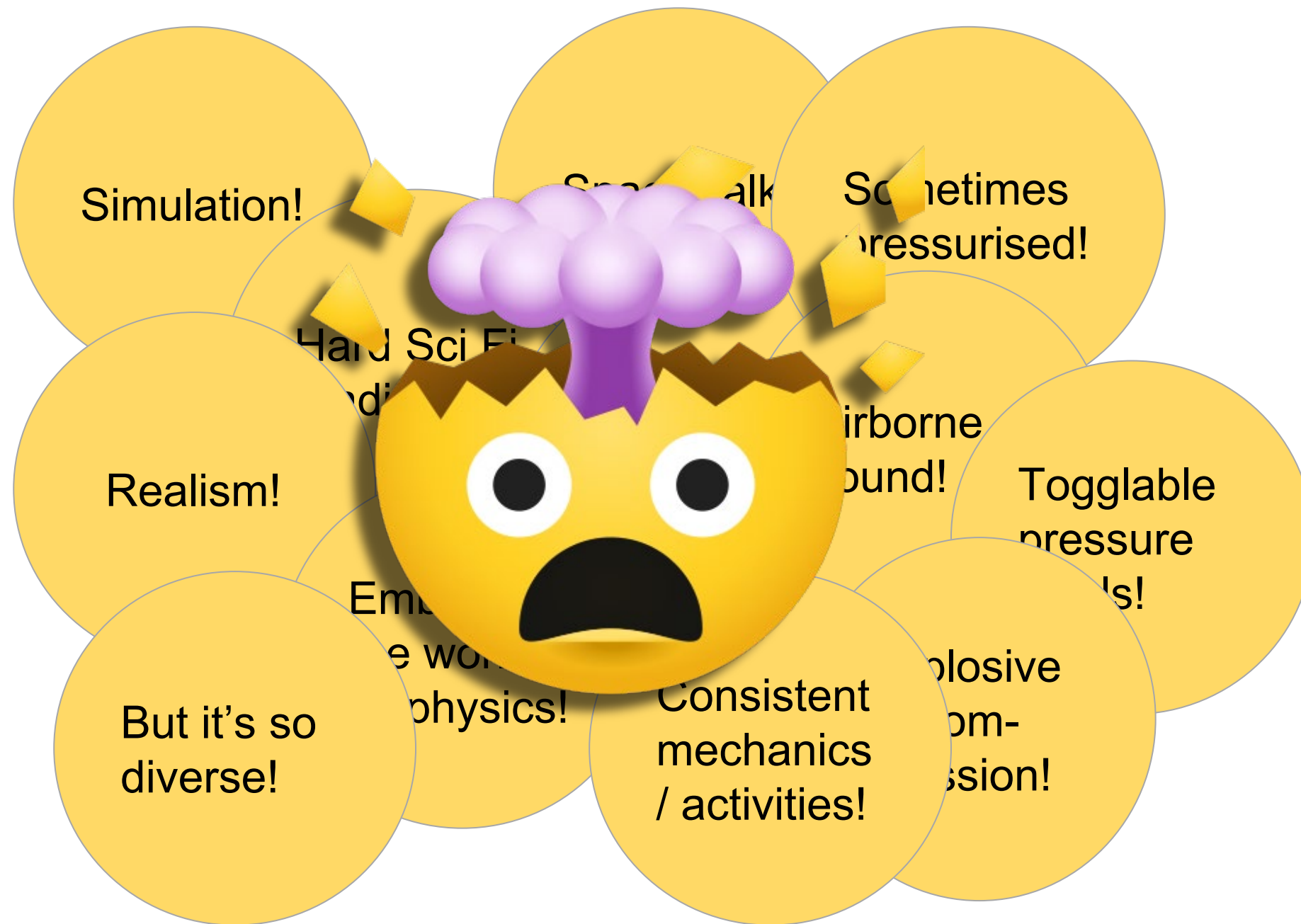
SCANNER [+]
HELMET LIGHT [- +]

HLTH [] FUEL []
SUIT [] 02

182502-CyanMargarita
P4: //lynx/main.game
Git: unknown
4/27/2021 3:08 PM

fps: 18.46 ms | 54.17 fps
avg: 18.48 ms | 54.12 fps
low: 18.46 ms | 54.17 fps

Creative Challenges



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Creative Challenges

Boiled down to:

- Sometimes the player would be able to hear conventional acoustic sounds
- But most of the time they would not!

Too many variables...!



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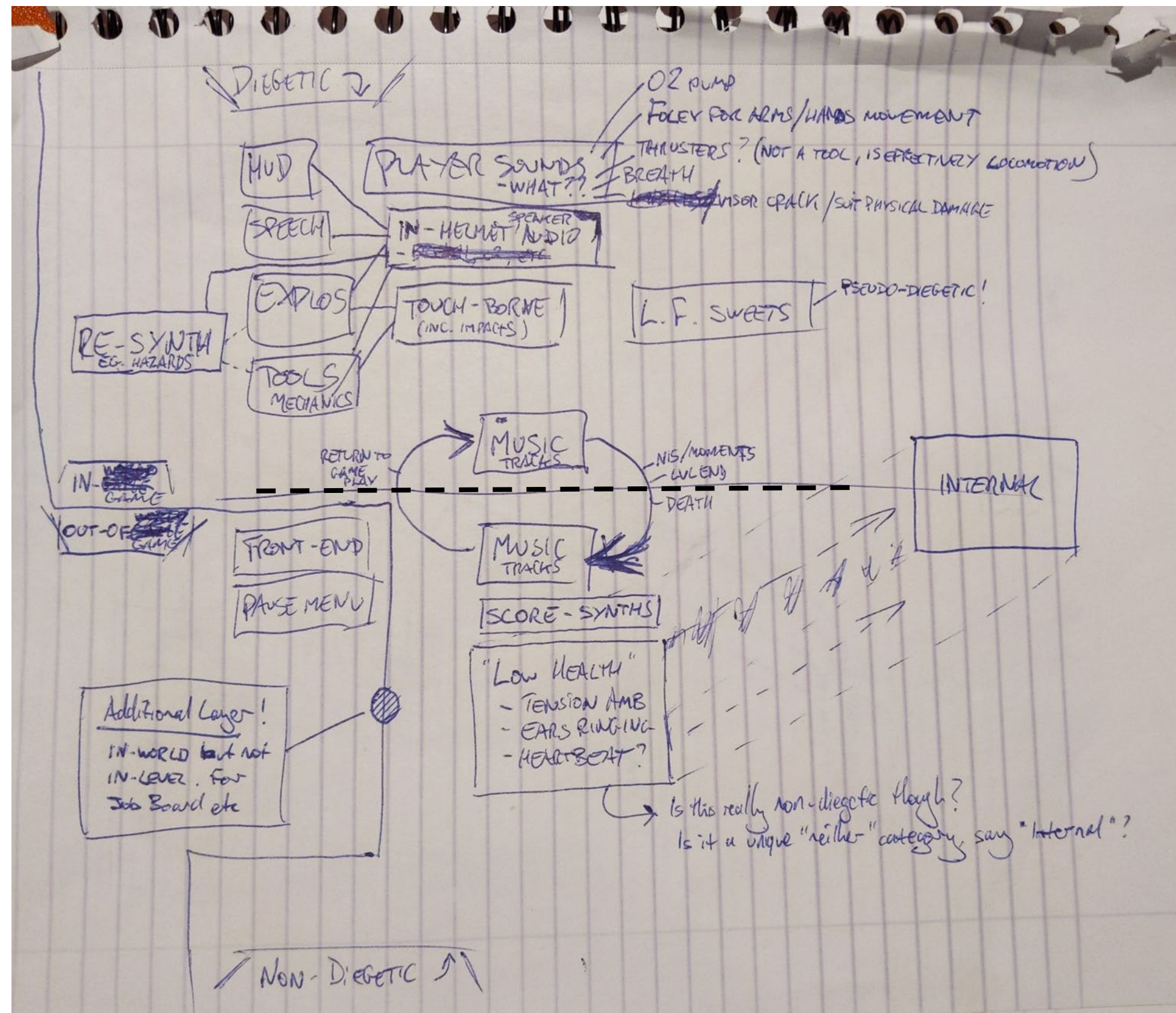
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Rules

1. This is a **Physical Sound**, transferring according to conventional acoustics.
2. This is a **Fictionalized Sound**, existing thanks to an established piece of in-game technology.
3. This is an abstract **Internal Sound**, representing the player's emotional/mental state.

Not just sound effects - we applied them to music too.

Rules WIP



Rules WIP

Garrett Reisman, former NASA astronaut:

Mostly what you hear is the sound of the pumps and fans that circulate air and water through your suit... it's not the silent lonely environment with no sound other than your own breathing like often depicted in the movies. Plus, you are wearing a headset so you have the sound of your crewmates and the folks in Mission Control talking to you fairly regularly.

<https://slate.com/human-interest/2013/10/what-sounds-do-astronauts-hear-during-a-spacewalk.html>



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Rules WIP

Conversation with NASA astronaut Ron Garan:

Even outside on a spacewalk, there is no silence. Indeed, it would have been worrying if there had been, because it would have meant that the pumps circulating air for him to breathe had stopped working.

<https://www.discovermagazine.com/the-sciences/what-does-space-sound-like>



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Rules WIP

Article “Can humans hear in space?”:

Let's say that you're drifting through space while wearing a space suit and you accidentally bump your helmet into the Hubble Space Telescope. The collision would make a sound that you could hear, even though you're in space. That's because the sound waves would have a physical medium to move through: Your helmet and the air inside your space suit.

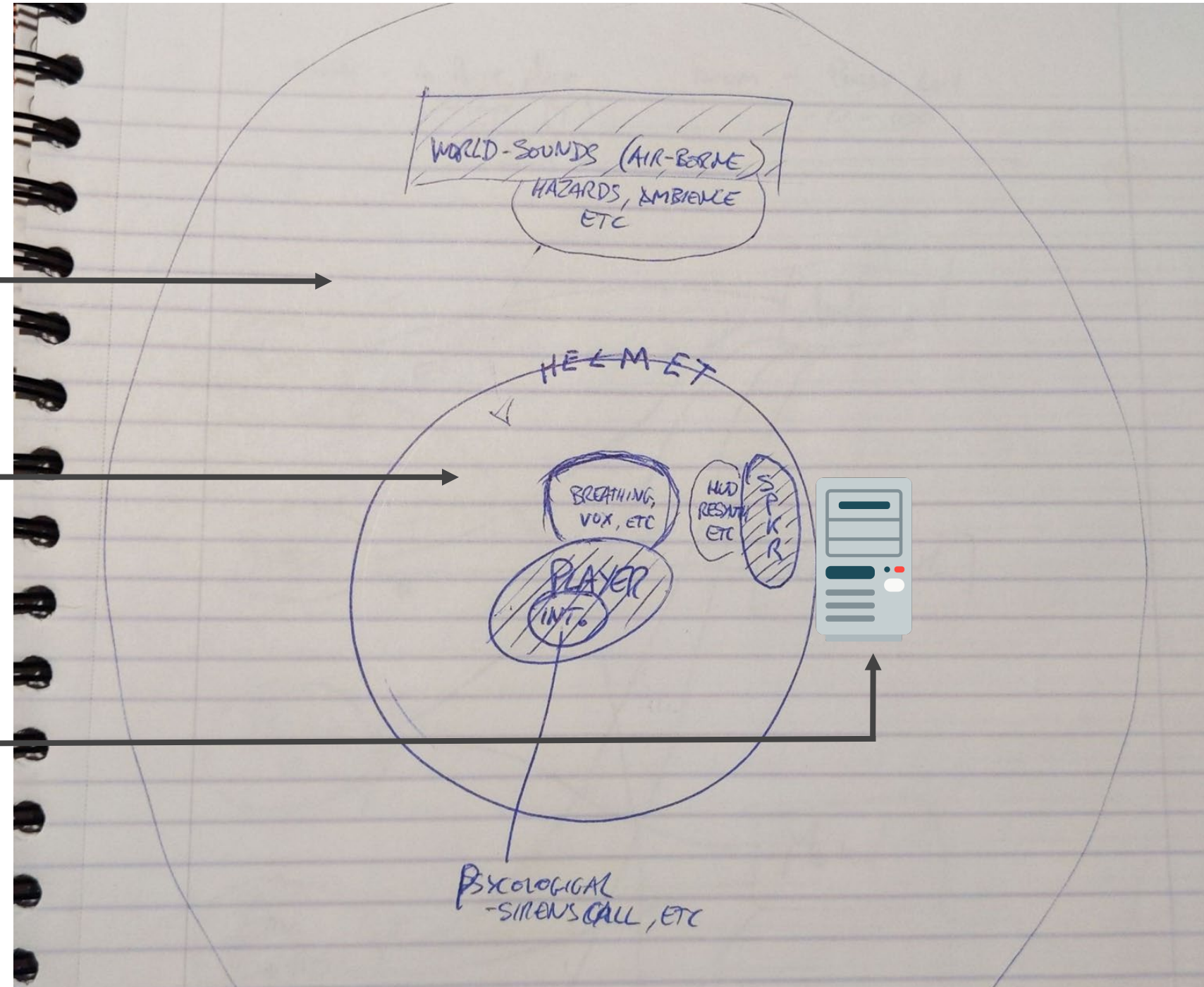
<https://science.howstuffworks.com/humans-hear-in-space2.htm>

Rules WIP

Stuff outside the suit
(intermittent)

Stuff inside the suit
(persistent)

Stuff outside the suit
that
touches the suit
(intermittent)



Rule 1 - Physical Sounds

- First order physical sounds:
the stuff that's happening **INSIDE** your suit
- Second order physical sounds:
the stuff that's happening **OUTSIDE** your suit
- Third order physical sounds:
the stuff that's **IN CONTACT** with your suit



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Rule 1 - Physical Sounds

First order physical sounds: the stuff that's happening INSIDE your suit

- Fans
- Pumps
- The suit's background electrical systems
- The player's breathing
- (Sounds coming through the in-helmet speaker
 - NPC Voices
 - Music)



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Debug Menu ▶

THE NEBULOUS SEKHON EXPLORER

MACKEREL - LAB

CERT

30

0/435,000 HP

16:48

BERTH

0.01 M/S
THRUSTERS
+ 93%

46m

UNPRESSURIZED

SCANNER [+]
HELMET LIGHT [+]

HLTH [] FUEL []
SUIT [] 02

+ CANCEL TETHERS
TETHERS [50]
+ 91%
GRAPPLE

fps: 12.60 ms | 79.39 fps
avg: 12.97 ms | 77.13 fps
low: 13.01 ms | 76.88 fps

182502-CyanMargarita
P4: //lynx/main.game
Git: unknown
4/27/2021 3:08 PM

Rule 1 - Physical Sounds

First order physical sounds: the stuff that's happening INSIDE your suit

- Fans
- Pumps
- The suit's background electrical systems
- The player's breathing



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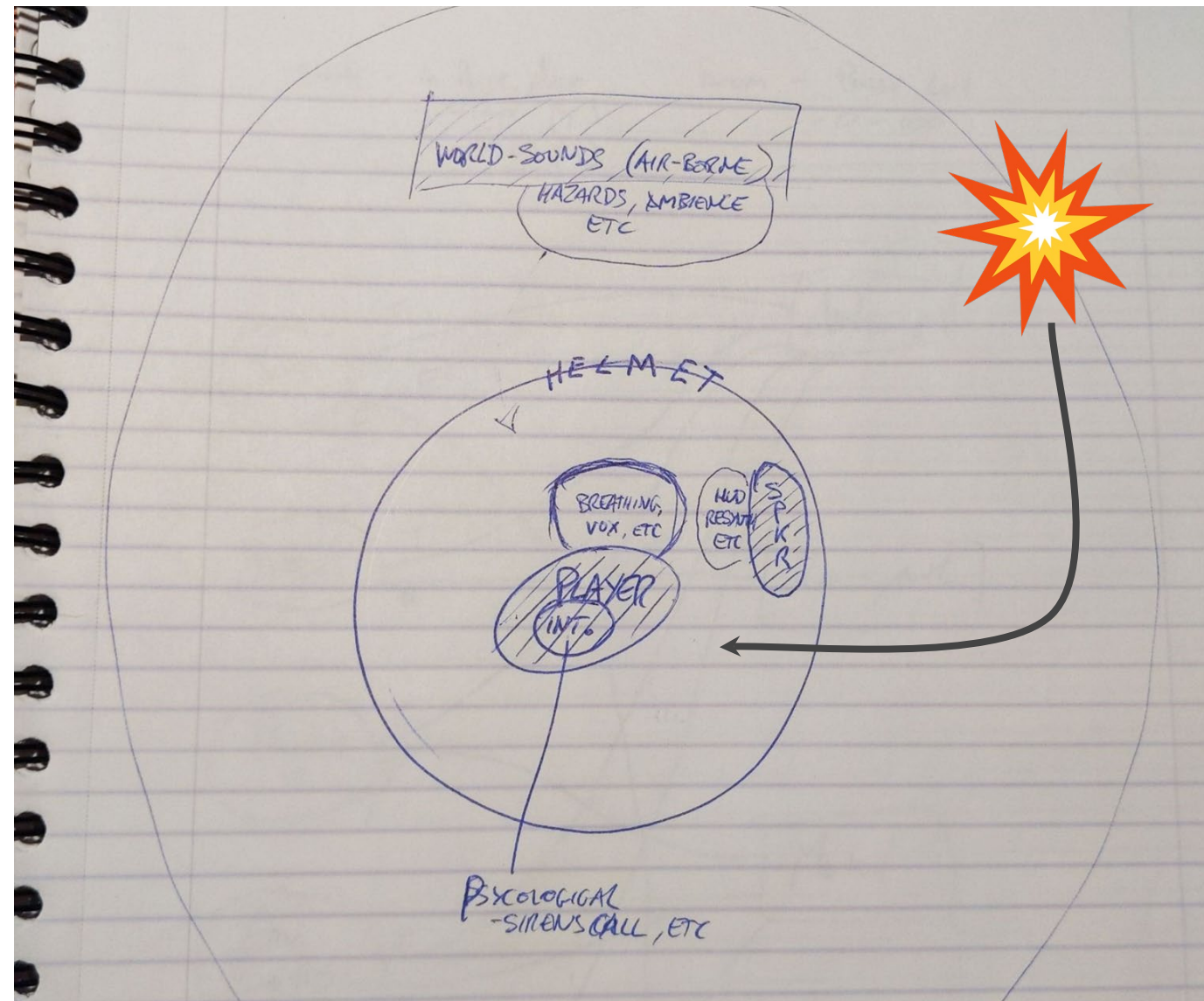
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Rule 1 - Physical Sounds

First order physical sounds: the stuff that's happening **INSIDE** your suit

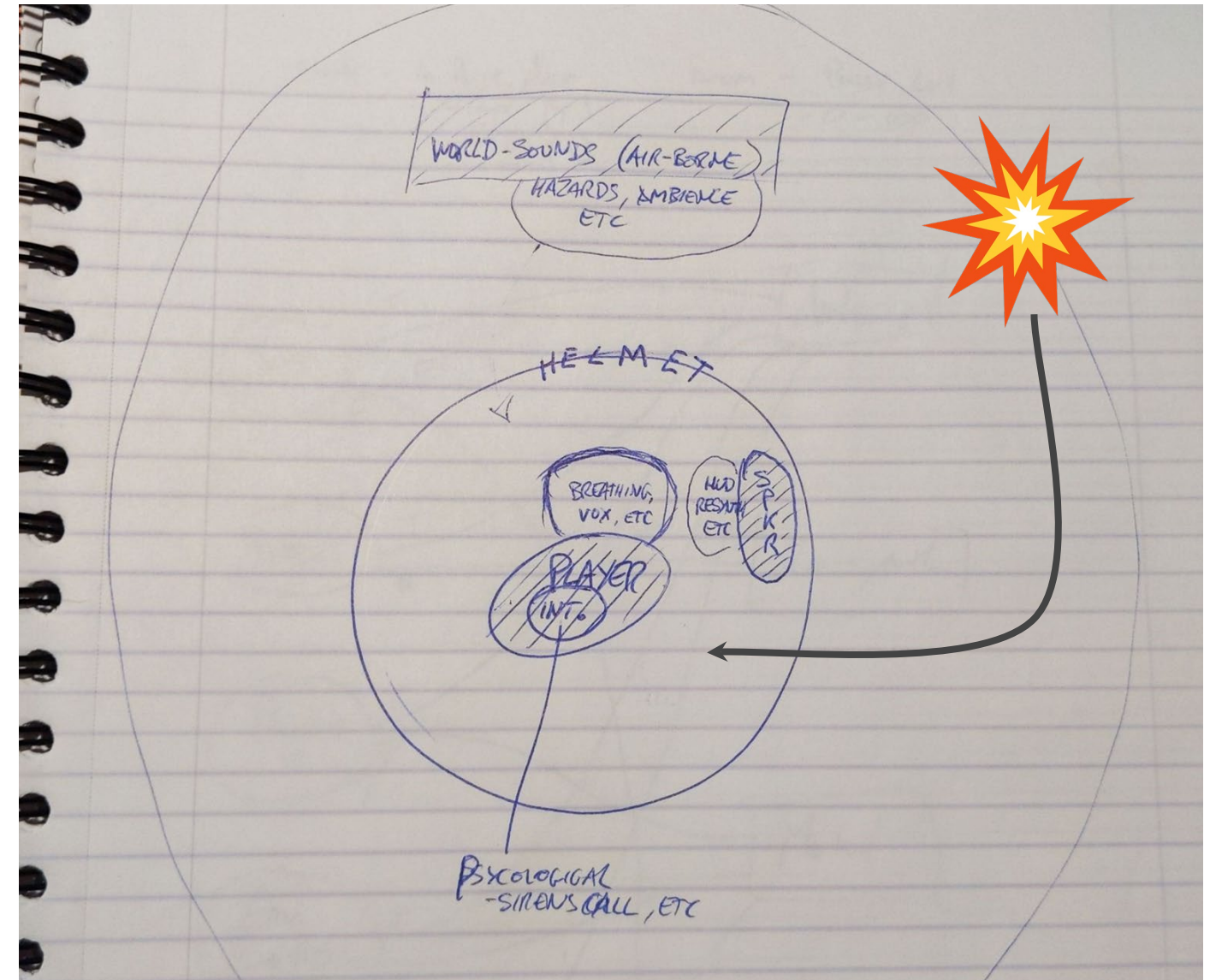
Opportunity!

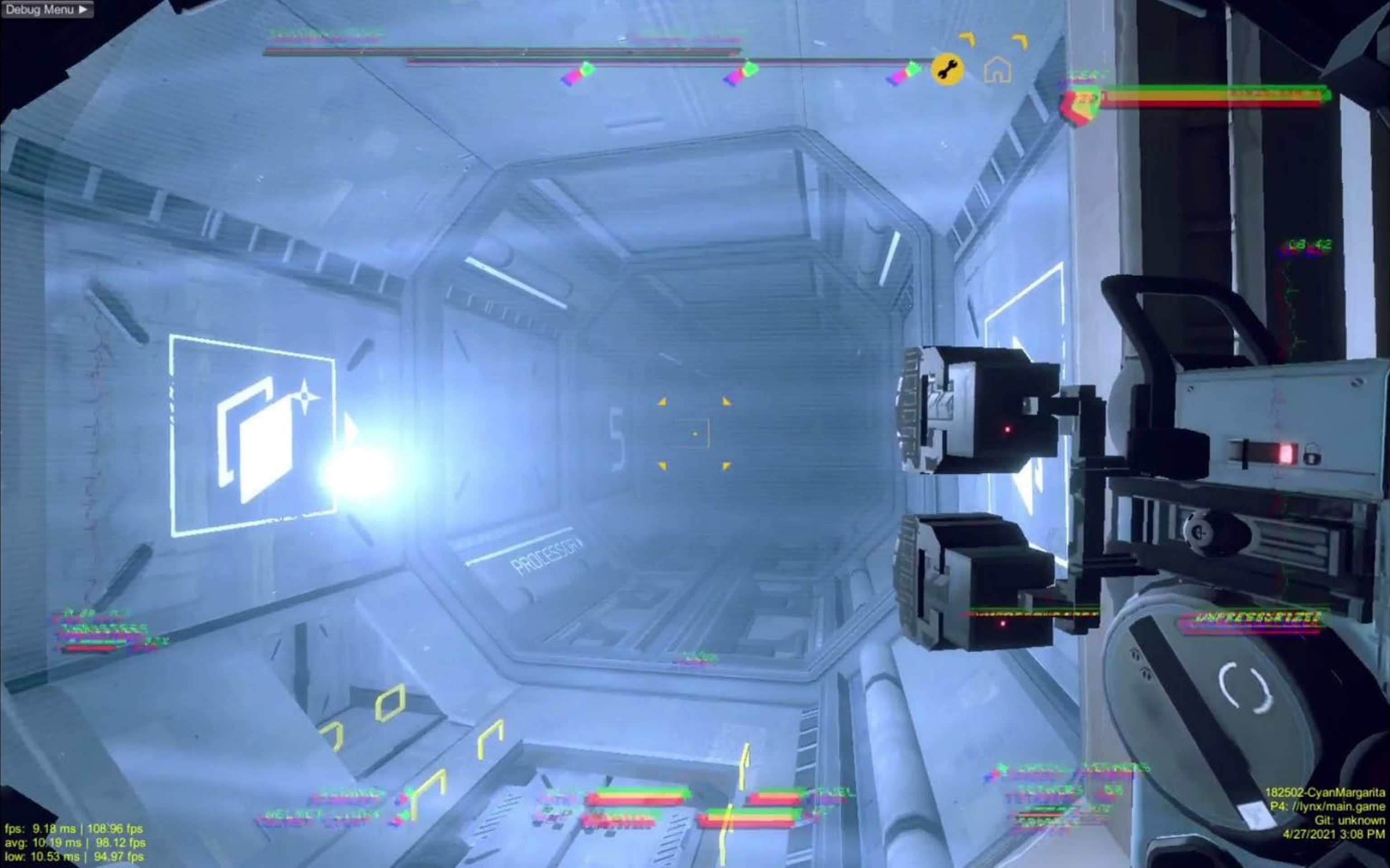
- Suit Disruption
 - A way to bring the audio for distant silent events *inside* the suit where there's an atmosphere.
- The *change* in the suit ambience becomes a sound in itself



Rule 1 - Physical Sounds

Examples





Rule 1 - Physical Sounds

- First order physical sounds:
the stuff that's happening **INSIDE** your suit
- Second order physical sounds:
the stuff that's happening **OUTSIDE** your suit
- Third order physical sounds:
the stuff that's **IN CONTACT** with your suit



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Rule 1 - Physical Sounds

Second order physical sounds: the stuff that's happening OUTSIDE your suit

In a pressurised environment:

- Standard acoustic sounds with reverbs etc
- BGs, point emitters, physics sounds
- I.e. normal stuff! A little slice of familiarity!

THE RISING HARRISON

MACKEREL - EXOLAB

CERT

30

0/435,000 HP

0.00 M/S
THRUSTERS
+ 92%

PANEL (ALUMINUM)
41529 kg [94 kg]
CUT LVL

2m

PRESSURIZED
Cockpit

SCANNER +
HELMET LIGHT +

HLTH FUEL
SUIT 02

+ CANCEL TETHERS
TETHERS 50
+ 90%
GRAPPLE

fps: 17.34 ms | 57.68 fps
avg: 18.87 ms | 52.99 fps
low: 19.08 ms | 52.41 fps

182502-CyanMargarita
P4: //lynx/main.game
Git: unknown
4/27/2021 3:08 PM

Rule 1 - Physical Sounds

- First order physical sounds:
the stuff that's happening INSIDE your suit
- Second order physical sounds:
the stuff that's happening OUTSIDE your suit
- Third order physical sounds:
the stuff that's IN CONTACT with your suit



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Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is IN CONTACT with.

Article "Can humans hear in space?":

Let's say that you're drifting through space while wearing a space suit and you accidentally bump your helmet into the Hubble Space Telescope. The collision would make a sound that you could hear, even though you're in space. That's because the sound waves would have a physical medium to move through: Your helmet and the air inside your space suit.

<https://science.howstuffworks.com/humans-hear-in-space2.htm>

Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is IN CONTACT with.



THE RISING IAPETUS IV

MACKEREL - HEAVY CARGO



CERT

30

0/435,000 HP

0.00 M/S
THRUSTERS
+ 90%

PROCESSOR

NANOCARBON
29272 kg [200 kg]
CUT LVL

7M

UNPRESSURIZED

Cabin

SCANNER +
HELMET LIGHT +

HLTH FUEL
SUIT 02

+ CANCEL TETHERS
TETHERS 50
+ 89%
GRAPPLE

fps: 21.80 ms | 45.88 fps
avg: 19.90 ms | 50.25 fps
low: 21.80 ms | 45.88 fps

182502-CyanMargarita
P4: //lynx/main.game
Git: unknown
4/27/2021 3:08 PM

Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is IN CONTACT with.

Touch-transferred sound:

- Grounds the player in the world
- Makes objects feel distinct and believable
 - Gives objects a sense of containing working systems
- Very tactile experience
- Can be used for gameplay feedback
 - Hazard management



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BIG BOREAS

MACKEREL - HEAVY CARGO

CERT

30

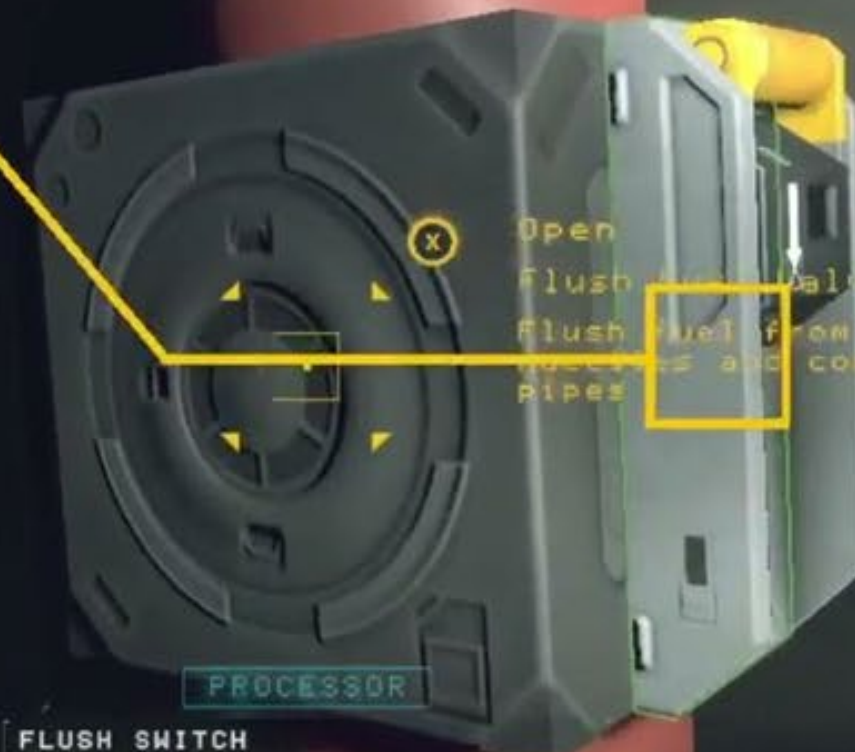
0/435

HP



20:28

0.29 M/S
THRUSTERS
+ 89%



Open
Flush Valve
Flush fuel from the
nozzles and conjoined
pipes

PROCESSOR

FLUSH SWITCH
38405 kg [0 kg]
CUT LVL

1m

PRESSURIZED
Crawl Space

SCANNER +
HELMET LIGHT +

HLTH FUEL
SUIT O2

+ CANCEL TETHERS
TETHERS 50
+ 88%
GRAPPLE

fps: 18.32 ms | 54.59 fps
avg: 19.33 ms | 51.74 fps
low: 19.43 ms | 51.47 fps

182502-CyanMargarita
P4: //lynx/main.game
Git: unknown
4/27/2021 3:08 PM

Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is **IN CONTACT** with.

Touch Transfer RTPCs

- Grab TT
- Proximity TT
- Physics TT



Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is **IN CONTACT** with.

Hierarchy check
for reactor:
rtpc on global
ambs raised



Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is **IN CONTACT** with.

Hierarchy check
for reactor:
rtpc on global
ambbs NOT raised



Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is **IN CONTACT** with.

Object check for contact:
RTPC is raised on the
object itself

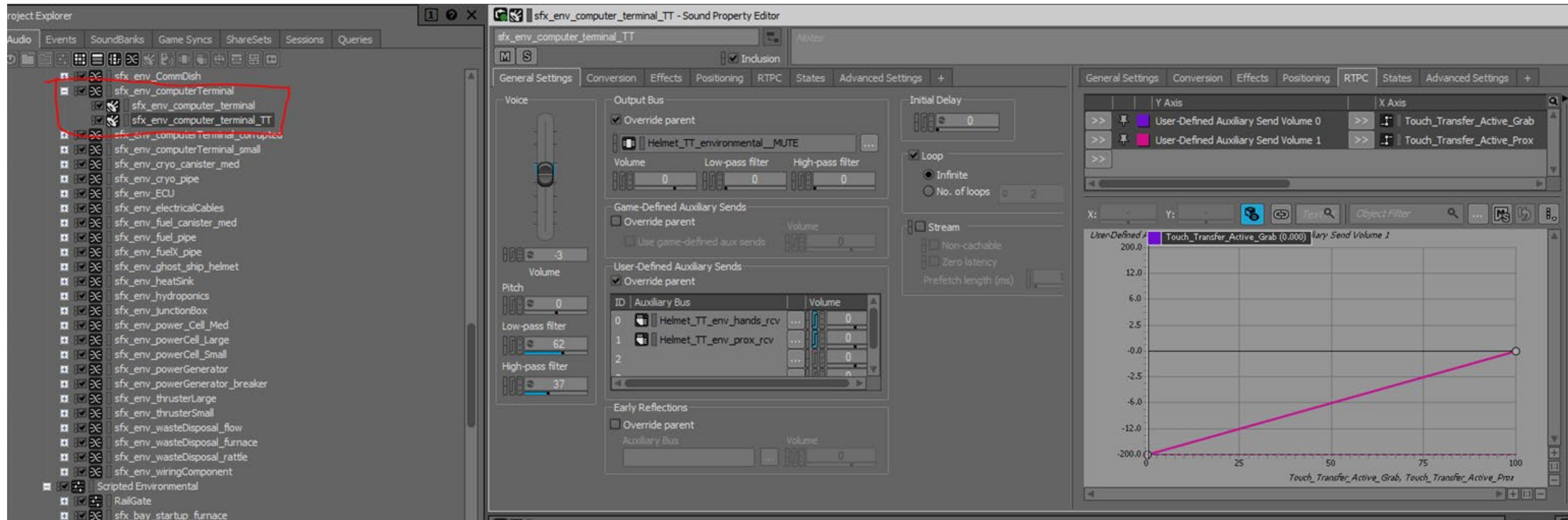


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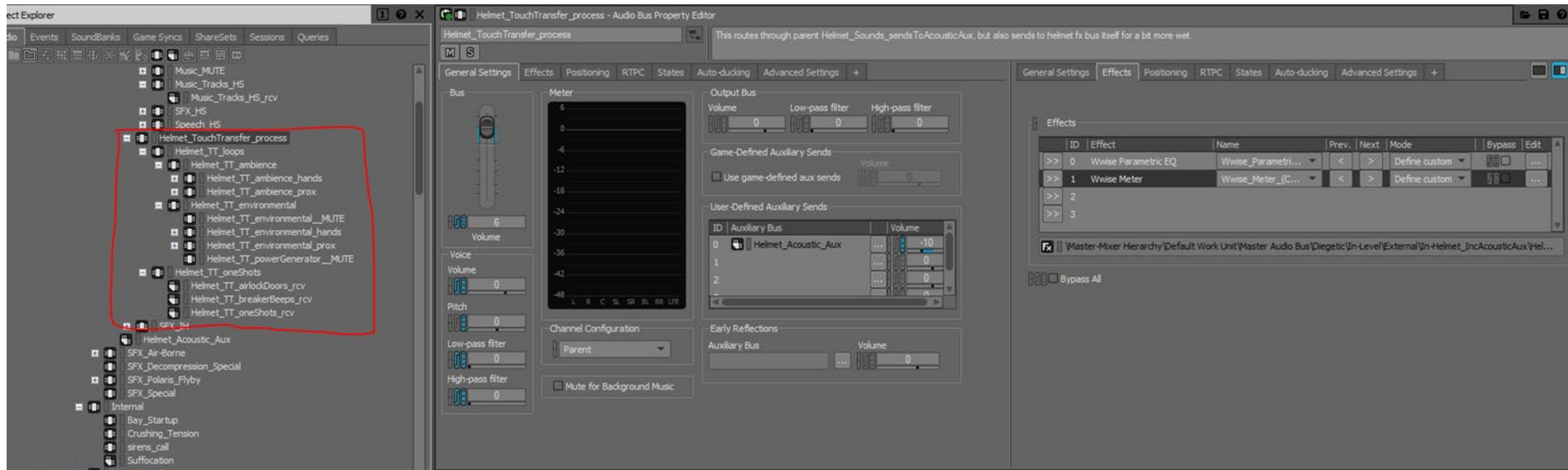
Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is IN CONTACT with.



Rule 1 - Physical Sounds

Third order physical sounds: the stuff that's happening to things your suit is IN CONTACT with.



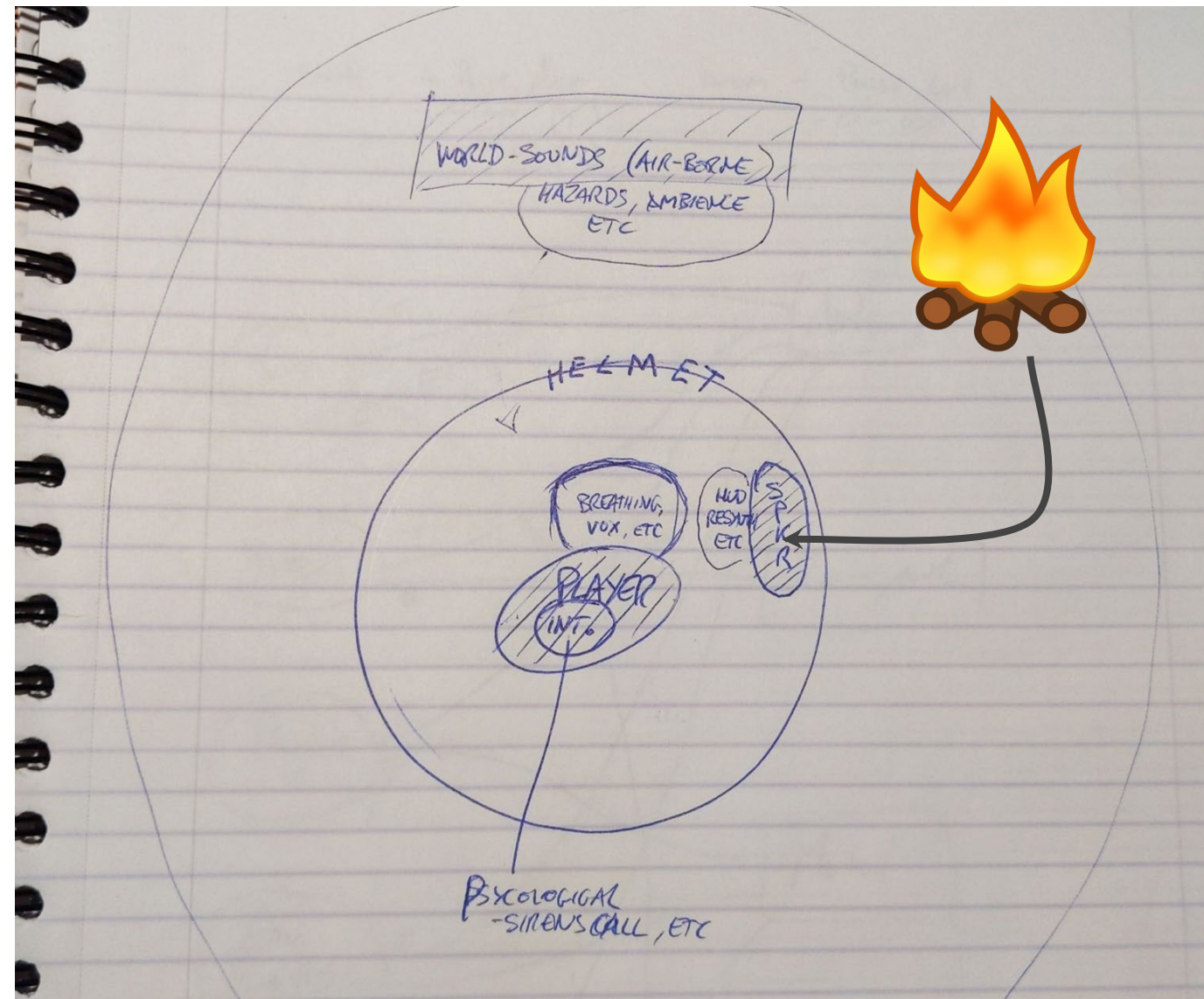
Rule 2 - Fictionalised Sounds

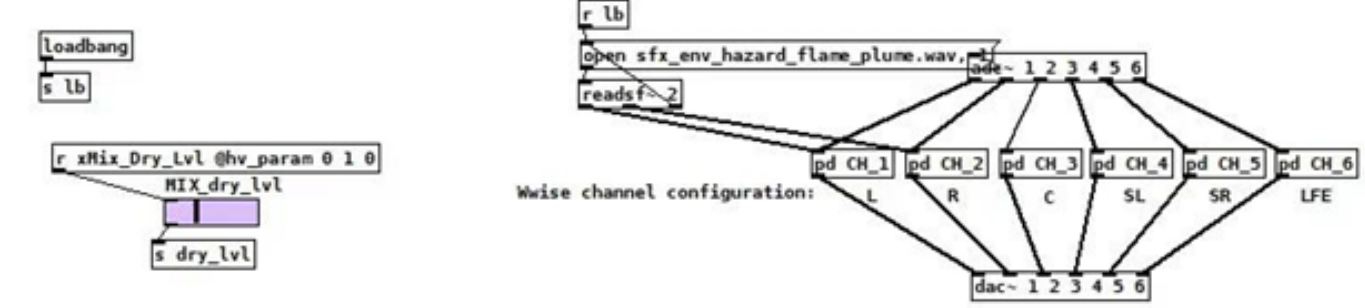
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Rule 2 - Fictionalised Sounds

“Resynthesis” Effect

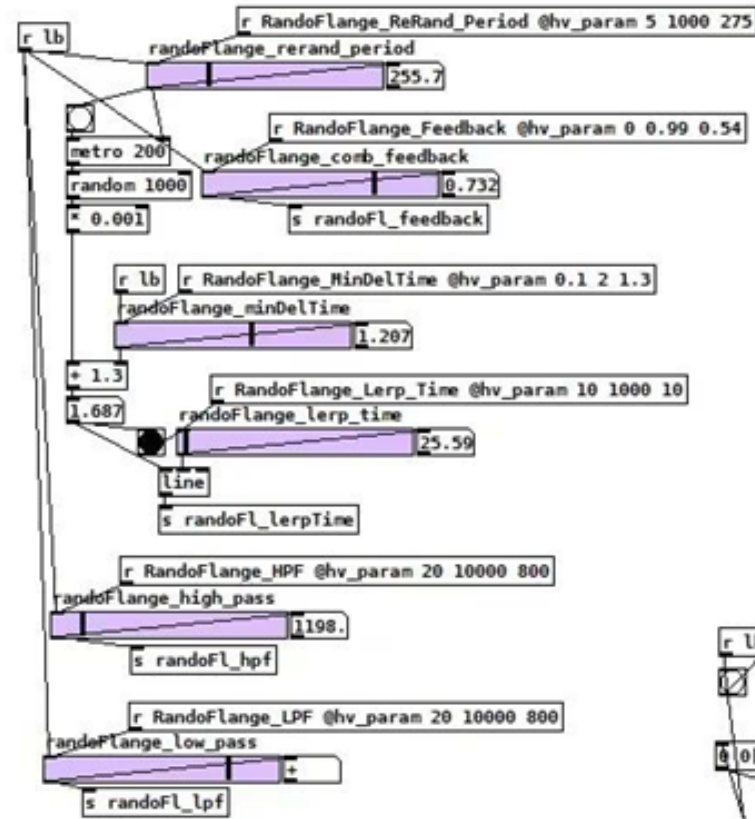
- Hazards/Dangers
- Janky-sounding
- Custom Wwise plugin
- Pure Data
- Heavy Library



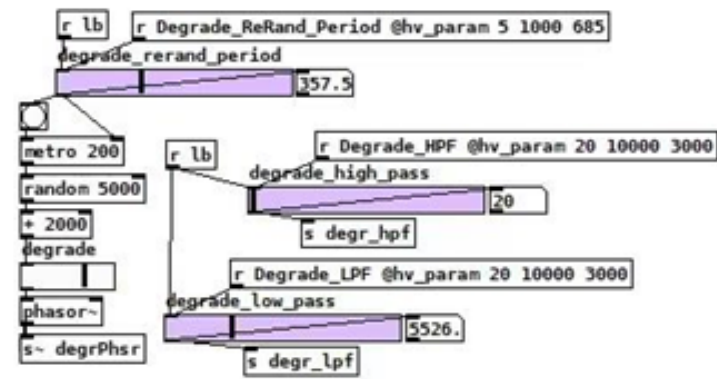


Wise channel configuration:

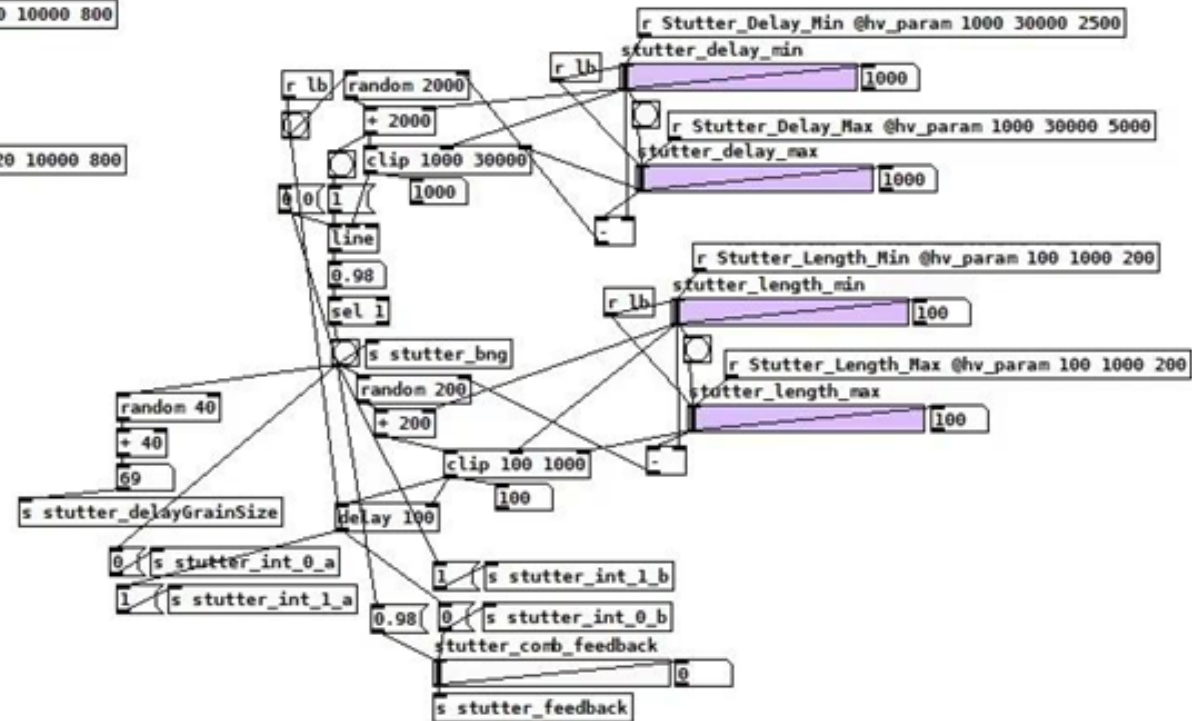
RANDOM FLANGER CONTROLS



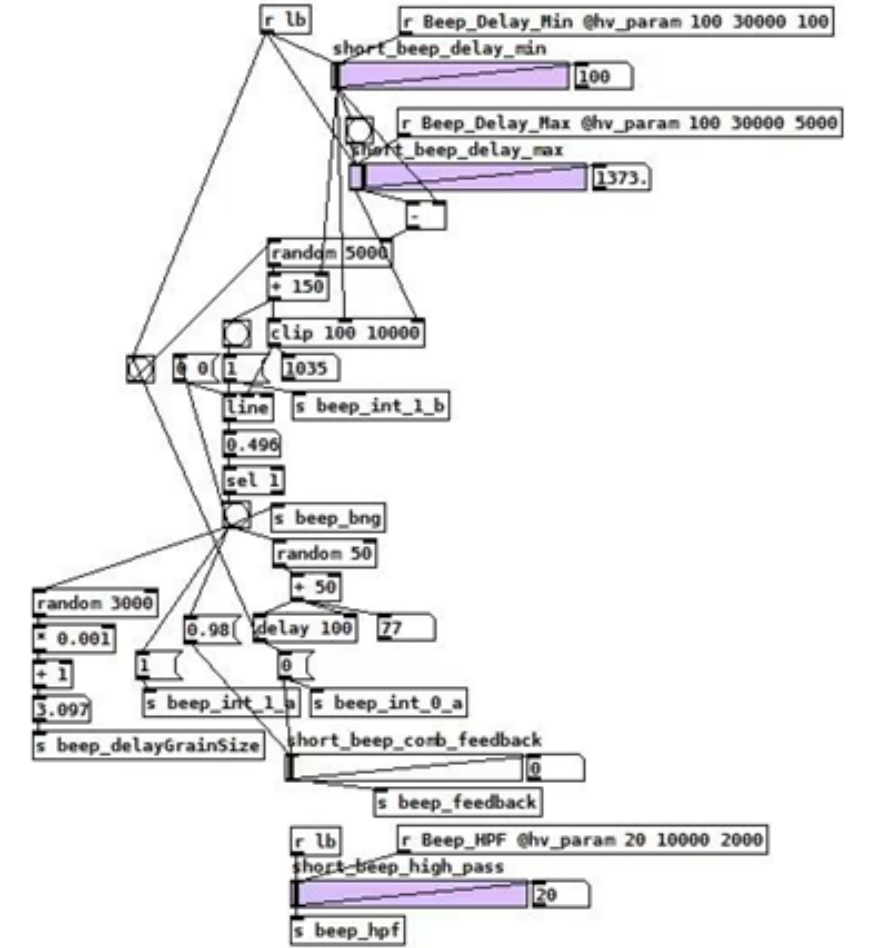
DEGRADER CONTROLS

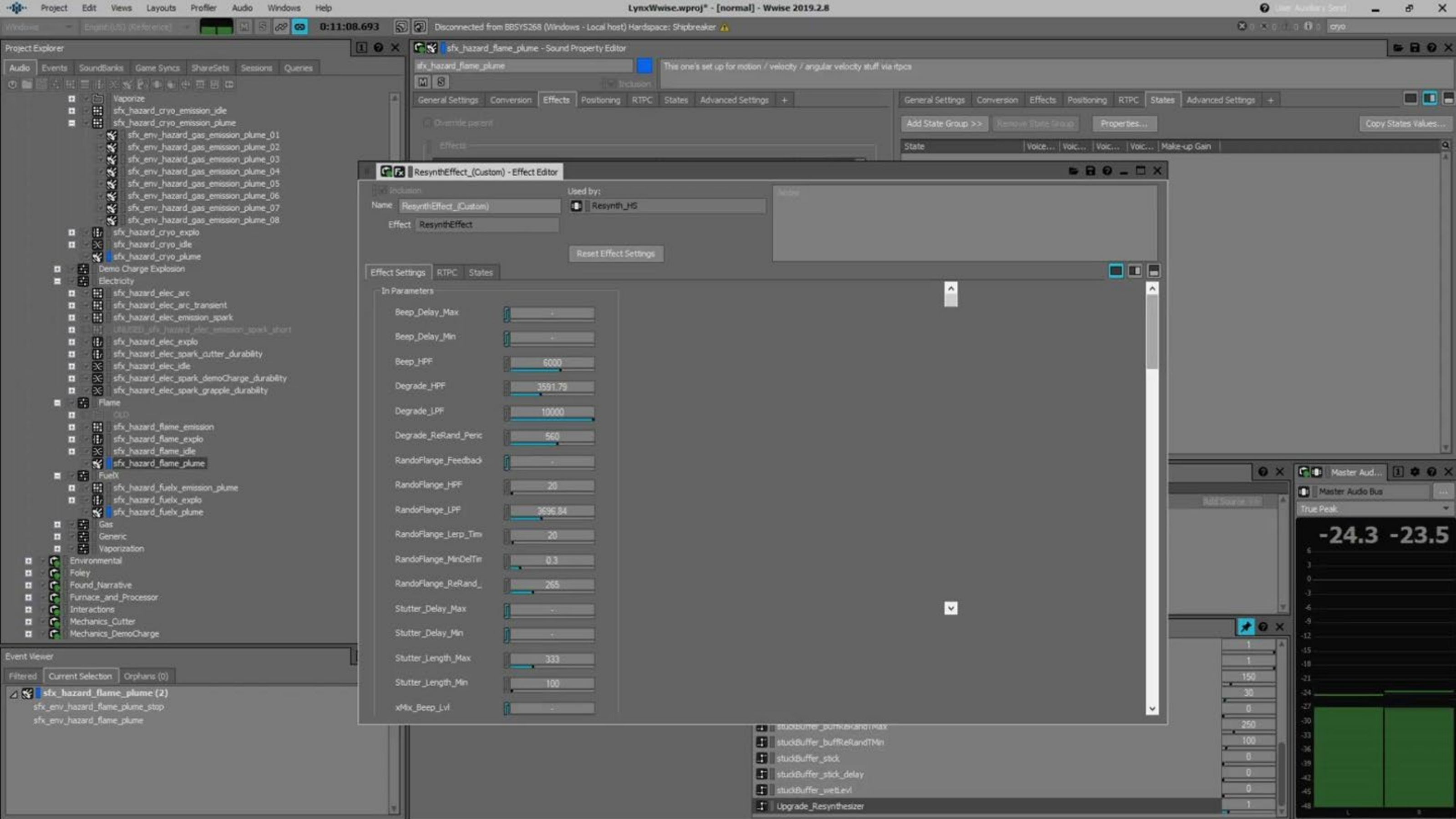


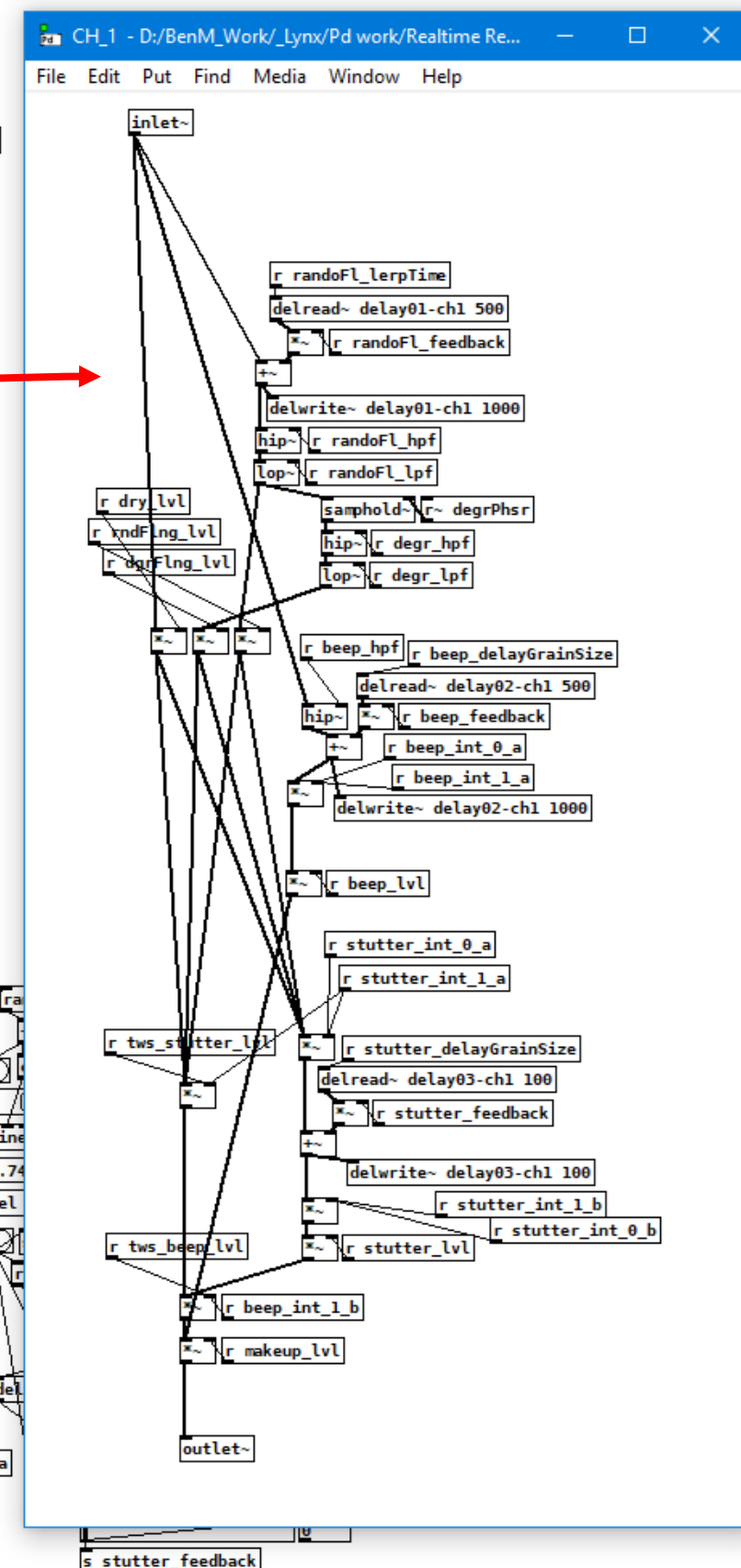
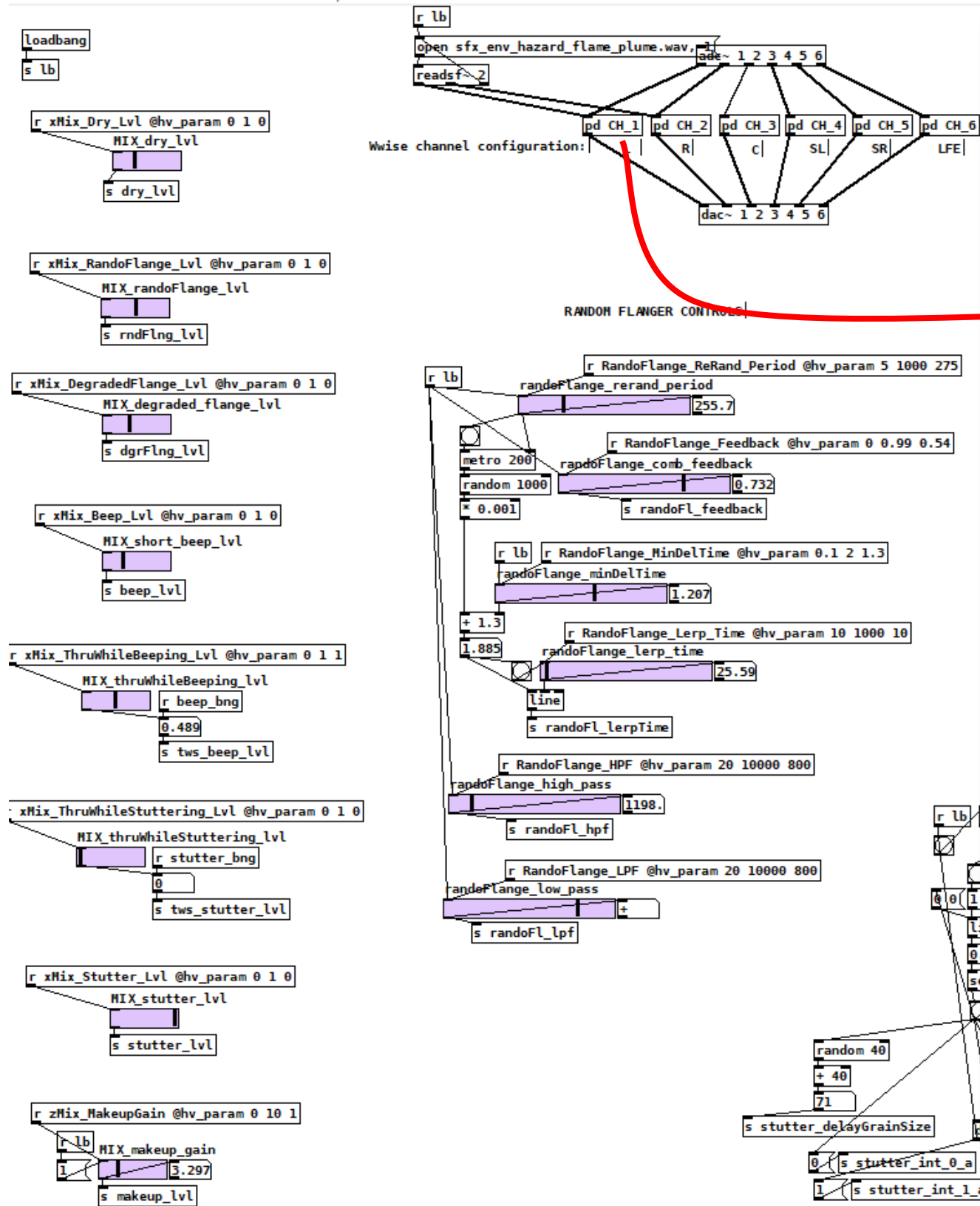
STUTTER CONTROLS



BEEP CONTROLS







Rule 2 - Fictionalised Sounds

Resynthesis - how we explain it to the player

- Not on by default
- Is an optional upgrade
- Three upgrade levels affecting range

Mixed results!



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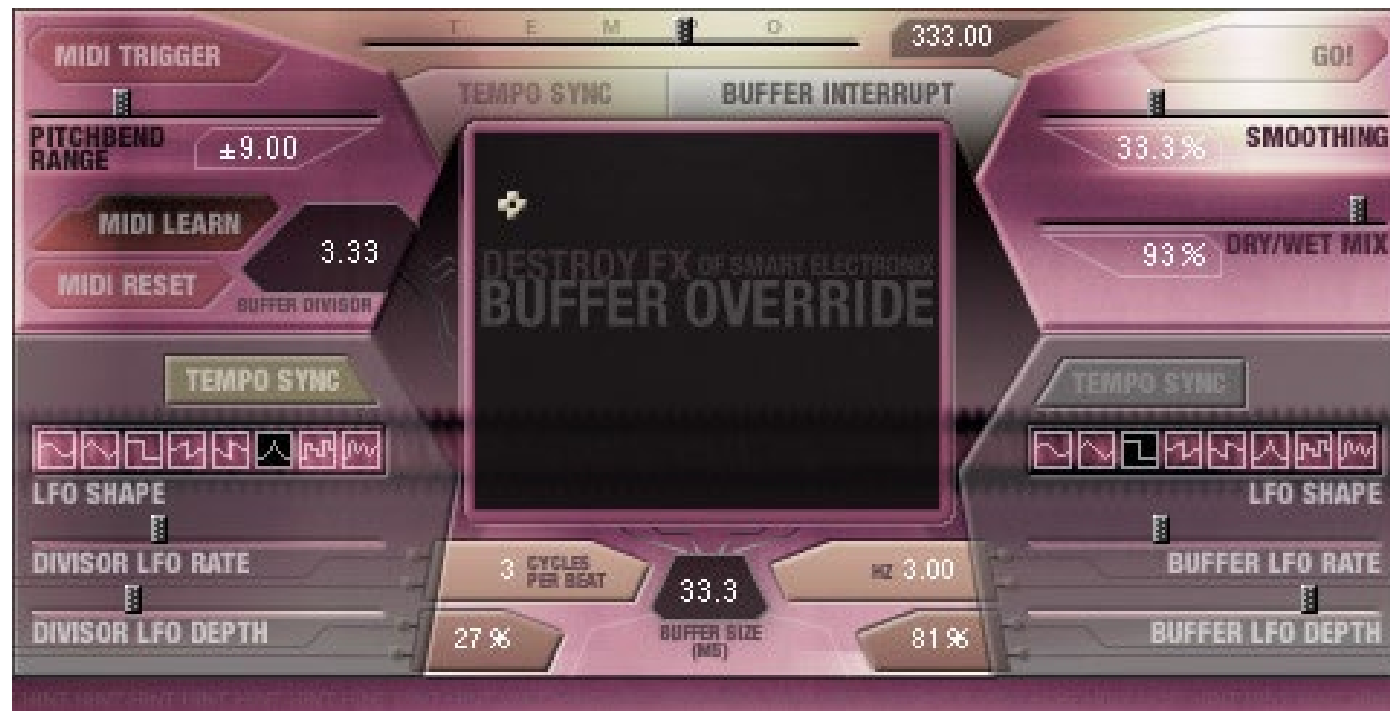
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Rule 2 - Fictionalised Sounds

Stuck Buffer Effect

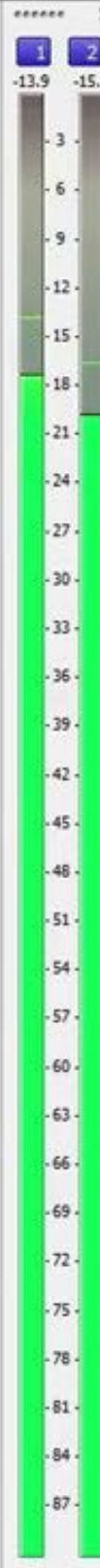
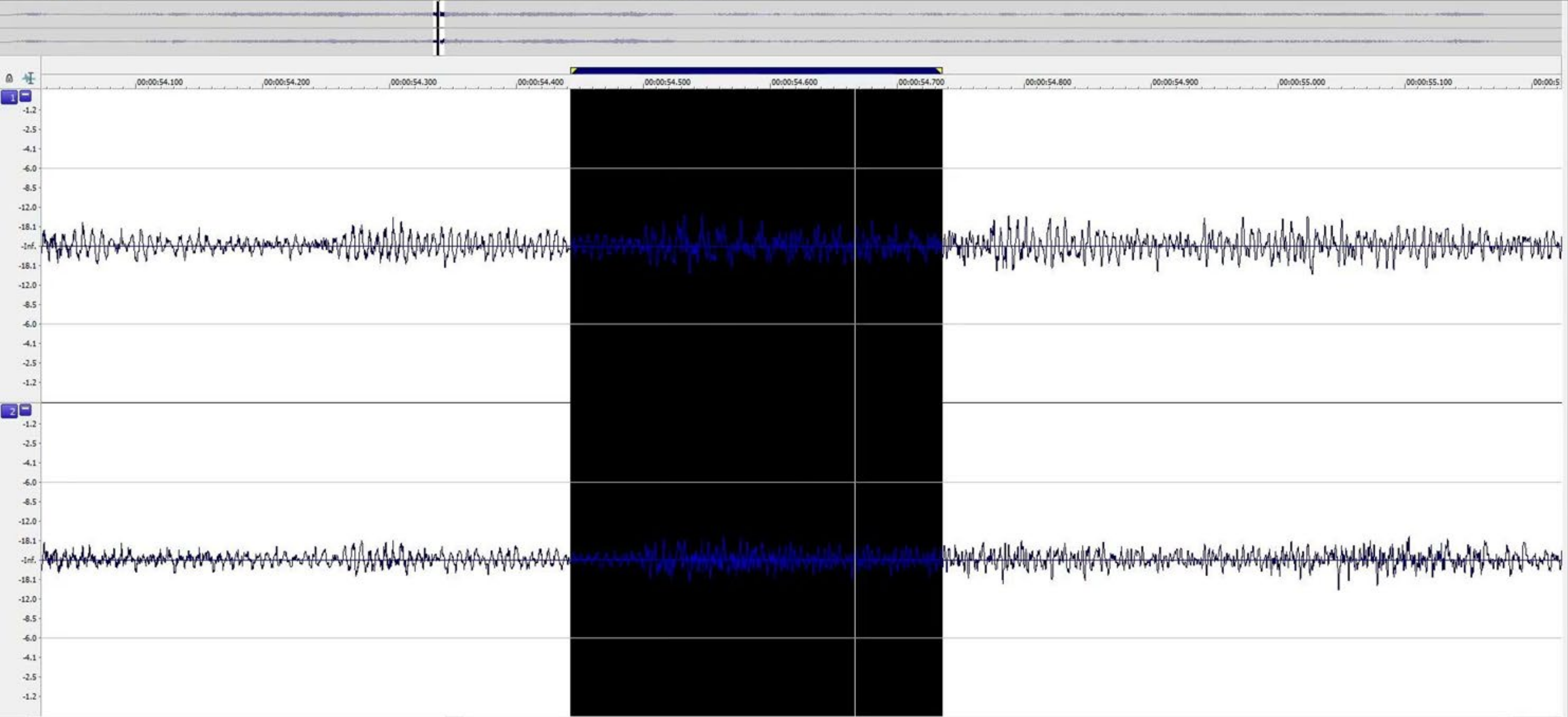
- an established piece of in-game technology *malfunctioning*

A tribute to...



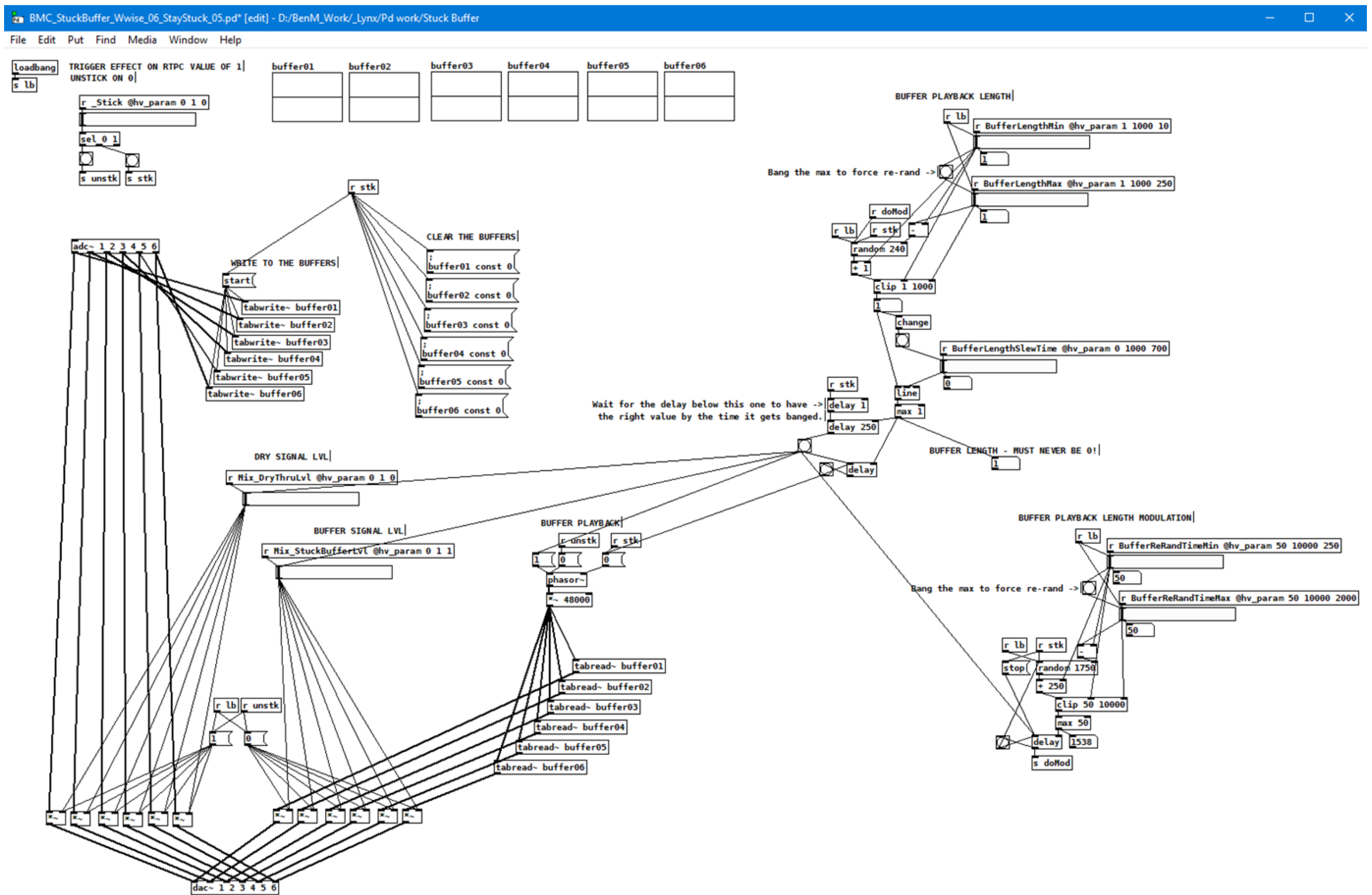
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Transport and playback controls including a play button, a seek bar, and a 'Rate: 1.00' label. Below these are three tabs: 'sfx_env_elem_fire_high_sus_ABV.wav', 'mus_nis_act1End.wav', and 'Sound 1 *'.

48,000 Hz 24 bit Stereo 00:03:14.487 212,101.4 MB



Debug Menu ▶

00:03:24:224

TETHERS 50

HAWKINS M.U.V.

G 0.00
2:30



84m

02 390

CUTTER

LIGHTS

GRAPPLE

MEGACUT

97
FUEL

100
HEALTH

SUIT

Unpressurized

Rule 3 - Internal Sounds

1. This is a **Physical Sound**, transferring according to conventional acoustics.
2. This is a **Fictionalized Sound**, existing thanks to an established piece of in-game technology.
3. This is an abstract **Internal Sound**, representing the player's emotional/mental state.

Rule 3 - Internal Sounds

Internal Sounds - represent the player's emotional/mental state

- Emotions
- Tension
- Fear
- Psychological State



UTTER #9346-52
\$ 1,257,813,700
Rank 30

Y.Gen
ovaFuel
ethers
emo Charge Pack
rilliant Repair Kit
amasC™ Patch Kit

SUIT VOICE

HEALTH LEVELS ARE CRITICAL. PLEASE DO YOUR PART TO
MINIMISE LYNX'S EMPLOYEE EXPIRY STATISTICS.

Rule 3 - Internal Sounds

Internal Sounds - represent the player's emotional/mental state

VEAR (visually-evoked auditory response)

The brain hears sounds that aren't there

We don't use this very much
(it's a bit too close to cheating)



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SWIFT SATURN

MACKEREL - STATION HOPPER

CERT

30

0/435,000 MP

0:12

BERTH

101m

1 ON H/S
THRUSTERS
87%

UNPRESSURIZED

SCANNER [+]
HELMET LIGHT [+]

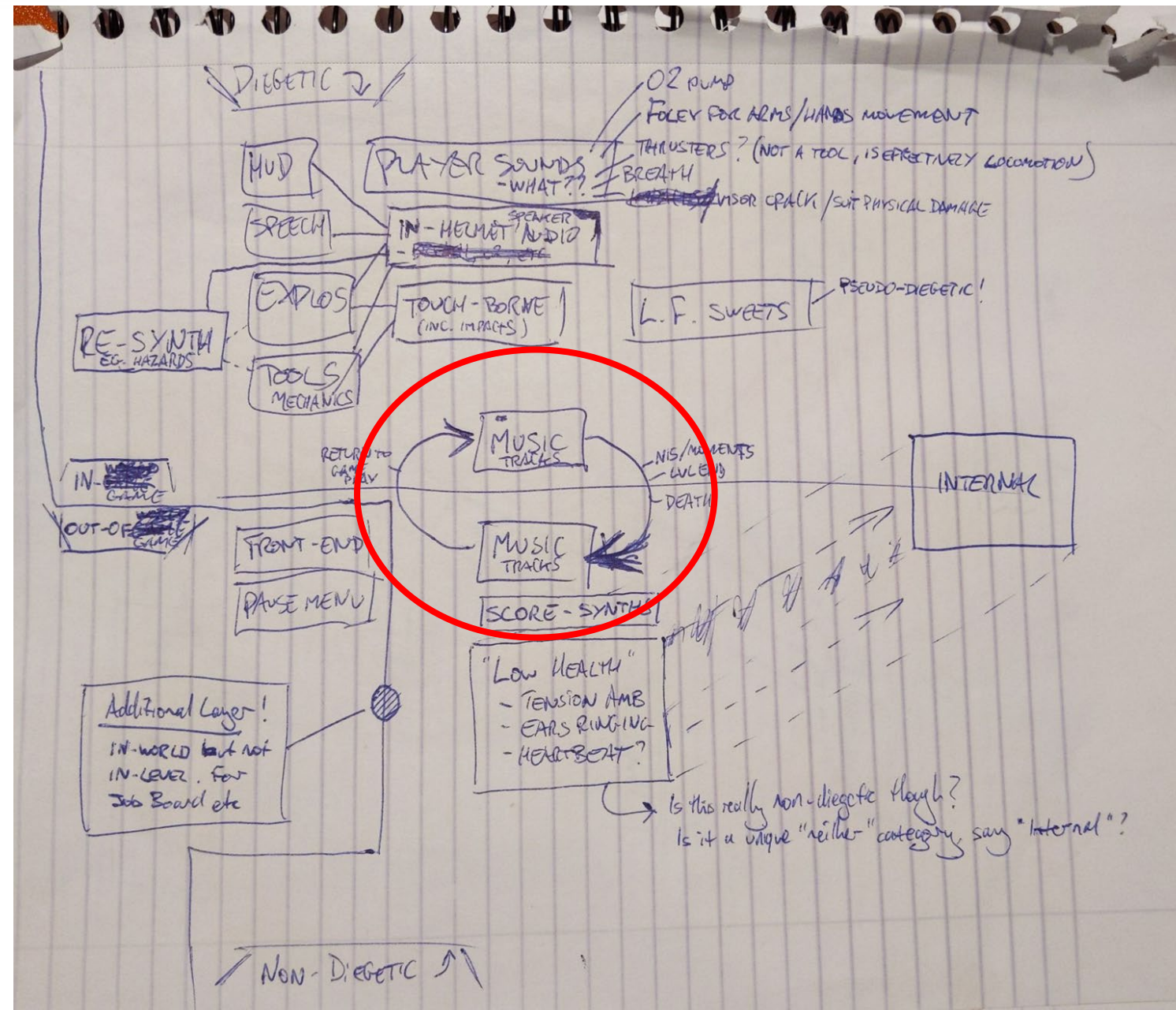
HLTH [] FUEL []
SUIT [] 02

+ CANCEL TETHERS
TETHERS [50]
+ 86%
GRAPPLE

Music Rules



How the rules work with music



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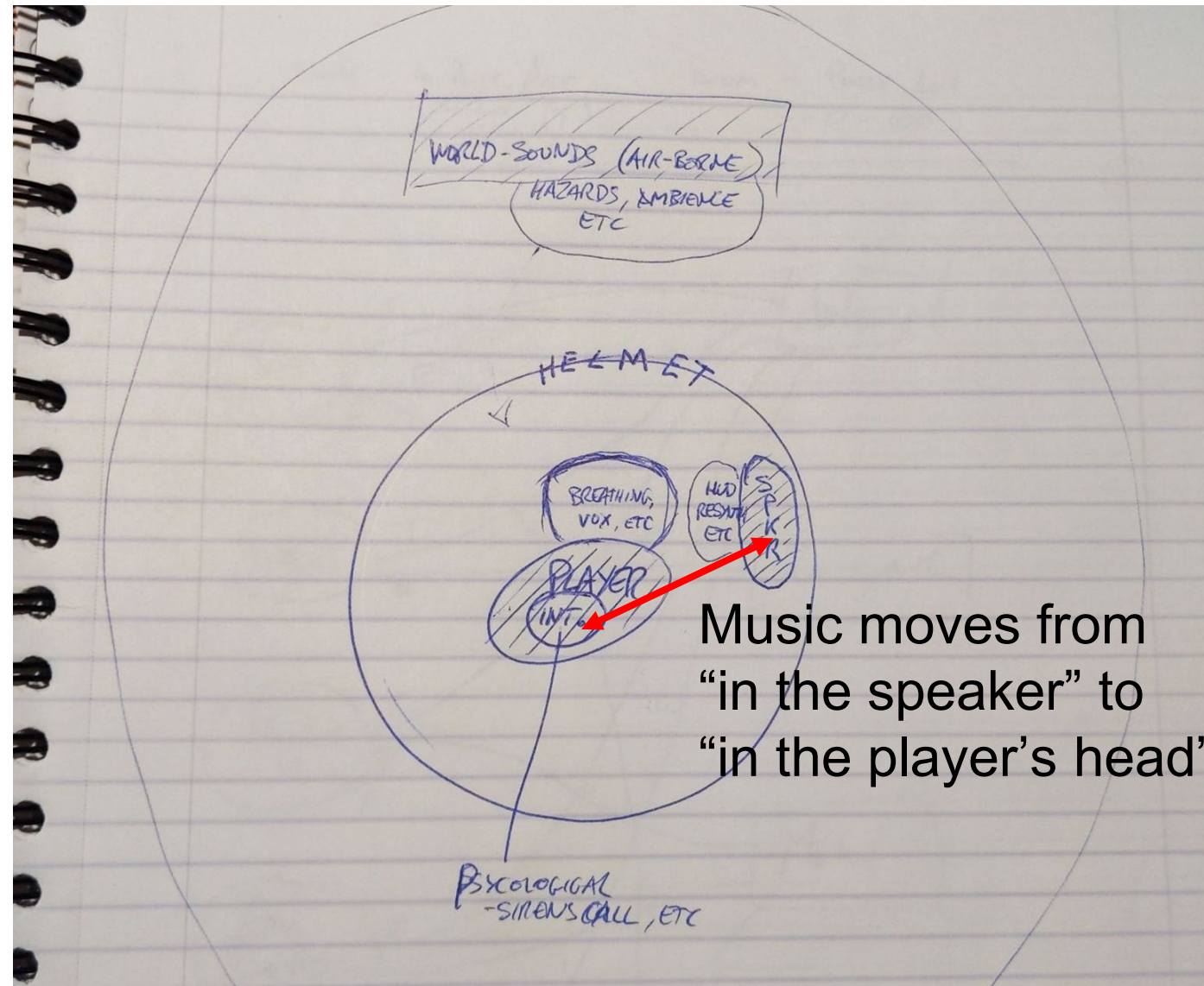
Music Rules



Music moves between being a fictionalised sound and an internal sound

Starts in the world, then moves into the player's head

Then bring it back into the world with a bump



SWIFT SATURN

MACKEREL - STATION HOPPER

CERT

38

81/435.000 HP

2:06

PROCESSOR

PANEL C/NANO CARD 07
585 Ks E61 A63
CUT LUL

14m

0.33 M/S
THRUSTERS
86%

UNPRESSURIZED

SCANNER +
HELMET LIGHT +

HLTH
SUIT

FUEL
02

+ CANCEL TETHERS
TETHERS 50
85%
GRAPPLE



Implementation Challenges 🤪

Triggering a “change” instead of triggering a “sound”

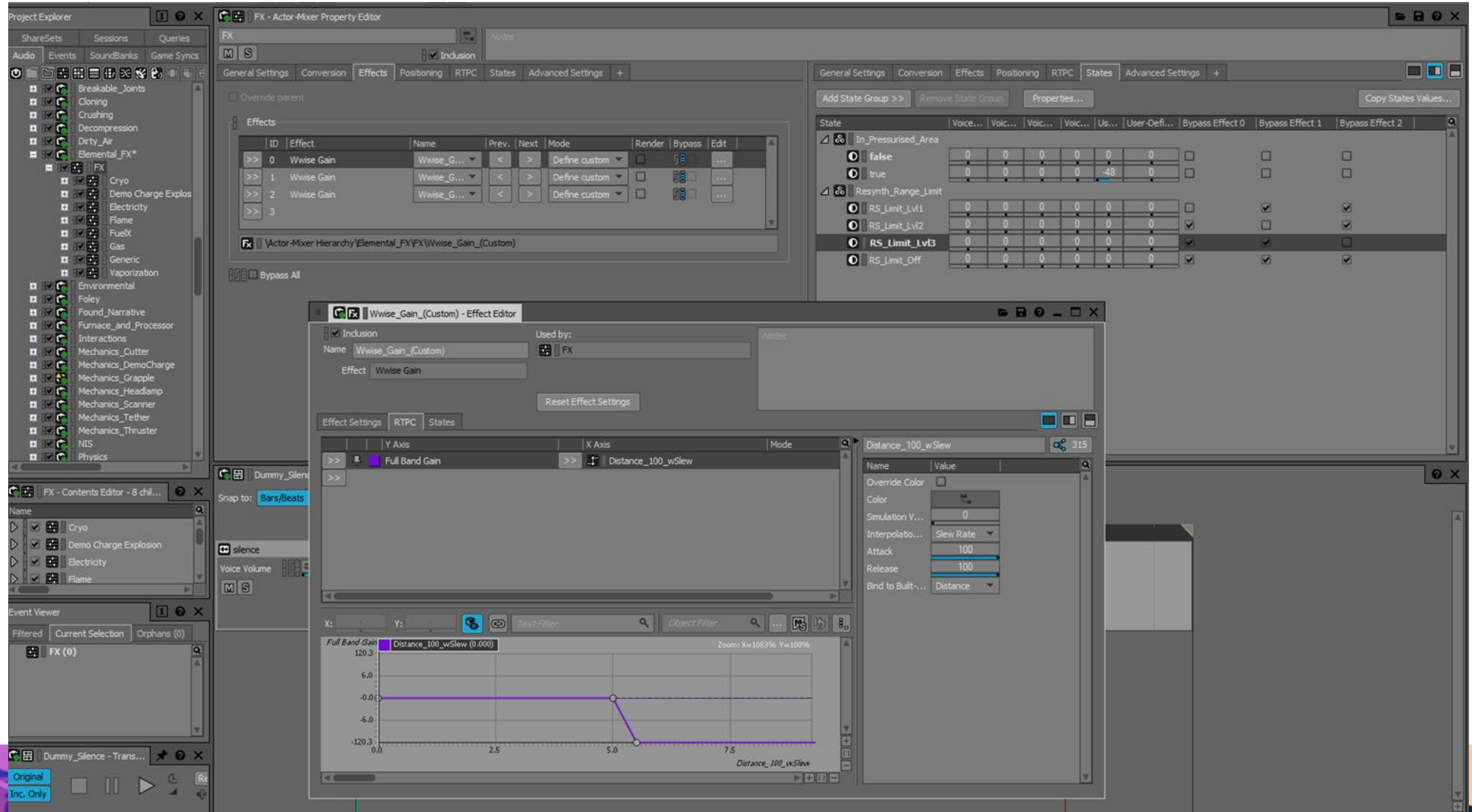
Event from game → state query → choose a sound to play



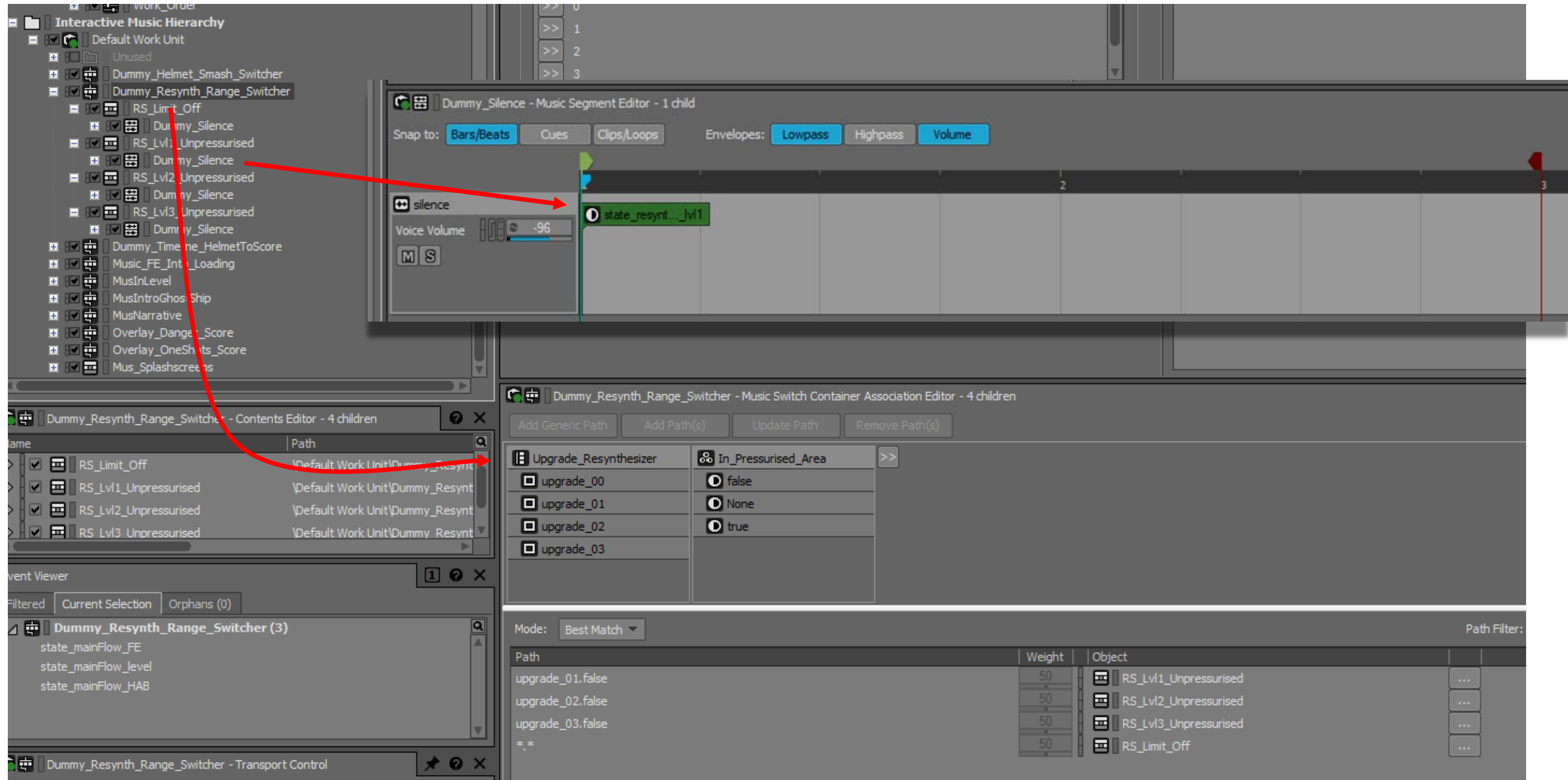
Event from game → state query → choose an event to play



Implementation Challenges 🤪



Implementation Challenges 🤪



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Implementation Challenges 🤪

A million micro-systems

Changes in non-audio systems would break audio systems

- Ship lighting system
- Ship component spawning system
- Changes to upgrades and difficulty curves

A Bit of Good Fortune

An incredibly supportive team

- Audio is taken seriously by everyone on the team.
- Game director and producer push for great audio
- Supportive tech director - prioritises features like Touch Transfer.

So Is It Working?

So far, yes! Lots of love for audio in our steam reviews & discord

I also have to add a note about the absolutely great work with the Audio Design and interface.

Hat's off to the game's sound design team. The first time I pulled a reactor from its housing,

For me, that is the biggest draw for the game: immersion. It's easy to get lost in this game, as the sound and 'weight' of everything feel great. Everything is presented in context, and the

There's a lot of great elements supporting verisimilitude, with the music and audio as standouts. There's a very clever dynamic

sys frontier, doing honest, but dirty work. The sound design is impeccable, with most of the game being spent in no atmosphere,

The attention to detail in this game is very satisfying. The physics feel *great*, and the auralcape is top-tier. The background music is a light twangy banjo tune with some humming,

which is the soft hear. Th *very* Listen. Just listen to the sounds around you. Listen to the tethers inside a pressurized vessel. Listen to the thumping of the music. Listen to the Splitsaw as it cuts. Listen to the hisses and the groans of the environment, the vibrations of a ship still powered. Listen to the explosions. Listen even to the silly music that plays when you hit your head or get electrocuted. Listening to your surroundings lets you know how much BBI loves their game.

I can't get over how beautiful sounding this game is. I feel as if I'm actually working out in deep space, cutting up ships (not that I know how that feels, obviously).



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So Is It Working?

Good press response



7 reasons I have fallen for Hardspace: Shipbreaker

5) The Gurgle



“The fun way to test the pipes is to put your hand on them. Press the X or Z buttons and you'll reach out with either hand, and press it against the pipe. If there's fluid moving inside, you'll hear a wonderful gurgling sound.”

"They can't understand our love. We'll be rid of them soon, my darling."

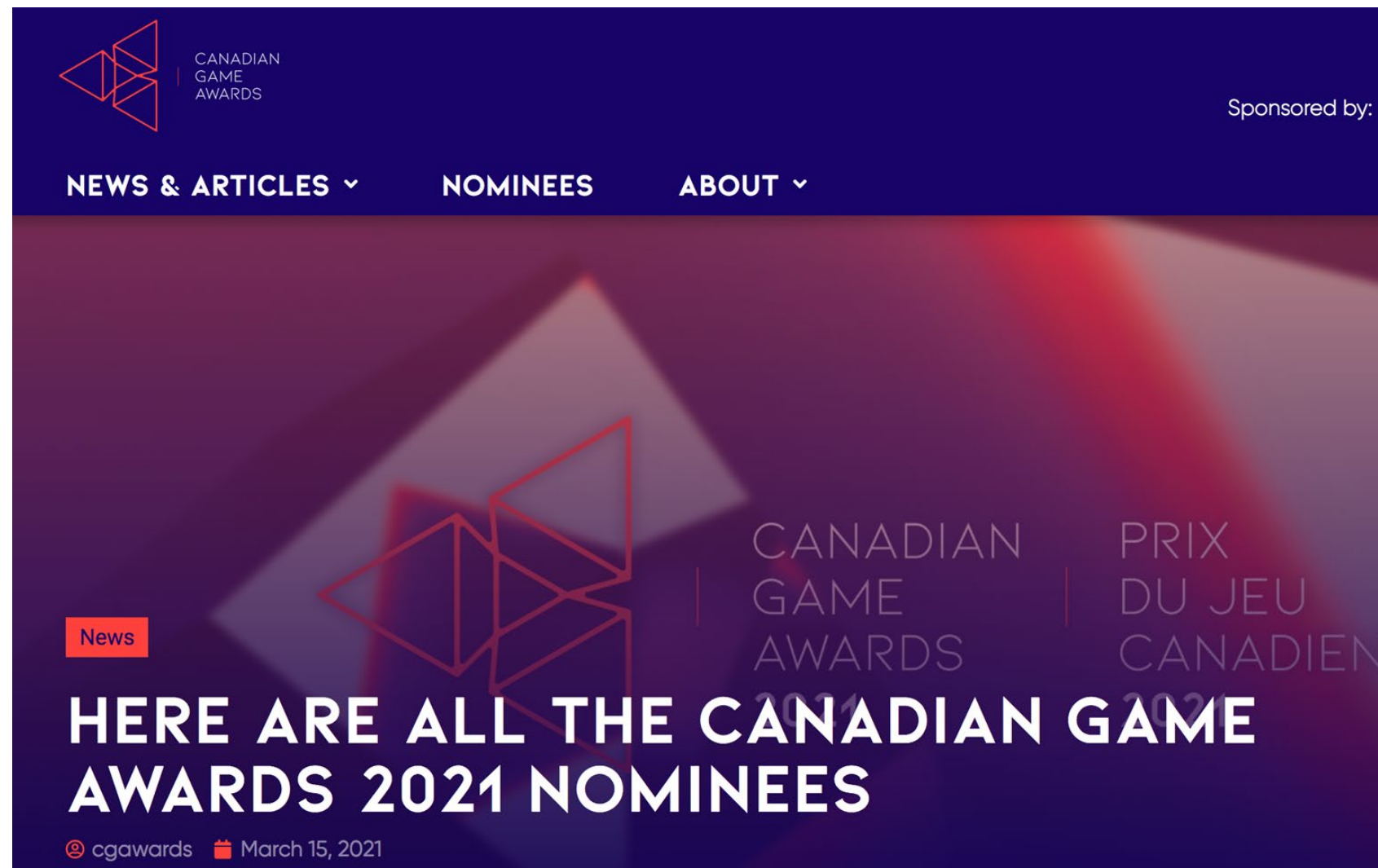


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So Is It Working?

CGA nominations



Best Score / Soundtrack

- *A Fold Apart*
- *Assassin's Creed Valhalla*
- *Hardspace: Shipbreaker*
- *Immortals Fenyx Rising*
- *Spiritfarer*

Best Audio Design

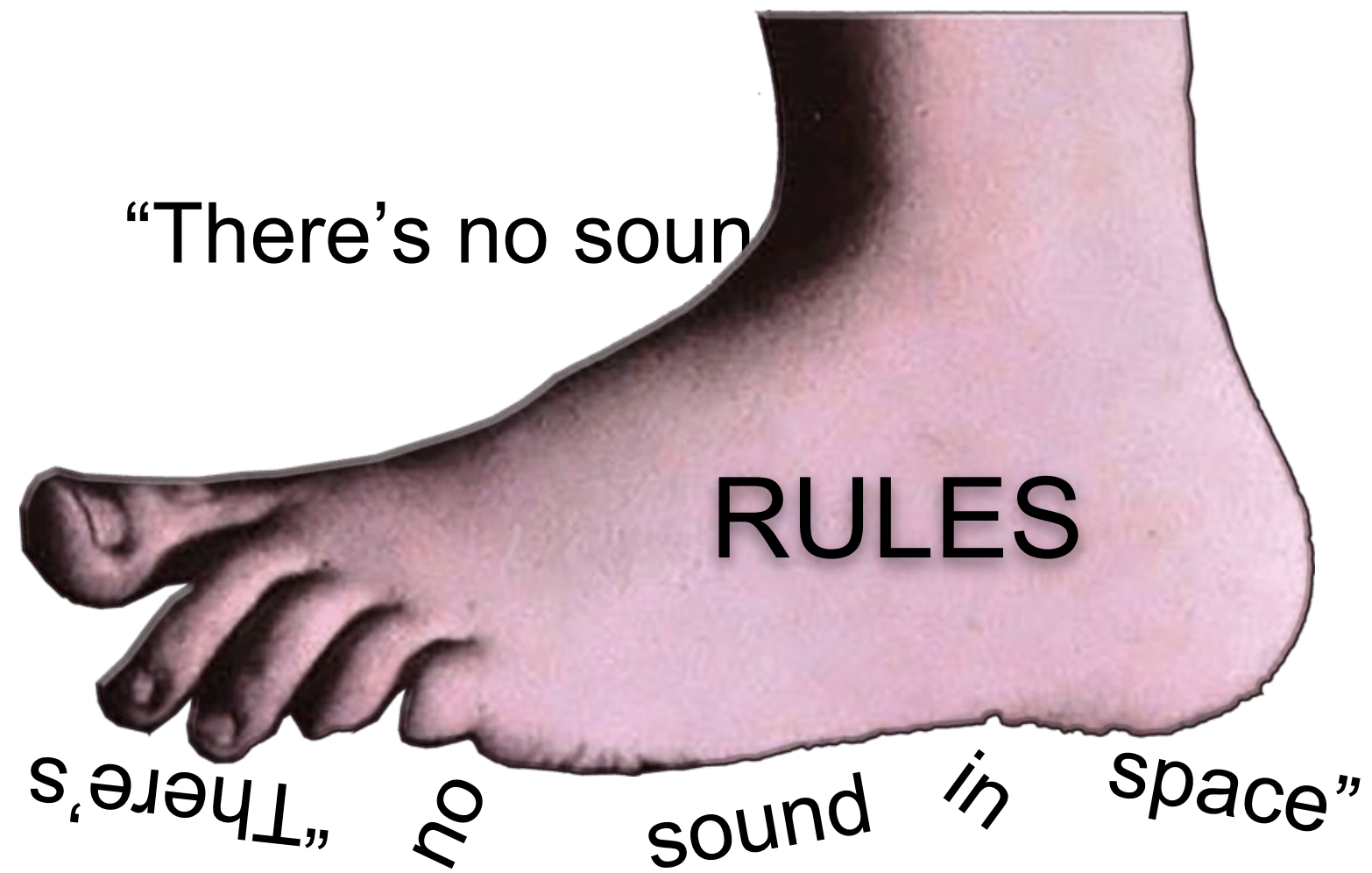
- *Assassin's Creed Valhalla*
- *Dauntless*
- *Hardspace: Shipbreaker*
- *Star Wars: Squadrons*
- *Watch Dogs: Legion*



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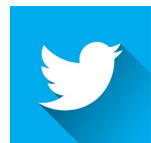
Conclusion



Thanks!



hardspace-shipbreaker.com



@benmcben

