

# 游戏音频设计

Game Audio Design

2025 SHU Shanghai Film Academy

# 沈希辰

Xichen Shen

- Lead Audio Designer at Hypergrph  
Aug 2023 - Present  
Unannounced project working in progress...
- Senior Audio Designer at Tencent NExT Studios  
Apr 2019 – Aug 2023  
SYNCED
- Audio Designer at Ubisoft Shanghai  
Aug 2015 – Apr 2019  
Far Cry New Dawn  
Far Cry 5  
Far Cry 5 DLC: Hours of Darkness  
Far Cry 5 DLC: Lost On Mars  
Far Cry Primal



# 课程简介

- Who is this course for?
- What does this course cover and not cover?
- What to expect from this course?
- What is expected from you?

# 内容大纲

## 理论

- Game Audio Design Overview
- Dev Workflow & Tool
- Audio Spatialization
- Ambience Sound Design
- Character Foley Design
- Gun Sound Design
- Music Design
- Voice Design
- Game Audio Debug
- Game Audio Mixing
- Game Audio with AI
- .....

## 实践

- Use Version Control
- Use Game Engine
- Use Game Audio Middleware
- .....

## 作业

- 3 Small Assignments
- 1 Final Work

# 课程评分

- 考勤与课堂互动: 10%
- 实践与作业: 20%
- 期末作品: 70%

对本课程还有什么疑问？

Any questions about the course?

# 游戏音频设计概述

Game Audio Design Overview

游 戏 音 频 设 计

Game Audio Design

# 游戏

电子游戏 Video Game

## 类型

- First-Person Shooter / Third-Person Shooter
- Action / Adventure / Role-Playing
- Platformer / Metroidvania
- Multiplayer Online Battle Arena
- Strategy
- Simulation
- Racing
- Sports
- .....

## 平台

- Console
- PC
- Mobile
- .....

# 音频

## 声音内容

- 音效 Sound Effect
  - 环境
  - 角色
  - 武器
  - .....
- 音乐 Music
  - 主观音乐
  - 客观音乐
  - .....
- 语音 Voice
  - 角色
  - 怪物
  - .....

## 实现方式

- 基于对象的资源制作形式
- 音频空间化的听者与声源
- 地图关卡中的物件对象
- 功能逻辑中的事件节点
- 动画序列与状态机
- 材质与物理
- 互动音乐
- 语音系统
- .....

## 管线与规范

- DAW -> Middleware -> Engine
- 迭代式开发流程
- 开发模块之间的分工协作
- 数据结构与命名规范
- 海量数据的管理
- 语音开发管线
- 不同平台的响度管理
- .....

# 设计

声音的“好听”和“有用”

## 美学性

与艺术风格和内容表现相匹配

- 写实主义 Realism
- 未来主义 Futurism
- 幻想 Fantasy
- 哥特 Gothic
- 赛博朋克 Cyberpunk
- 像素风 Pixel Art
- 低多边形 Low Poly
- 赛璐珞 Cel-Shading
- .....

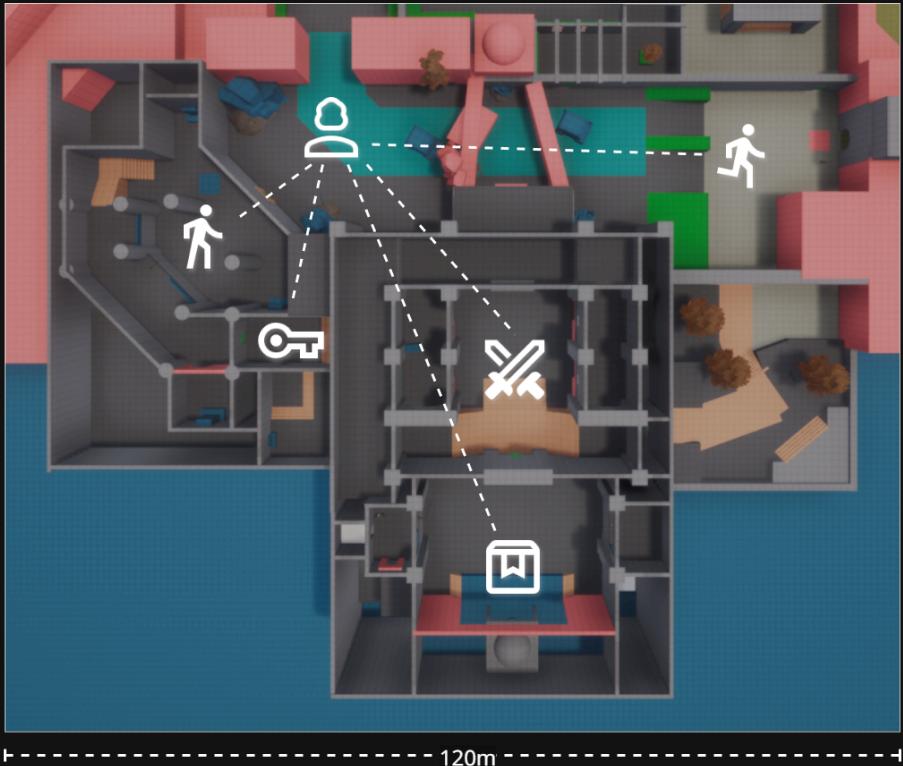
## 功能性

与游戏类型和玩法机制相结合

- Action: 即时反馈与打击感
- RPG / Adventure: 角色塑造与叙事推进
- Sports / Racing: 真实的物理反馈
- PvP: 声音信息传递
- Horror / Survival: 心理暗示
- .....

# 听声辨位

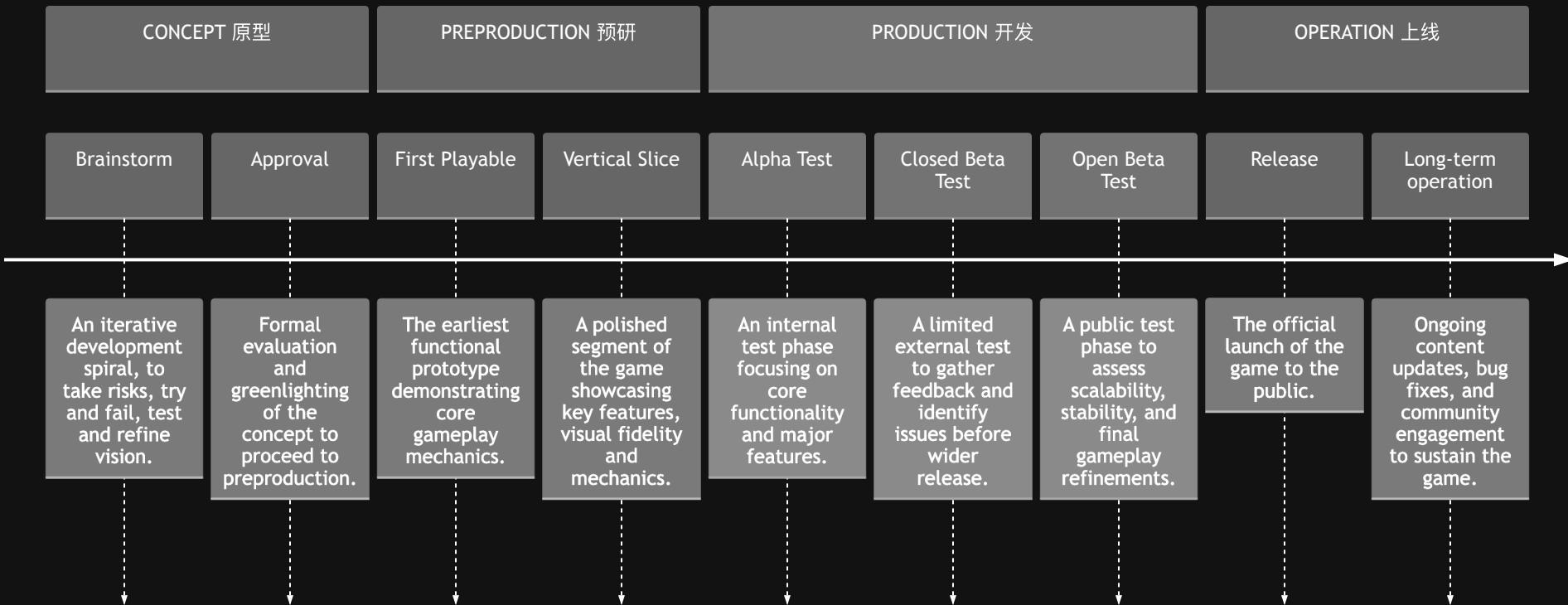
- 脚步声是玩家获取信息的重要声音
- 游戏内各种类别声音的听感大小和传播距离不同
- 声音传播时会受到房间、门和障碍物的影响
- 玩家能够根据听到的声音来判断声源的距离和方位



# 开发流程

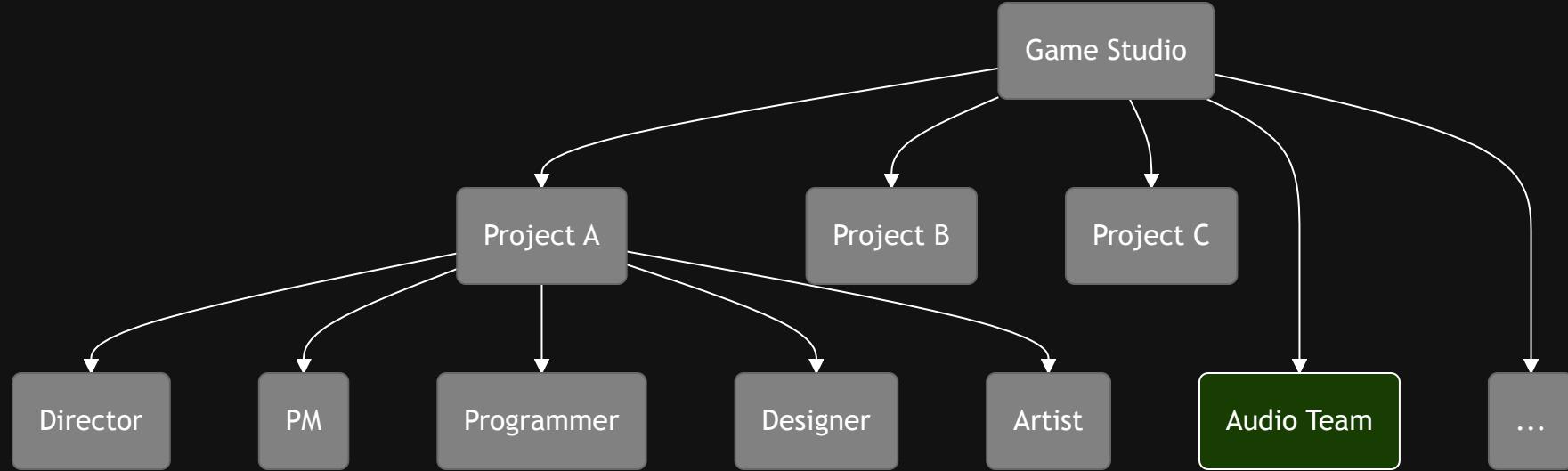
Dev Workflow

# 开发阶段 Dev Stage



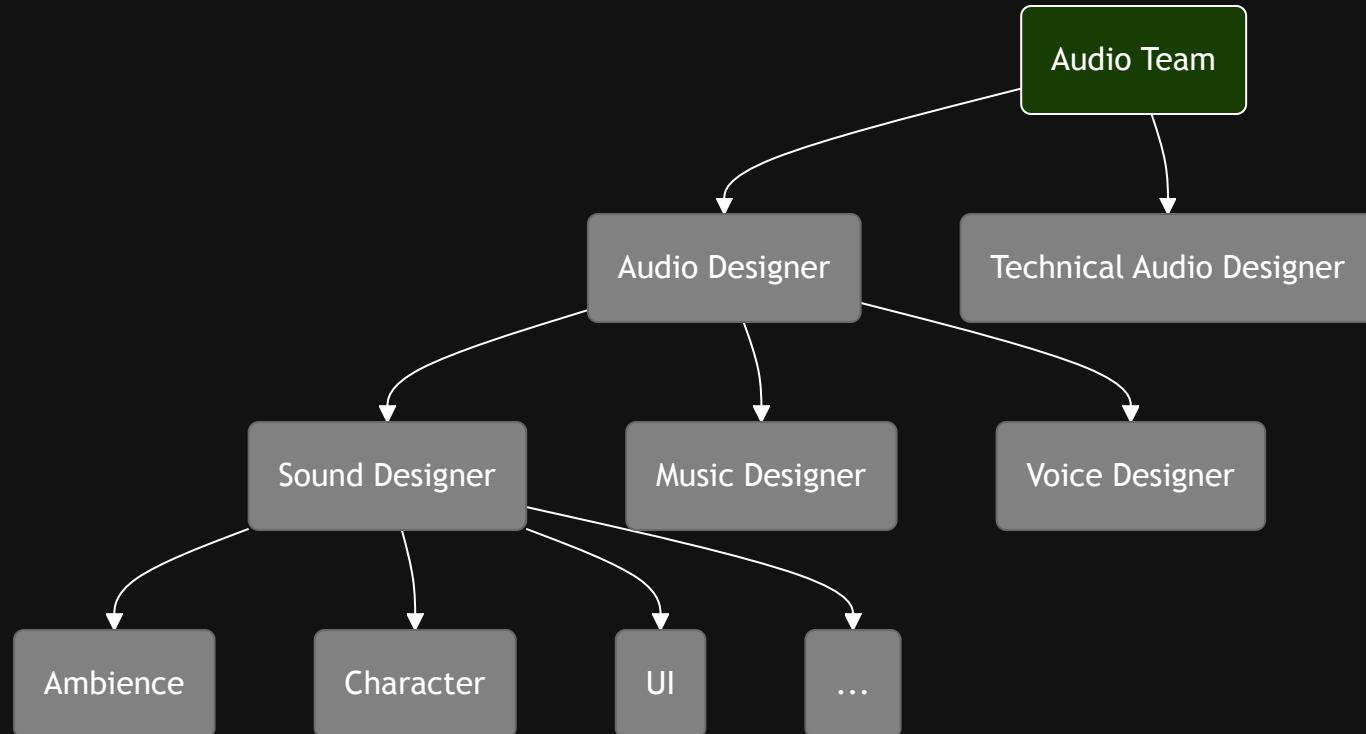
# 开发团队 Dev Team

中台化的音频团队?



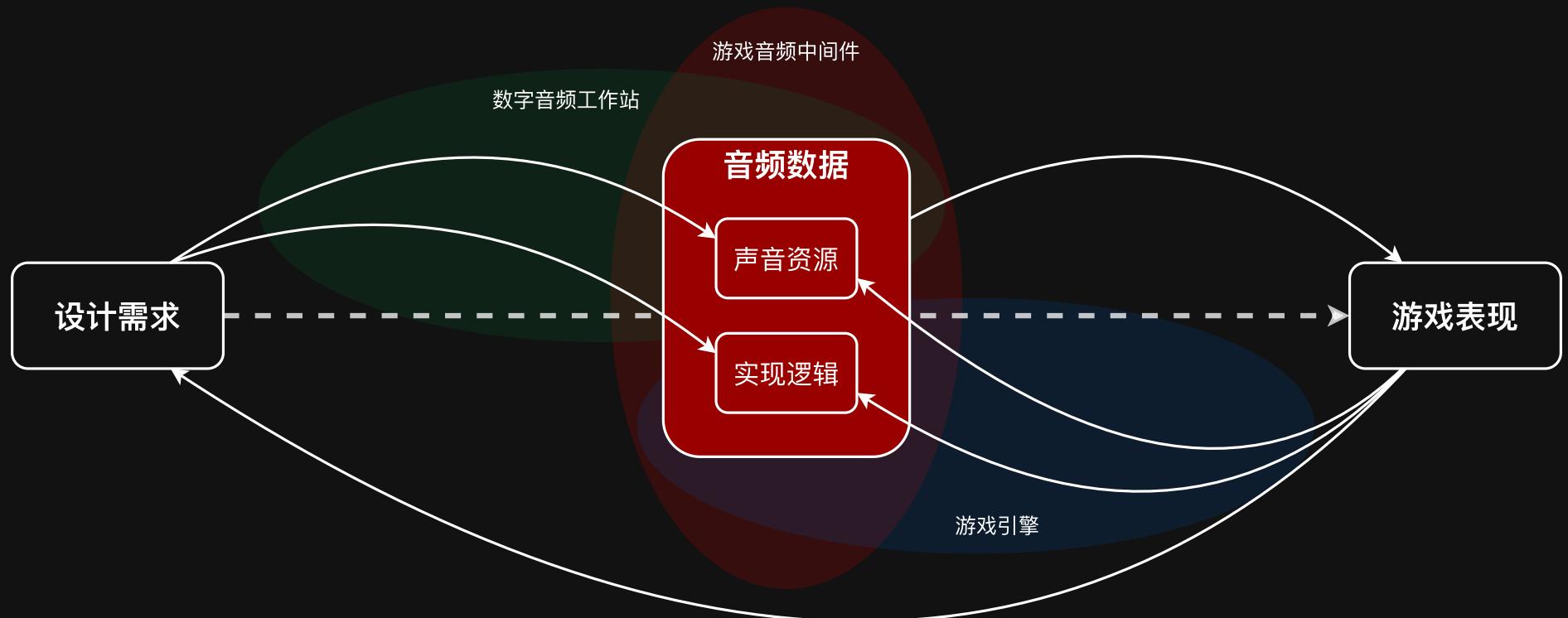
# 音频团队 Audio Team

如何具体分工?



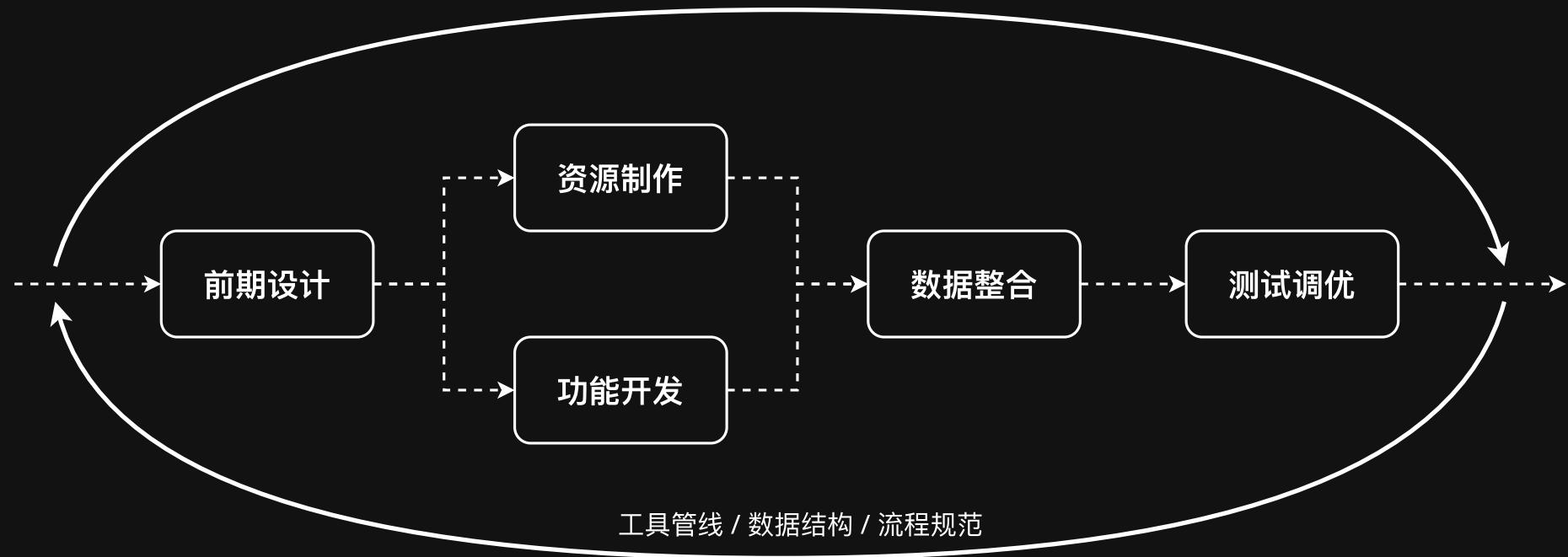
# 音频数据 Audio Data

根据设计需求制作出相应的音频数据，并将其整合到游戏引擎中去，与其它设计元素共同形成最终整体的游戏表现。



# 设计流程 Design Workflow

迭代式开发流程



**游戏开发是系统工程，游戏音频设计也应如此。**

Game development is like systems engineering, and so is game audio design.

# 开发工具

Dev Tool

# Core Tool

## 版本控制

Version Control

- Perforce Helix Core



- Git



- GitHub



- Apache Subversion



## 游戏引擎

Game Engine

- Unreal Engine



UNREAL  
ENGINE

- Unity



Unity®

- Godot



GODOT  
Game engine

- Cocos



COCOS

- Construct 3



CONSTRUCT3

## 音频中间件

Audio Middleware

- Wwise



Wwise

- FMOD



CRIWARE



## 数字音频工作站

Digital Audio Workstation

- REAPER



REAPER  
Digital Audio Workstation

- Pro Tools



- Cubase



- Nuendo



# Other Tool

- Project Management
  - Feishu 
  - TAPD 
  - Jira 
- Code Editor & IDE
  - Visual Studio 
  - Visual Studio Code 
  - Rider  Rider JETBRAINS IDE
- Knowledge Management
  - Notion 
  - Obsidian 
  - SiYuan 
- Image & Video & Audio
  - Greenshot 
  - Flameshot 
  - OBS Studio 
  - draw.io 
  - Inkscape 
  - GIMP 
  - DaVinci Resolve 
- Media Player
  - PureRef 
  - mpv 
  - VLC Media Player 
  - foobar2000 
- Content Presentation
  - Markdown 
  - Mermaid 
  - Docusaurus 
  - Slidev 
- AI
  - OpenAI
  - LLaMA
  - Gemini
  - Claude
  - Deepseek
  - Hugging Face
  - .....

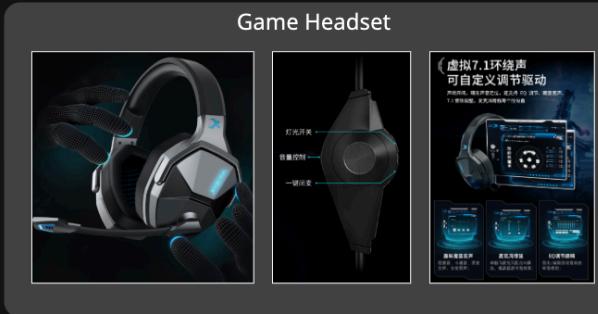
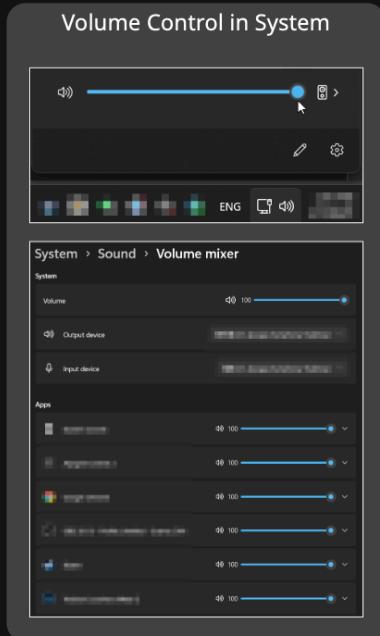
得体地使用优雅的工具。

Use elegant tools decently.

# 如何听声音

How to Listen Sound

# 数字音频制品 --> 最终听感效果



# 数字音频信号的响度与动态范围

- 在数字音频信号领域中，使用 dBFS (dB Full Scale) 来度量某一时刻的信号电平大小
- 结合心理声学相关理论，使用 LUFS (Loudness Units Full Scale) 来度量某一段时间内的信号感知响度
- 短时内的最大和最小响度差异称为 Loudness Range (Loudness Range)



# 数字音频信号测量

## 频谱仪与响度表

- TC Electronic CLARITY M STEREO



- iZotope Insight



- Blue Cat Audio FreqAnalyst



- Youlean Loudness Meter



## 参考标准

- ITU-R BS.1770-3

- EBU R128

- ATSC A/85

- AES Streaming

- ASWG-R001

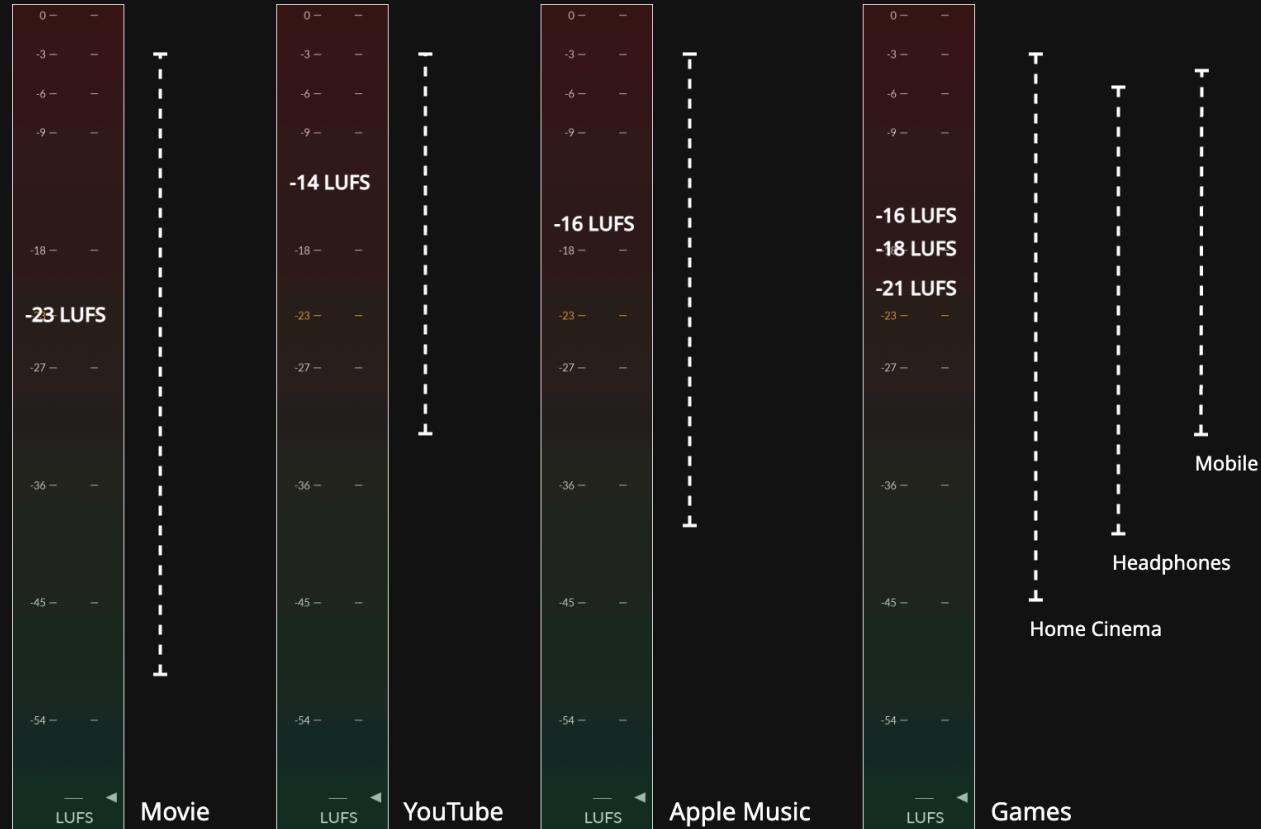
- Netflix

- Apple Music

- .....

# 常见媒介的响度规范

广播、电视、电影、音乐和游戏等内容和流媒体平台的响度和动态范围



**校准日常的听声环境，养成良好的听声习惯。**

Adjust daily listening environment and cultivate good listening habit.