User Interface

UI & UX

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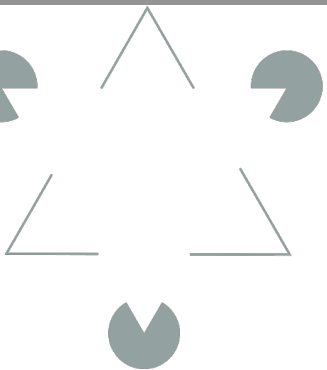
Faculty of Information Technology
DCGM, cPhoto@FIT
Faculty of Fine Arts
Game Media Studio

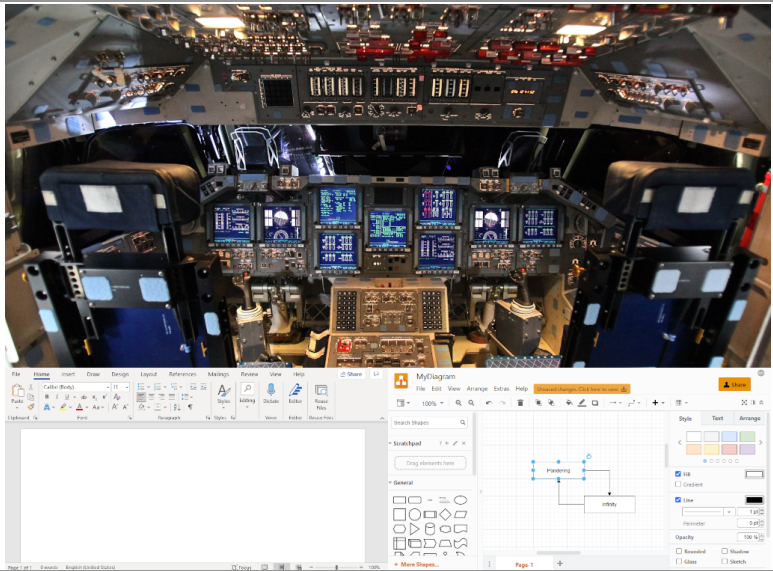
10



Principles & Goals

What is UI?

- User ↔ UI ↔ System
- Interaction
- Communication
- Five Senses
- Maximize Usability



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UI in Games

- Player ↔ UI ↔ Game
- = Player Feedback
- Three Senses
- Frontend & Gameplay
- Game Specifics

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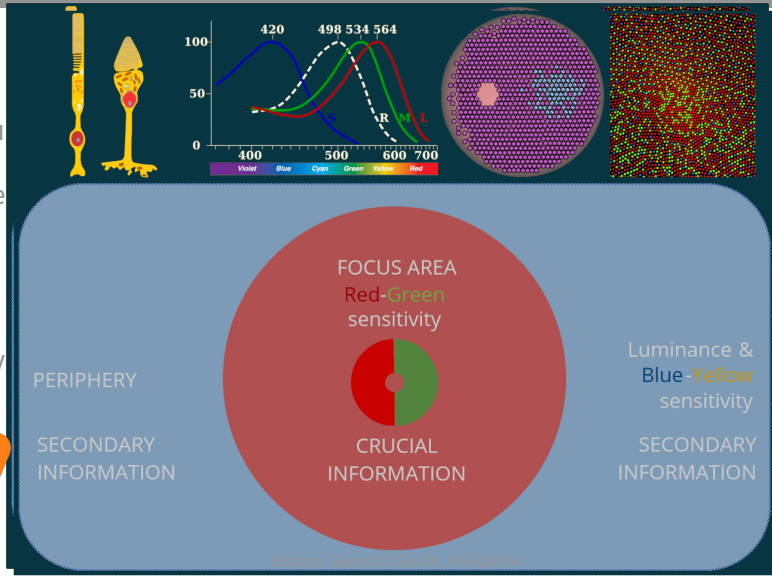
User Interface Design

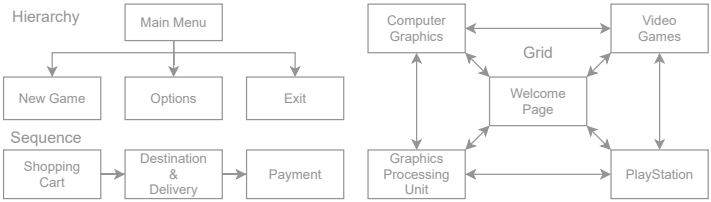
Communication Channels

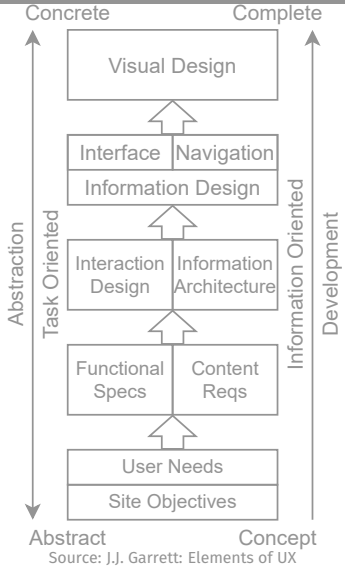
- Goal: Optimal Usage
- Matter of Bandwidth
- Hearing ⇝ Sound
  - Afterthought → 50% [1
  - Combined Effect
  - Mood, Attention, Mode
- Touch ⇝ Controls
- Sight ⇝ GUI
  - Human Visual System
  - Visual Perception
  - Distance & Readability



User Experience

- Interaction Experience [3]
- UI vs UX Design [6]
- Goal: Design for Needs
- Information Architecture (IA)
  - Organization & Categorization
  - Labeling, Navigation, Search
  - Graph – Nodes + Edges
  - Organization Structure
- Interaction Design (IxD)





Source: J.J. Garrett: Elements of UX

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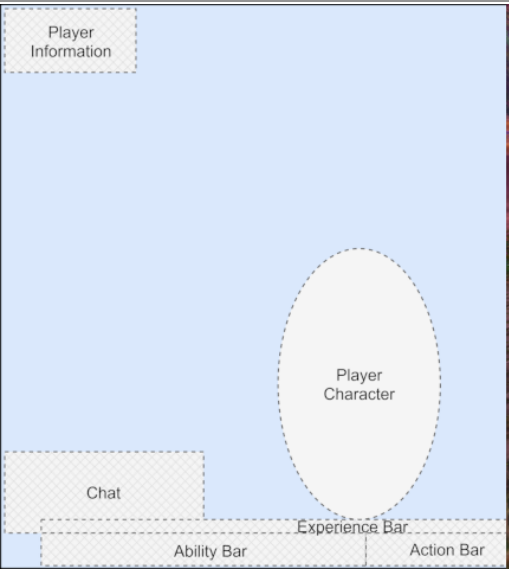
User Experience and User Interface



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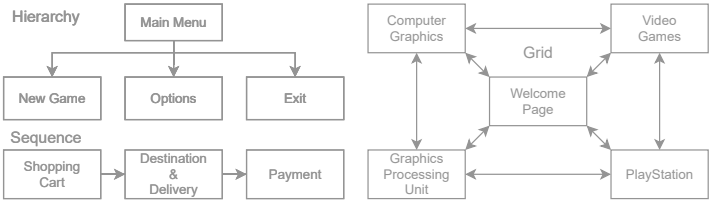

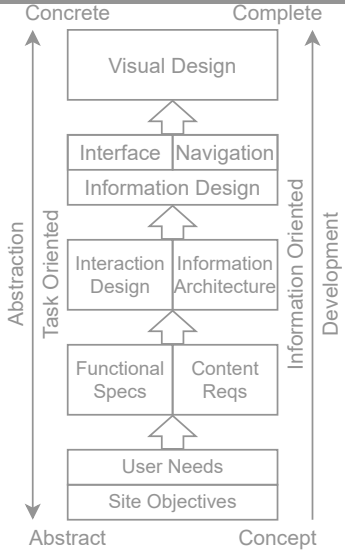

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Cognitive Load

- Mental Processing
- Intrinsic $\times$ Extraneous
- Minimize Effort
  - Progressive Disclosure
  - Modes
  - Nesting & Clicks
- Miller's "Law" : 7 ± 2
- Recognition, not Recall
- Immunda Rasa $\rightarrow$ Mental Model

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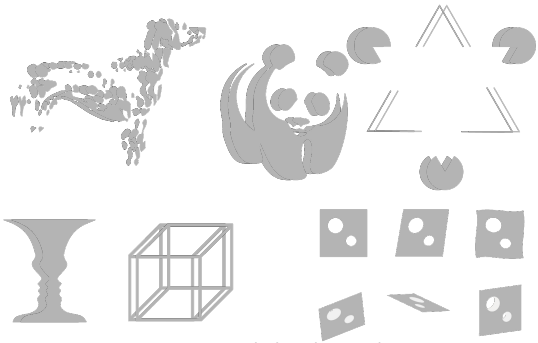
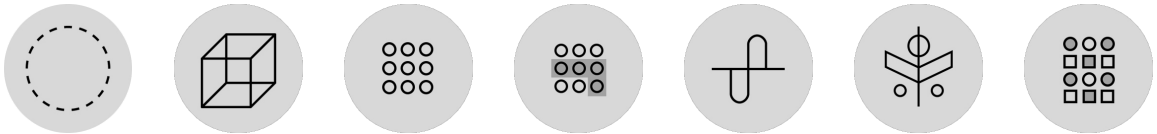
Perceptual Psychology

- Gestalt Psychology → Perception
- "The Whole is More
  than the Sum of Its Parts" [5]
  — Kurt Koffka
  - Emergence
  - Reification
  - Multistability
  - Invariance
- Prägnanz ⇝ Gestalt Principles [4]



Source: Gestalt Principles in UI Design



Source: Game UX Master Guide

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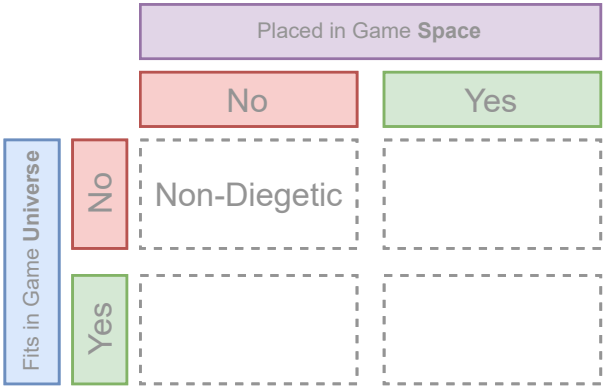
SPECTATOR
TEAM 1
GERMAN EMPIRE
+ APPLES 5/5
+ BUTTER 2/5
+ CHARLIE 5/5
+ DUFF 5/5
+ EDWARD 5/5
Emort90
Wotanson3
lapplander1
450 14:19 403
TEAM 2
BRITISH EMPIRE
+ NO SQUAD
+ APPLES 5/5
+ BUTTER 5/5
+ CHARLIE 5/5
+ DUFF 5/5
Wotanson3
KILLS: 11
DEATHS: 6
POINTS: 4800
K Bullets
SQUAD: HARRY
ipwire Bomb — HE
HEALTH: 100%
Gas Grenade
Gewehr 98 Sniper
Mars Automatic
Shovel
5/9
0
PLAYER VIEW
OPTIONS
1P
3P
DIRECTOR
ORBIT

Gameplay UI

- Used in Core Gameplay
- Genre, Art, Style
- Use-Based Classes: **Universe** × **Space** [2]
- Non-Diegetic UI
  - Classical & Common
  - Easy Design / Implementation
- Diegetic UI
  - Integrated & Immersive
  - More Difficult, Performance
- Spatial UI
  - Straightforward & Immersive
  - Limited Style, Information
- Meta UI
  - Entire Game & State Change
  - Screen-Space, Details



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L2
R1
R2
OPTIONS
L3

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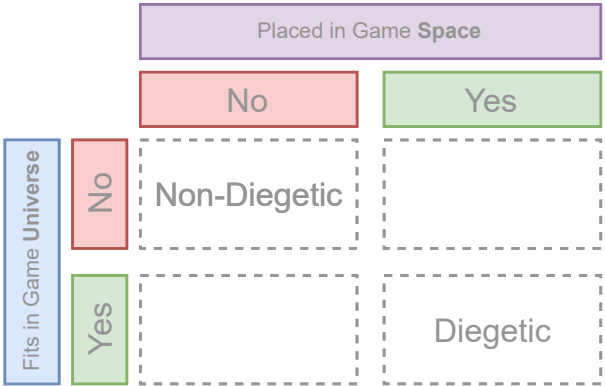

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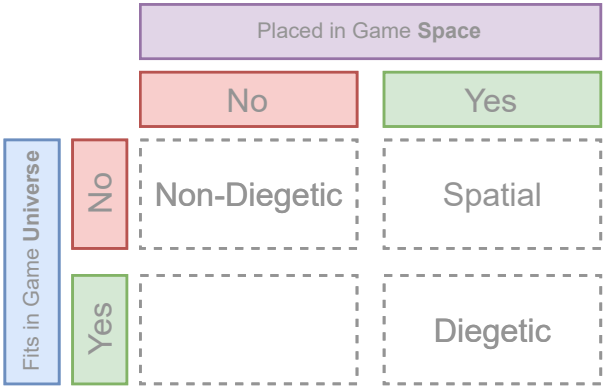

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S
W
THROWABLE: Traffic Cone
[E] Grab
[T] (HOLD) UNMARK ALL
TRANQUILIZER RIFLE
6
16
SMOKE
2
[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
[9]
[0]

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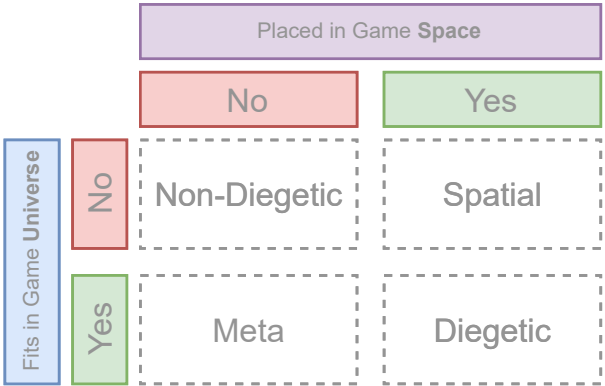

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Ai! Blya! Radioactive... I almost feel it burning through my gloves.

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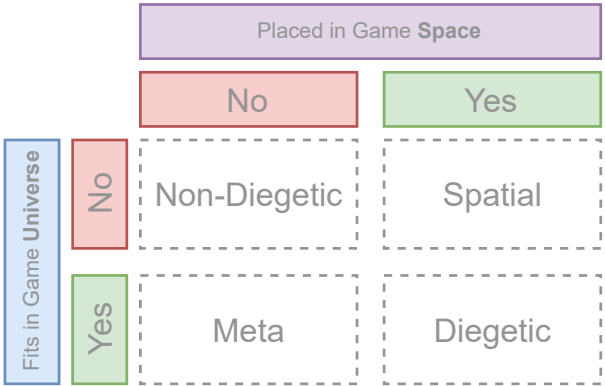

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- Cognition + Psychology → Frontend UX
- Rules, Principles, Guidelines
- Seven Principles of Usability [4]

Source: Game UX Master Guide

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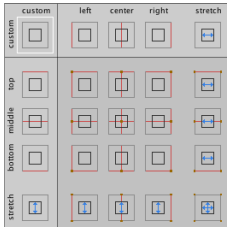
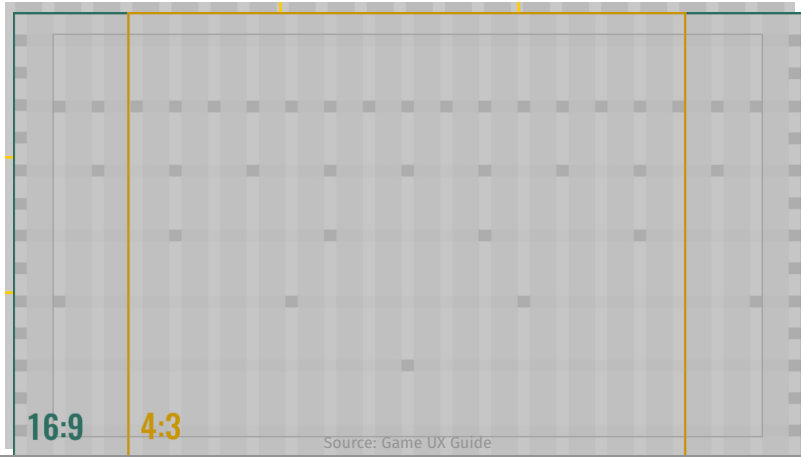
User Interface Layout

- Layout = Placement of Elements
- Grid Layout
- Safe Frame
  - Action Safe ≈ 95%
  - Title Safe ≈ 90%
- Golden Ratio
- Aspect & Resolution
- Alignment Anchors





Source: Game UX Guide

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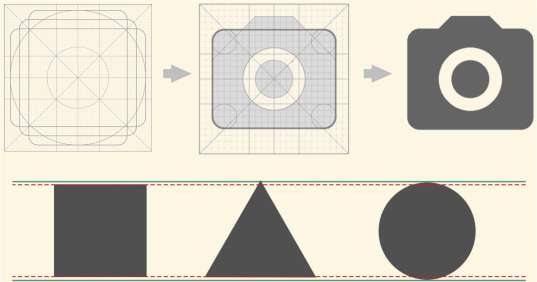
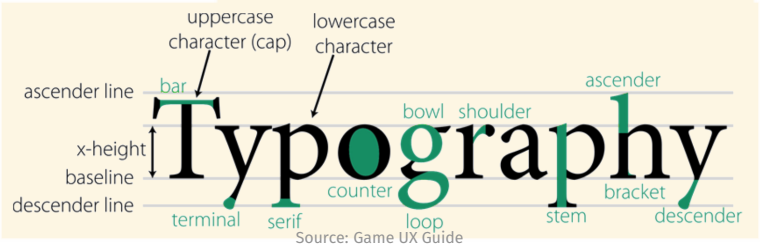
On the Matters of Design

- Color Palette
- Typography
  - Font Family
  - Variations
  - Localization → 40%
- Iconography
  - Construction
  - Optical Balance
- And Much More...





Source: Game UX Guide

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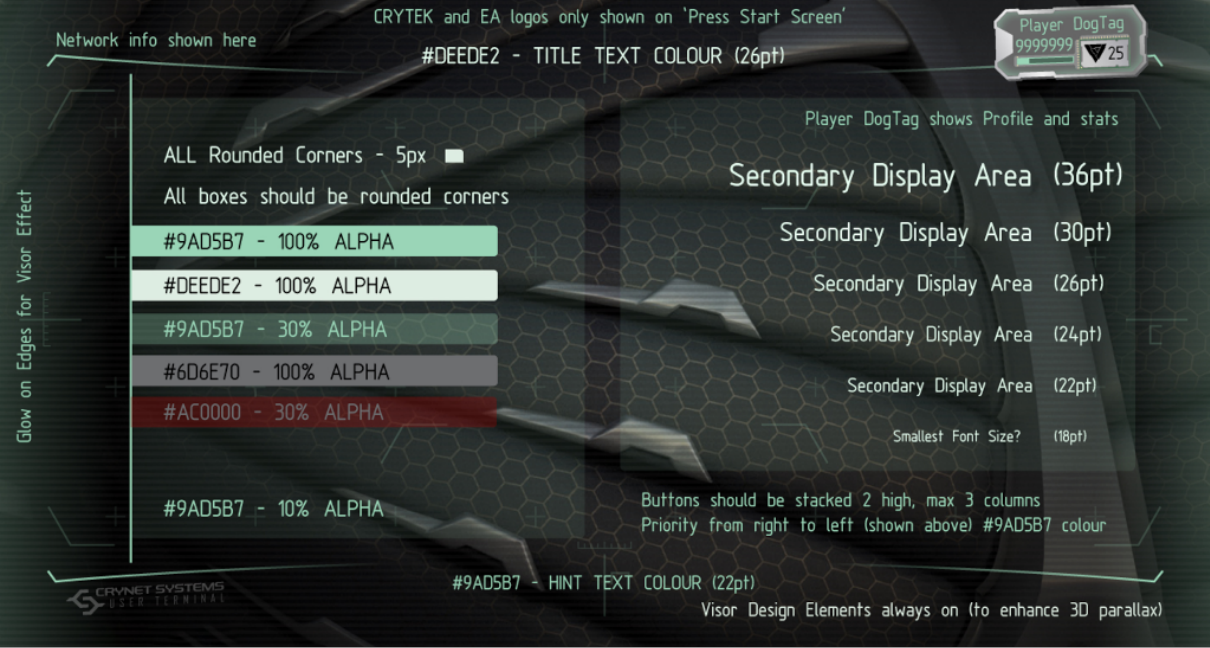
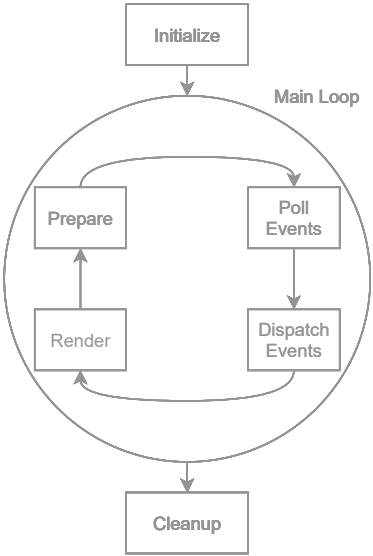

CRYTEK and EA logos only shown on 'Press Start Screen'
Network info shown here
#DEEDE2 - TITLE TEXT COLOUR (26pt)
Player DogTag
9999999
25
Player DogTag shows Profile and stats
ALL Rounded Corners - 5px
All boxes should be rounded corners
#9AD5B7 - 100% ALPHA
#DEEDE2 - 100% ALPHA
#9AD5B7 - 30% ALPHA
#6D6E70 - 100% ALPHA
#AC0000 - 30% ALPHA
#9AD5B7 - 10% ALPHA
Secondary Display Area (36pt)
Secondary Display Area (30pt)
Secondary Display Area (26pt)
Secondary Display Area (24pt)
Secondary Display Area (22pt)
Smallest Font Size? (18pt)
Buttons should be stacked 2 high, max 3 columns
Priority from right to left (shown above) #9AD5B7 colour
Glow on Edges for Visor Effect
CRYNET SYSTEMS
USER TERMINAL
#9AD5B7 - HINT TEXT COLOUR (22pt)
Visor Design Elements always on (to enhance 3D parallax)

User Interface Implementation

Anatomy of the Main Loop

- Goal: Keep Interactivity
- Focus on GUI
- Initialize & Cleanup
- Main Loop:
  1. Prepare State
  2. Poll Events
  3. Event Dispatch
  4. Render Results
- Engine Integration
- UI Frame Rate



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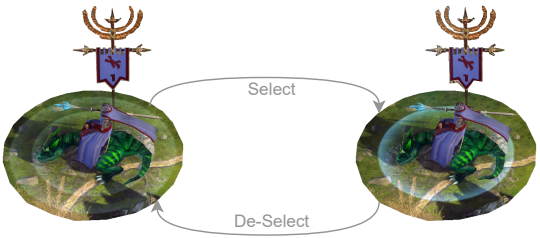
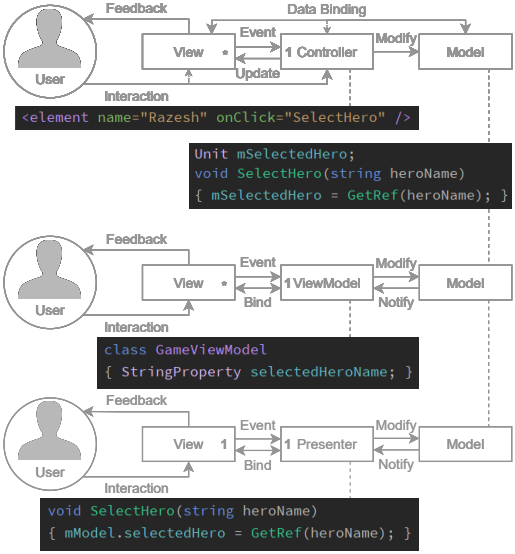
Computation Model

- Data × Logic × Interaction
- Architectural Patterns
- MVC Pattern
  - Model ⇝ Data + Logic
  - View ⇝ Feedback
  - Controller ⇝ Interaction
- MVVM ⇒ ViewModel
- MVP ⇒ Presenter





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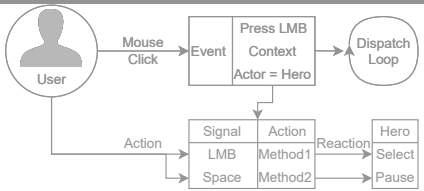
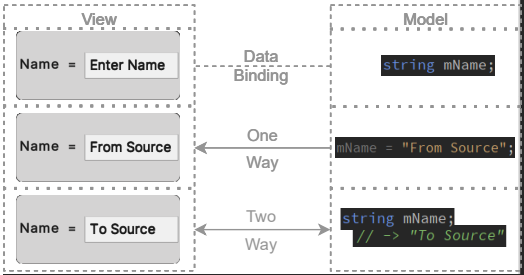
System Design

- Asynchronous → Events
- Event ≈ Message
- Signals & Actions
- UI Markup × Backend
- Data Binding






```
<ui:TextField name="HeroName" label="Name =  "
              text="Enter Name" binding-path="mName"/>
```

```
<ui:UXML xmlns:ui="UnityEngine.UIElements" engine="UnityEngine.UIElements">
    <Style src="project://database/Assets/UI/UIStyle.uss" />
    <ui:VisualElement name="Background" style="height: 100%; width: 100%; ...">
        <ui:VisualElement name="Menu" style="height: 414px; width: 389px; ...">
            <ui:Label text="Main Menu" name="MainMenu" style="font-size: 32px; ..." />
            <ui:Button text="Start Game" name="StartButton" class="button-style" style="..." />
            <ui:Button text="Exit" name="ExitButton" class="button-style" style="..." />
        </ui:VisualElement>
    </ui:VisualElement>
</ui:UXML>
.button-style {
    background-color: rgb(121, 171, 226);
    font-size: 22px;
    border-radius: 10px;
}

.button-style:hover {
    background-color: rgb(162, 188, 217);
}

.button-style:active {
    background-color: rgb(50, 88, 130);
}
```

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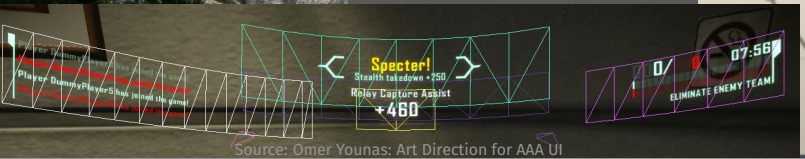
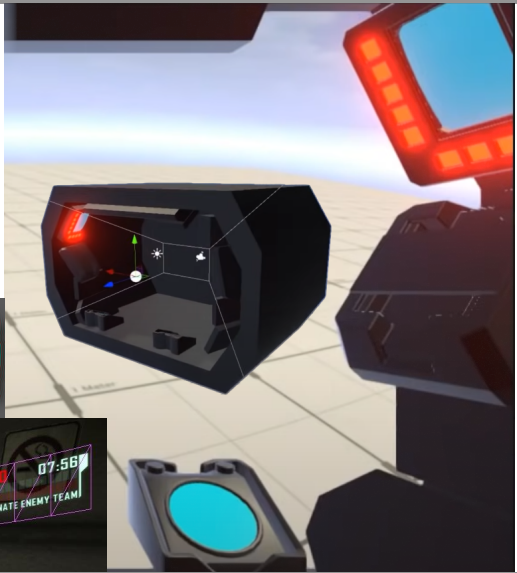
Rendering UI

- Rendering & Feedback
- Vector → Raster
- Units, Scales, Pixels
- Layer Composition
- Screen-Space × In-Scene
- Shader Effects



Source: Omer Younas: Art Direction for AAA UI



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UI in Unity

User Interface System

- UI Fully Supported
- Various Modes
- Camera Stacking
- Three Options
  - UI Toolkit
  - Unity UI
  - ImGUI

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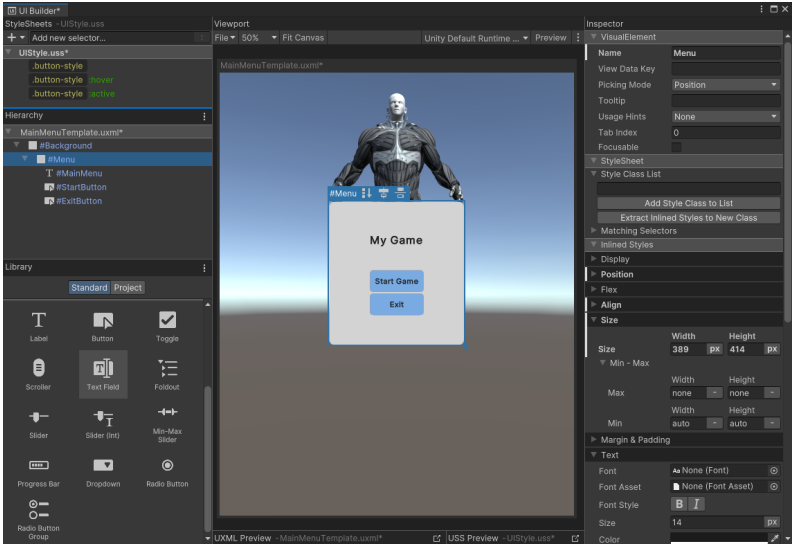
Unity UI Toolkit

- Newest System
- “Classical UI”
- Integrated Editor
- HTML + XML + CSS
- Performance



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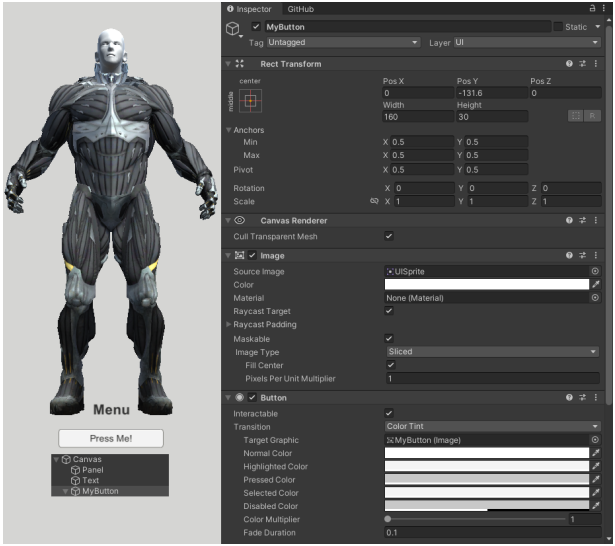
Unity UGUI

- Older System
- Based on GameObjects
- Utilizes Assets
- Code Integration



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Unity ImGUI

- Based on ImGUI
- Immediate Mode
- Good for Programmers
- Debugging & Tools

```
public class ImGUITest : MonoBehaviour {

    void OnGUI ()
    {
        var menuXPos = 612;
        var menuYPos = 512;
        GUI.Box(position:new Rect(menuXPos, menuYPos,
            width:100,height:90), text:"Main Menu");

        if(GUI.Button(position:new Rect(x:menuXPos + 10,y:menuYPos + 30,
            width:80,height:20), text:"Start Game"))
        { Debug.Log(message:"Started the Game"); }

        if(GUI.Button(position:new Rect(x:menuXPos + 10,y:menuYPos + 60,
            width:80,height:20), text:"Exit"))
        { Debug.Log(message:"Exiting the Game..."); }
    }
}
```


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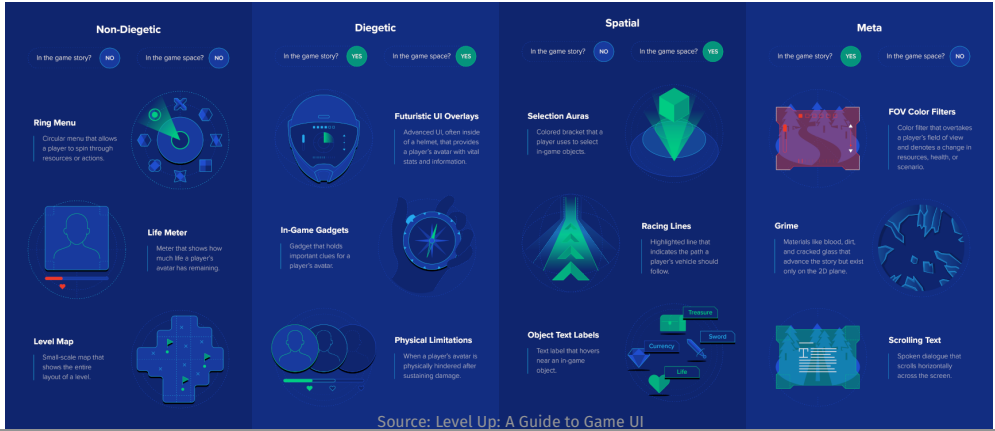
Additional Resources

- [YouTube] Hearthstone: 10 Bits Of Design Wisdom
- [YouTube] Art Direction for AAA UI
- [Article] Game UI Discoveries: What Players Want



Source: Level Up: A Guide to Game UI

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Thanks For
Your Attention!
Press) to open sidebar options
HEAD : !!!!! TORSO: !!!!! L ARM: !!!!!
R ARM: !!!!! L LEG: !!!!\ R LEG: !!!!\
Sound: 0 Mood : :| Focus: 89
Stam : !!!!\ Speed: 97 Move : 0(W)
Str : 5 Dex : 9 Power: --
Int : 10 Per : 5 Safe : On
Weary: Fresh Activ: None
Weary Transition:!!!!! Weary Malus: + 0%
Place: swamp
Sky : Clear
Light: bright
Date : Winter, day 1
Time : 8:02:45 AM
Wield: fists
Style: No style
Pain : Minimal pain Thirst:
Rest : Hunger:
Heat : Comfortable Weight:Big
Sound: 0
The coyote hits your left leg.
The coyote misses you.
NW: North: NE:
West: East:
SW: South: SE:
d coyote
Cataclysm: Dark Days Ahead

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