

USER INTERFACE

UI & UX

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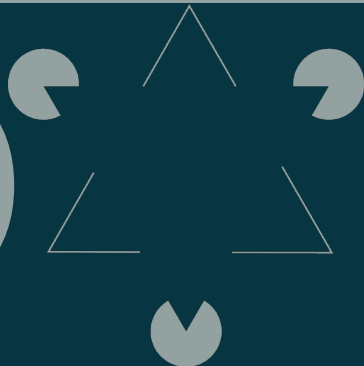
FACULTY OF INFORMATION TECHNOLOGY

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



UI IN GAMES

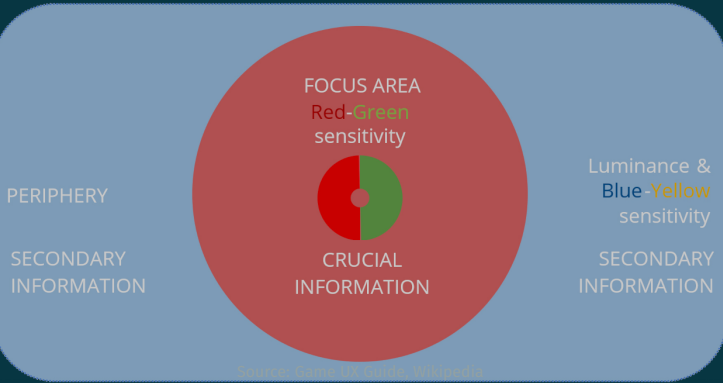
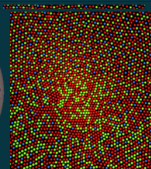
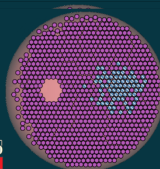
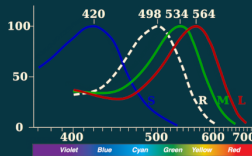
- Player ↔ UI ↔ Game
- = Player Feedback
- Three Senses
- Frontend & Gameplay
- Game Specifics



USER INTERFACE DESIGN

COMMUNICATION CHANNELS

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

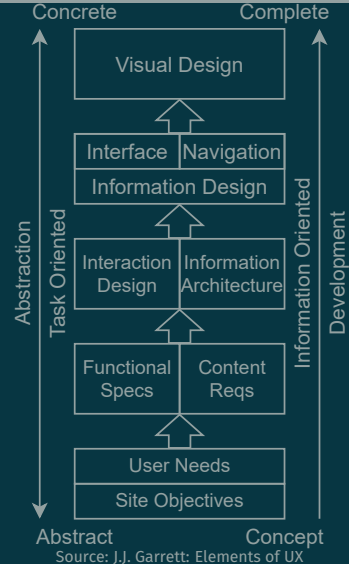
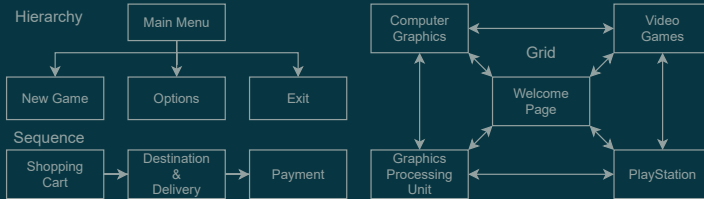


Source: Game UX Guide, Wikipedia

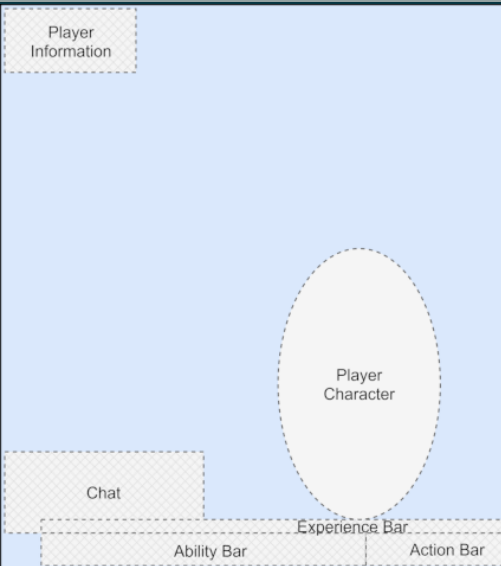
USER EXPERIENCE

- 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)



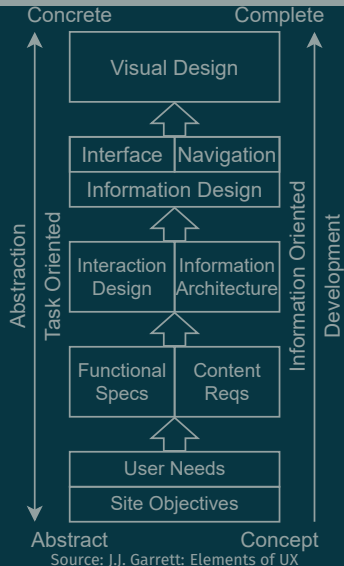
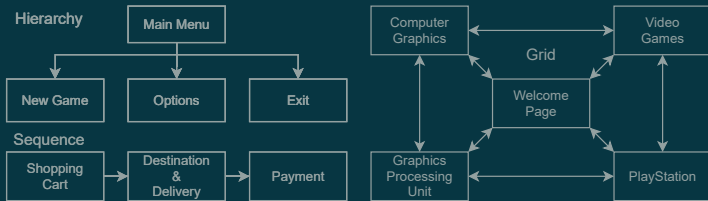
USER EXPERIENCE AND USER INTERFACE



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COGNITIVE LOAD

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



COGNITIVE LOAD



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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 $\rightsquigarrow$ Gestalt Principles [4]



Source: Gestalt Principles in UI Design



Closure



Figure-Ground



Proximity



Enclosure



Continuity



Symmetry



Similarity

Source: Game UX Master Guide



SPECTATOR

TEAM 1
GERMAN EMPIRE

Emort190

Wotanson3

lapplander1

TEAM 2
BRITISH EMPIRE

- + APPLES 5/5
- + BUTTER 2/5
- + CHARLIE 5/5
- + DUFF 5/5
- + EDWARD 5/5

- + NO SQUAD
- + APPLES 5/5
- + BUTTER 5/5
- + CHARLIE 5/5
- + DUFF 5/5

450 14:19 403

A B C D E F

Wotanson3

KILLS: 11 DEATHS: 6 POINTS: 4800

Gewehr 98 Sniper Mars Automatic
ipwire Bomb — HE
Gas Grenade
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

		Placed in Game Space	
		No	Yes
Fits in Game Universe	No	Non-Diegetic	
	Yes		



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	Yes		Diegetic



THROWABLE: Traffic Cone

[E] Grab

[T] (HOLD) UNMARK ALL

TRANQUILIZER RIFLE

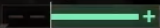
6

16

SMOKE



2



MKIceAndFire

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

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DESIGNING FRONTEND

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



Unique Items



State Change



3 Levels Deep



Page Flow



Affordances



Help & Hint



Focus Area

Source: Game UX Master Guide



ABILITIES

[21]

	INTEL+	★2
	INTEL+	★3
	OPTICS+	★1
	OPTICS+	★2
	OPTICS+	★3
	ANTI-MARKING+	★1
	ANTI-MARKING+	★2

Faster enemy marking.
Increased enemy markers display duration.
Larger enemy marking area of effect.

Select abilities.

Unequip all

ABILITIES	
LETHAL AIM+	
	★3
INTEL+	
	★1

Assault



6.1 KG



USER INTERFACE LAYOUT

- Layout = Placement of Elements

- Grid Layout

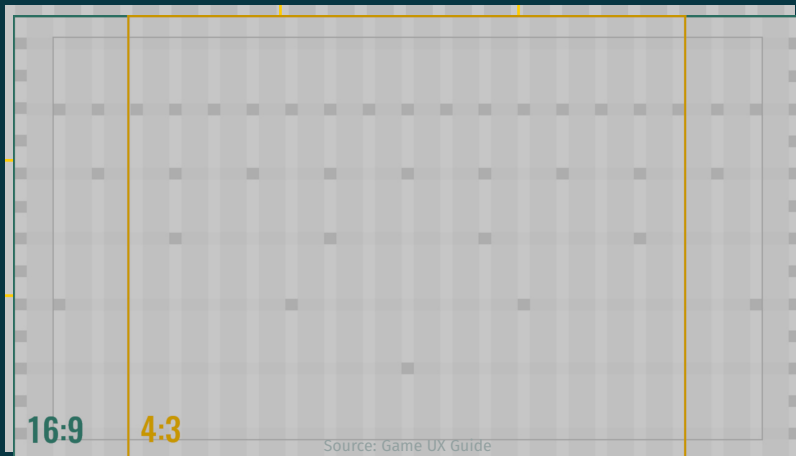
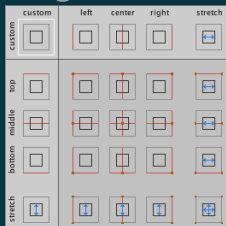
- Safe Frame

- Action Safe $\approx 95\%$
- Title Safe $\approx 90\%$

- Golden Ratio

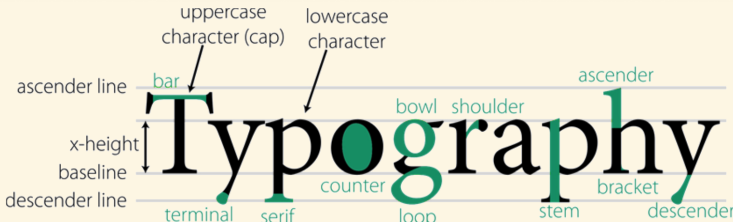
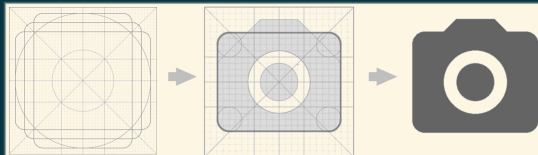
- Aspect & Resolution

- Alignment Anchors



ON THE MATTERS OF DESIGN

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



Source: Game UX Guide

Network info shown here

CRYTEK and EA logos only shown on 'Press Start Screen'

#DEEDE2 - TITLE TEXT COLOUR (26pt)

Player DogTag

9999999

25

Player DogTag shows Profile and stats

Secondary Display Area (36pt)

Secondary Display Area (30pt)

Secondary Display Area (26pt)

Secondary Display Area (24pt)

Secondary Display Area (22pt)

Smallest Font Size? (18pt)

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

Buttons should be stacked 2 high, max 3 columns
Priority from right to left (shown above) #9AD5B7 colour

#9AD5B7 - HINT TEXT COLOUR (22pt)

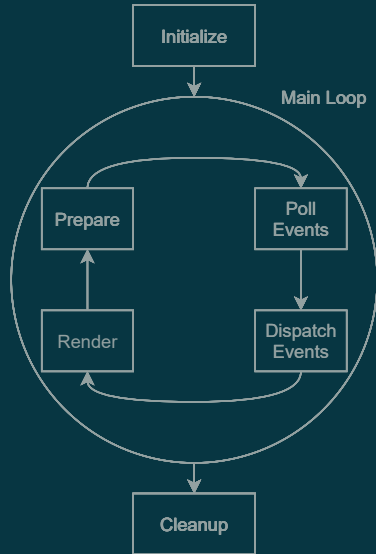
Visor Design Elements always on (to enhance 3D parallax)



USER INTERFACE IMPLEMENTATION

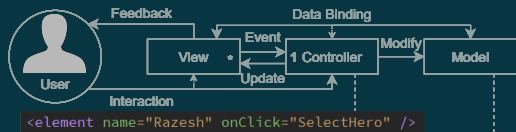
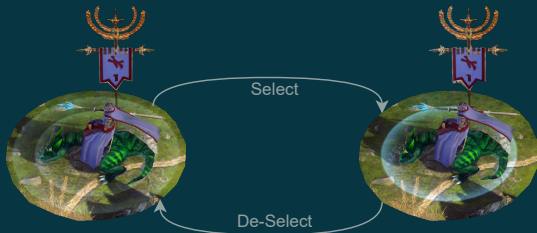
ANATOMY OF THE MAIN LOOP

- 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
- Dynamic Resolution

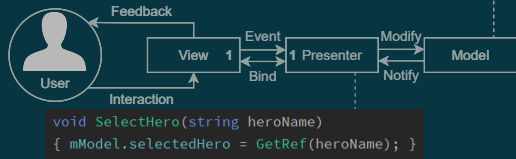
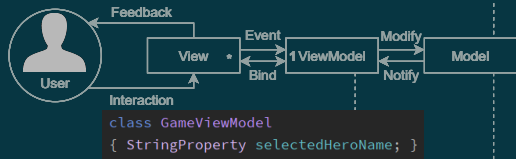


COMPUTATION MODEL

- Data × Logic × Interaction
- Architectural Patterns
- MVC Pattern
 - ▶ Model $\rightsquigarrow$ Data + Logic
 - ▶ View $\rightsquigarrow$ Feedback
 - ▶ Controller $\rightsquigarrow$ Interaction
- MVVM $\Rightarrow$ ViewModel
- MVP $\Rightarrow$ Presenter

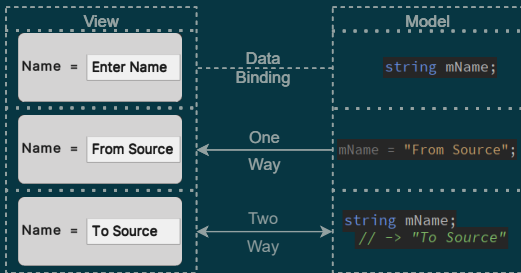
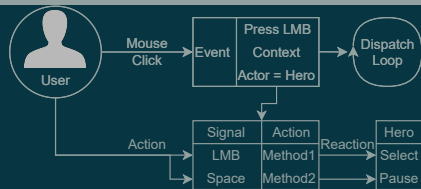


```
Unit mSelectedHero;  
void SelectHero(string heroName)  
{ mSelectedHero = GetRef(heroName); }
```



SYSTEM DESIGN

- Asynchronous → Events
- Event $\approx$ Message
- Signals & Actions
- UI Markup $\times$ Backend
- Data Binding



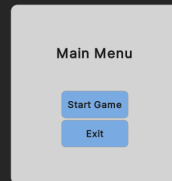
```
<ui:TextField name="HeroName" label="Name = "
text="Enter Name" binding-path="mName"/>
```

```
<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;
}

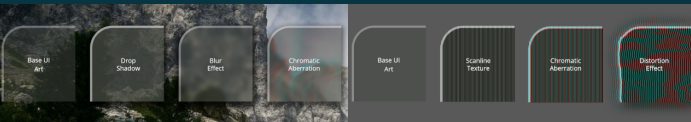
.button-style:hover {
  background-color: rgb(162, 188, 217);
}

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

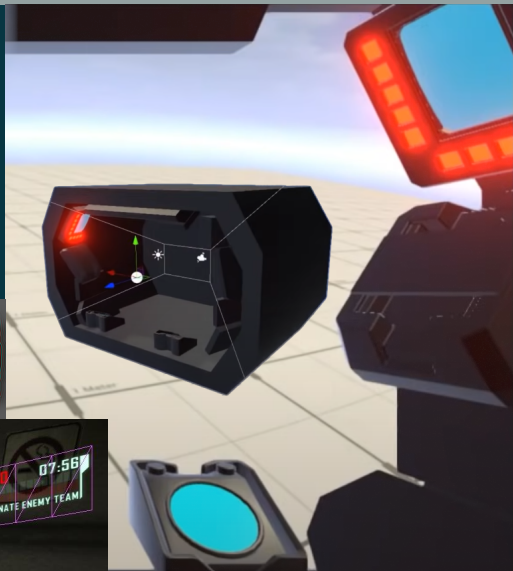


RENDERING UI

- Rendering & Feedback
- Vector $\rightarrow$ Raster
- Units, Scales, Pixels
- Layer Composition
- Screen-Space $\times$ In-Scene
- Shader Effects



Source: Omer Younas: Art Direction for AAA UI



UI IN UNITY

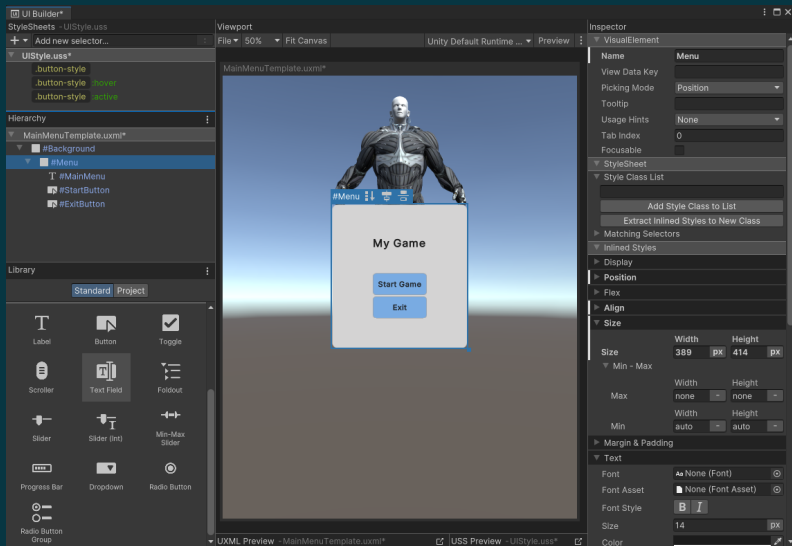
USER INTERFACE SYSTEM

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



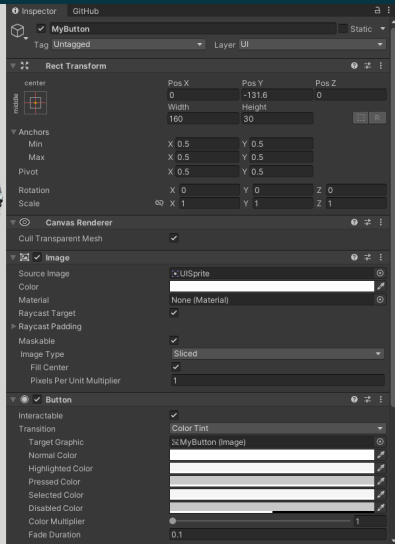
UNITY UI TOOLKIT

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



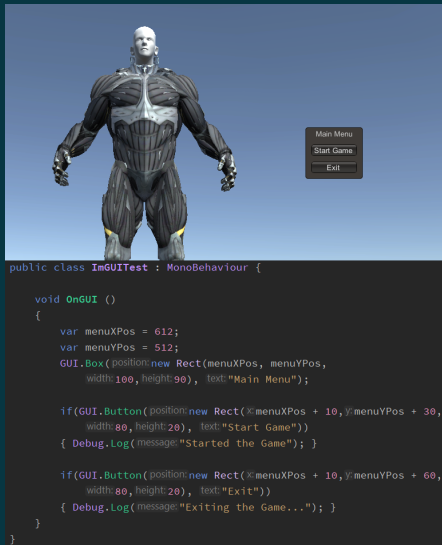
UNITY UGUI

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



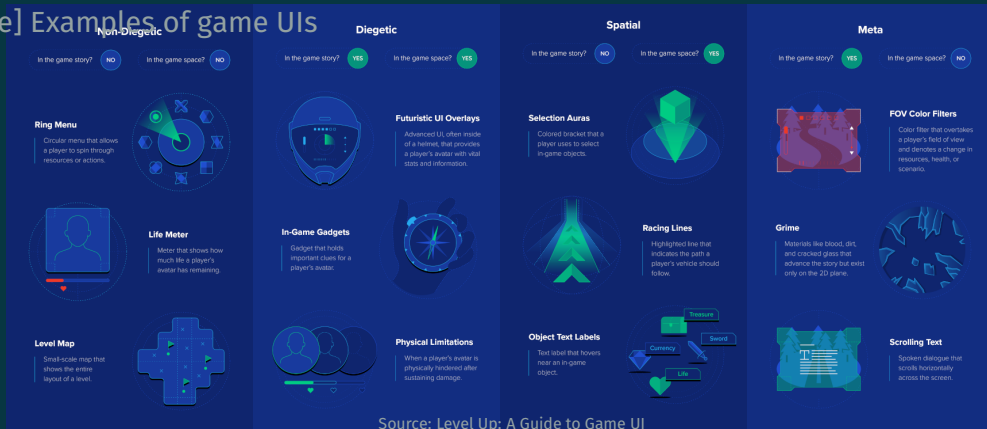
UNITY IMGUI

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



ADDITIONAL RESOURCES

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



Source: Level Up: A Guide to Game UI

Cataclysm: Dark Days Ahead

REFERENCES I

- [1] JAIME CROSS. **GAME AUDIO AND THE 50% FALLACY**.
<https://speedyjx.com/2015/06/04/game-audio-and-the-50-fallacy/>. 2015.
- [2] ERIK FAGERHOLT AND MAGNUS LORENTZON. “**BEYOND THE HUD-USER INTERFACES FOR INCREASED PLAYER IMMERSION IN FPS GAMES**”. MA thesis. 2009.
- [3] JESSE JAMES GARRETT. **THE ELEMENTS OF USER EXPERIENCE: USER-CENTERED DESIGN FOR THE WEB AND BEYOND**. Pearson Education, 2010.
- [4] OMER YOUNAS LEE B STEG. **GAME UX MASTER GUIDE**.
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- [5] STEVEN M LEHAR. **THE WORLD IN YOUR HEAD: A GESTALT VIEW OF THE MECHANISM OF CONSCIOUS EXPERIENCE**. Psychology Press, 2003.
- [6] TECHNOLOGY TRANSFORMATION SERVICES. **USABILITY.GOV**.
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