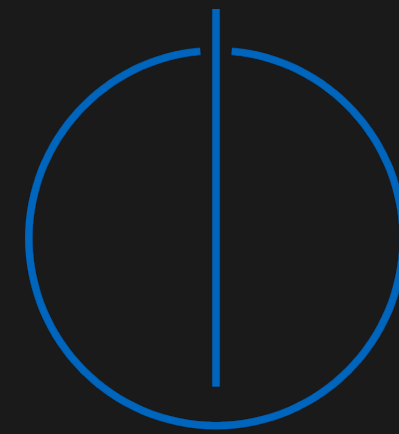


Master's Thesis
Department of Informatics

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**A Practical Approach to Documents
in Game Development**

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Motivation

- documentation requires a lot of extra time and effort from the developers
- often more of a necessity than something people actually enjoy doing
- there is no magic template^[2]
 - too restrictive
- is there a better way?

Motivation (cont.)

- **Conceptual frameworks**
 - loose bounds grant more flexibility
 - offer customisable guidelines
 - allow more granular control^[4]
 - guide developers throughout the whole production process
 - ▶ no longer “just” a necessity, but a powerful tool

Related Work

- **core idea** →
 - “Game Design Methods and Tools: Documents in Game Development”, lecture by D. Dyrda^[5]
 - “Pillars, Goals, Features & Elements”, article by M. Eff^[7]

Related Work (cont.)

- **concept** → “The Art of Game Design”, book by J. Schell^[2]
- **pillars** → “Game Audio Guide”, article by A. Andersen^[6]
- **features** → “Game Mechanics Vs. Game Features”, article by D. Mullich^[8]
- **goals** → “Game Design Methods and Tools: Documents in Game Development”, lecture by D. Dyrda^[5]

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The Purpose of Documentation

- **benefits**^[11]:
 - a **single source of truth** saves time and energy
 - encourages **knowledge sharing**
 - cuts down **duplicative work**
 - helps with **onboarding** new team members

The Purpose of Documentation (cont.)

- who is it for?
 - “From developers for developers”
- however, resulting artifacts could also be presented to players
 - e.g. game manual or artbook

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The Ludodome

- **etymology**
 - specifically **created** for the purpose of this thesis
 - from the Latin words ***ludus*** (“game”)
 - ▶ game development
 - and ***domus*** (“house, home”)
 - ▶ **mnemonic** to help remember the general **structure** of the framework
- “house of games” → intentional **metaphorical comparison** to the idiom “house of cards”

The Ludodome (cont.)

- what is it exactly?
 - in short, a **framework**
 - **fuses** different **terminologies** from game development together
 - ▶ **design concepts, pillars, features and goals**

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Concept

- “The game begins with an idea.” (J. Schell^[2], Chapter 6)
- compact enough to give creativity room to expand
 - 1-2 phrases should be enough
- complex enough to immerse the reader in the vision of the designer
 - should provide hints about:
 - ▶ *aesthetics*
 - ▶ *space-time setting*
 - ▶ *general atmosphere*

Concept (cont.)

- should **resonate** with both **players and developers**
- **focal point** of all design **decisions**
 - design team should use every means possible to **reinforce** the **concept**^[2]
- **lays the foundation** for the overarching pillars to be **derived**

Example

“The fantasy of being a pirate.”^[2]

- the term “pirate” alone brings a lot of **sensory cues** with it
 - exploration of exotic islands (**visual**)
 - sea shanties and the sound of waves hitting the shores (**acoustic**)
 - the smell of sea salt and sweat (**olfactory**)
 - the wind blowing in your face while trying to balance on the swaying ship (**tactile**)
 - the taste of rum (**gustatory**)

Example (cont.)

“The fantasy of being a pirate.”^[2]

- “fantasy” does not directly imply the genre here
 - fantasy vs. realistic **setting**
- **temporal setting**: most likely 1650 - 1730 (The Golden Age of Piracy^[14])
- **dynamic gameplay**

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Pillars

- set of core elements that define the game and give it structure
- a more detailed extension of the concept
- make sure the game delivers the intended player experience^[2]
- help share the designer's vision with the rest of the team
- multiple iterations before the production phase to ensure robustness^[5]
- to be consulted during production whenever there is a decision anyone on the team needs to make^[15]

Pillars (cont.)

- **goals:**
 - **bind** all elements of the game together into a **cohesive** and **robust unit**
 - **ensure** all elements live in **harmony** with each other
 - provide **support** and **stability** for the features
- very important **rule:**

No decision during pre-production, production or post-production should ever be against a pillar. All decisions should be in line with the vision of the pillars.^[5]

Pillars Types

- **3 base types**
 - textual pillars
 - visual pillars
 - acoustic pillars
- **2 special types**
 - custom pillars
 - unique pillars

Textual Pillars

- straightforward and no longer than a paragraph
 - the more specific a pillar is, the harder it will be to find features to properly reinforce it
- require no special tools
- should be written in prose and technical terms should be avoided^[5]
 - goal is to create emotional connection with the reader^[6]

Textual Pillars – Example



REDEFINING MUSICAL STYLE FOR THE WITCHER 3

- ▶ The Witcher universe is heavily grounded in **slavic folklore**
- ▶ Dark fantasy setting
- ▶ Game's main feature - **gritty, mature, engaging story**
- ▶ Both **intimate and epic in storytelling**
- ▶ Nothing is good or bad, everything is in the gray zone
- ▶ **choices & consequences**
- ▶ **nonlinearity**

THE WITCHER WILD HUNT

Fig. 1.
Slide extracted from
a GDC 2016
presentation on the
Slavic Adaptation of
Music in 'Witcher
3'[e][16]

Visual Pillars

- evoke **emotions** by **visual means**
- used when words are **not enough** to express **intangible qualities** of the design^[17]
- very effective way to **explore** the **visual style** of the project^[18]
 - can **trigger inspiration** for new ideas
- can be a **simple image** from the internet, a **commissioned work** by an artist, an **AI-generated image** or a set of images (**mood board**)
- **warning**: make sure everything depicted in the image reflects the **game vision**

Visual Pillars – Mood boards

- collage consisting of diverse visual materials
- used to convey a general feeling about a particular topic
- great support for early design thinking

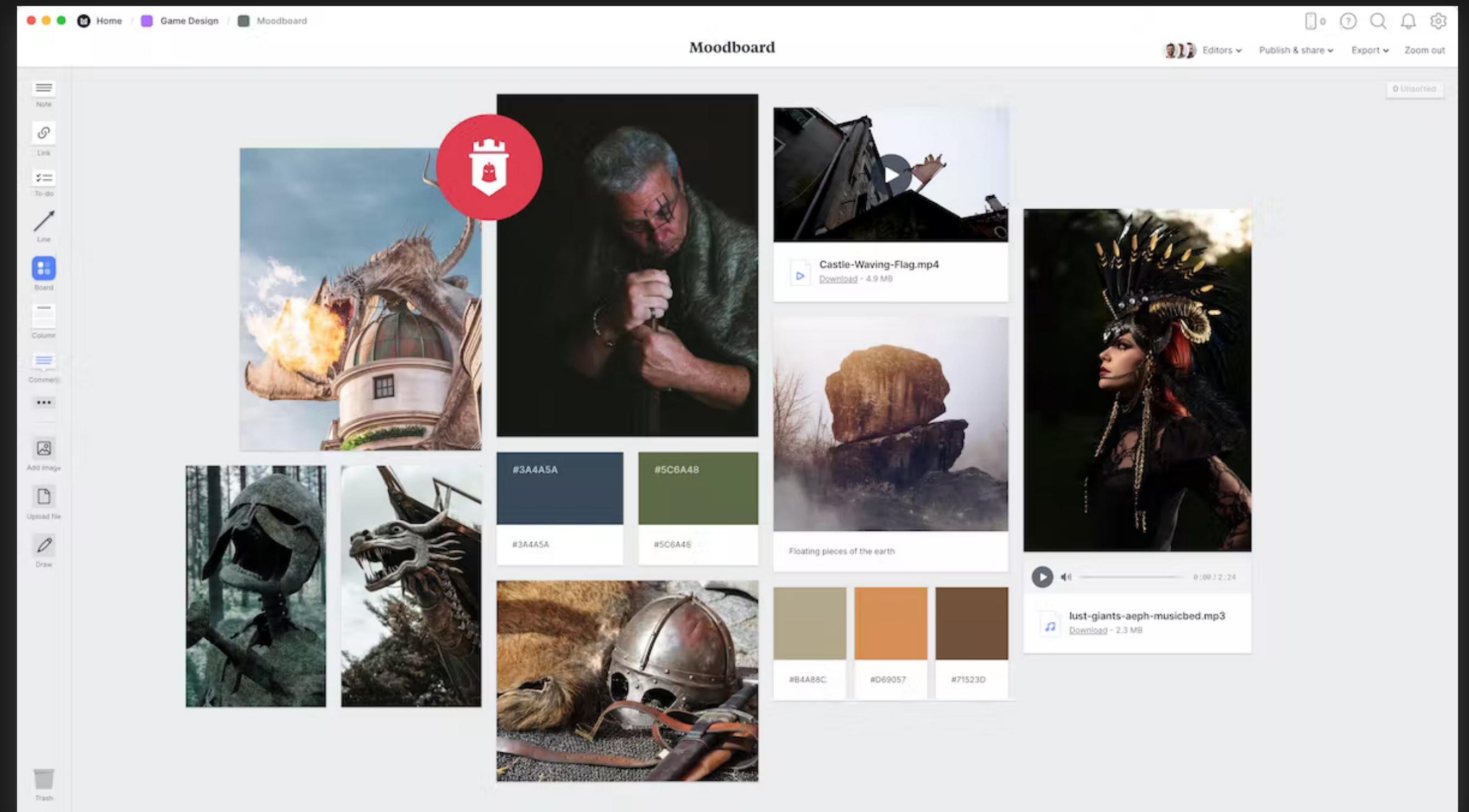


Fig. 2.
Mood board example by Milanote^[1].

Visual Pillars – Midjourney^[1]

- AI-based image generator operated through Discord
- cost-efficient & time-efficient
- requires little to no artistic skills
- requires some proficiency in prompt-writing
 - otherwise easy-to-learn and works out-of-the-box

Visual Pillars – Midjourney Example

“/imagine **Aerial view**, **2d high quality art style**. **Concept art** of an **alien natural park**. **exotic plants**, **unique animals**, **photorealism**, **hyper detailed**, **vivid colors**, **realistic high detail 4k render**, **vibrant volumetric lighting**, **strong contrast**, **ray tracing** --aspect 16:9 --v 5”

Visual Pillars – Midjourney Example (cont.)



“/imagine Aerial view, 2d high quality art style. Concept art of an alien natural park. exotic plants, unique animals, photorealism, hyper detailed, vivid colors, realistic high detail 4k render, vibrant volumetric lighting, strong contrast, ray tracing --aspect 16:9 --v 5”

Fig. 3.
AI-generated image by
Midjourney^[1].

Acoustic Pillars

- used to **induce** a certain **emotion** by **auditory means**
- can range from short **sound effects** to full movie **soundtracks**
- **musical skills** not necessarily needed
 - royalty free music libraries + film scores
 - ▶ **warning**: these music components were written for a **purpose** that may be **different** to that of the **game vision**^[22]
- **AI-based** sound generators → **MusicLM**

Acoustic Pillars – MusicLM[23]

- generates **high-fidelity** music from **text descriptions**
 - **not** available to public **yet**
- can **combine** multiple prompts with **fixed timeframes** and **morph** them together into a **single composition**:
 - time to meditate (0:00-0:15)
 - time to wake up (0:15-0:30)
 - time to run (0:30-0:45)
 - time to give 100% (0:45-0:60)

Custom Pillars – Syntax-Semantics Interface

- studies the **interaction** and **correlations** between form (**syntax**) and meaning (**semantics**)
- apply the **same reasoning** to pillars
 - **combing** different pillars of the three basic types can drastically alter their **semantic meaning**
- **result**: custom pillars

Custom Pillars

- situational and customizable
- depends on the type of game
 - some common game elements that need a dedicated custom pillar:
 - ▶ characters
 - ▶ factions
 - ▶ locations
 - ▶ soundtrack
- **general rule:** every game element that plays a central role in your game could have its own dedicated custom pillar

Unique Pillars

- all other pillars that **break** the **conventional classification** of textual, visual and acoustic
- in the end, **anything** can be a **pillar**
 - as long as it **drives** the **decision** making process **forward**
- **examples**
 - ‘The Witcher’^[e] → Andrzej Sapkowski’s^[26] book series
 - ‘Stray’ → cats were brought to the office to study their behaviour and movement

Pillars – Closing Notes

- populating the office with the established pillars is an incredibly effective technique to make sure the team is always aware of them
 - they become deeply rooted in one's consciousness
 - ▶ following them becomes almost instinctive
- do not have to be reproduced in the game with 100% fidelity
 - they mainly serve as a source of inspiration

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Features

- any type of **game element** that **interacts** with the players **directly**
- **toolkit** that the developers provide for the players to **explore the pillars**
 - actual **implementation** of the pillars → should always be **aligned**
- always consider **feasibility** of features
 - **technical, organizational** and **monetary** restrictions

Example

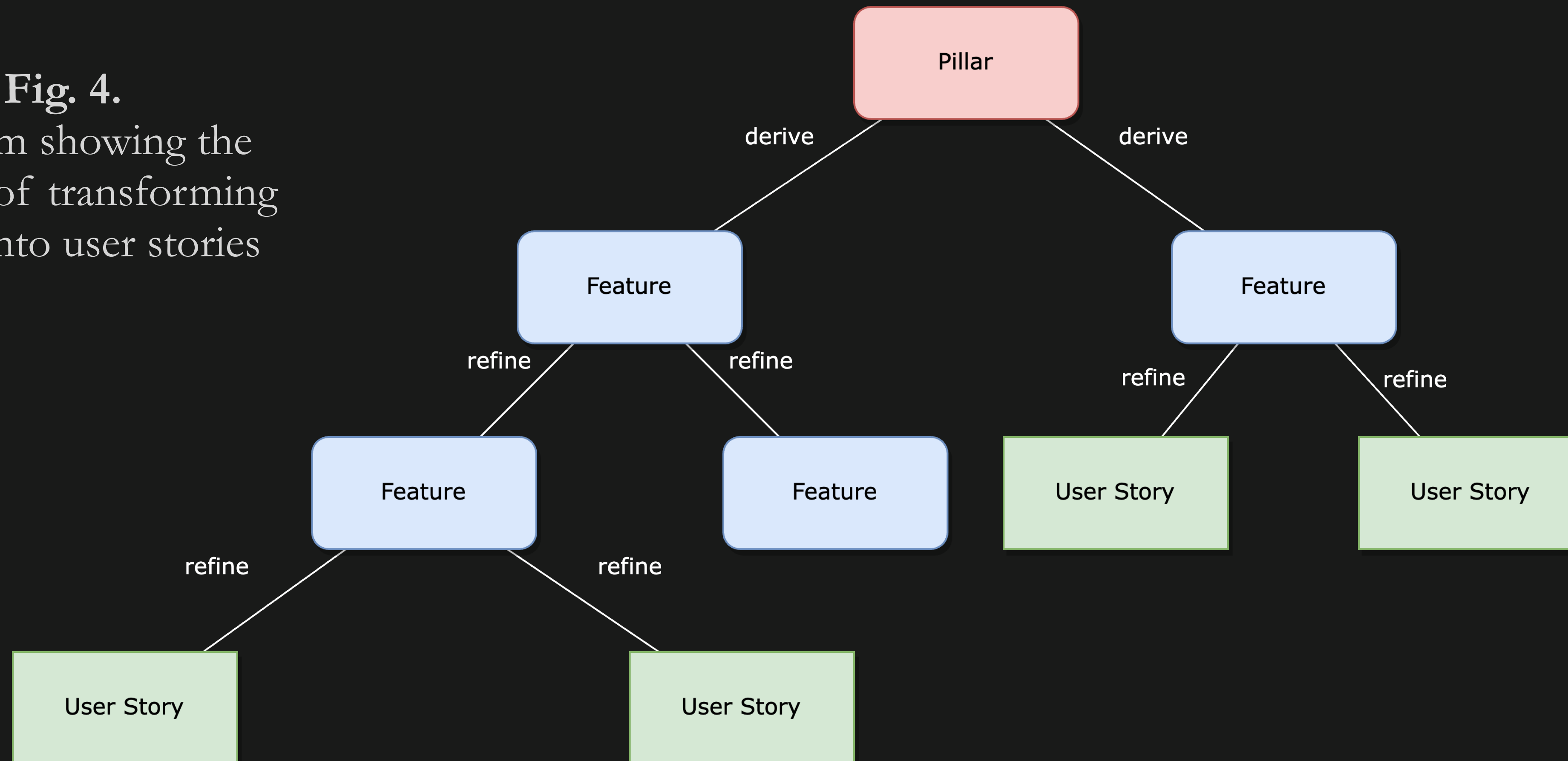
- set of features by M. Eff in “Pillars, Goals, Features & Elements”^[7]
 - steer and modify your own privateer vessel
 - acquire more vessels and strengthen your pirate fleet
 - set sail towards uncharted lands [...]
- specific player actions are described
 - vs. pillars, which are purposefully left open-ended

User Stories

- features can be almost *infinitely refined*
 - more *fine-grained* with each *iteration*
 - ▶ eventually *no longer* possible to *split*
 - transform into *user story* → *smallest* unit of work in the *agile environment*
- the point where the *Ludodome approach* and the *agile framework* touch base to reveal a highly efficient *synergy*

User Stories (cont.)

Fig. 4.
Diagram showing the process of transforming pillars into user stories



Feature-Pillar Disambiguation

- how/why-questions
 - features answer how-questions
 - pillars answer why-questions
- abstraction vs. implementation
 - pillars *could* potentially become part of the game in one form or another at some point
 - features *are certain* to become part of the game in the exact form they are formulated

Feature-Pillar Conflict

- endangers the integrity of the game & the reputation of the developers
- **example:** Heroes of Might and Magic III^[k][34][35][36]
 - fantasy, turn-based strategy game, where the player controls one of eight different factions (towns)
 - expansion pack is planned → developers plan to introduce a new futuristic steampunk-science-fiction faction
 - early artwork and sketches is published → community immediately reacts and threatens to boycott the game
 - developers decide to scrap the new faction

Feature-Pillar Conflict (cont.)

Fig. 5.

Side-by-side comparison between the concept art of a unit from the core game (left^[37]) and a unit from the unreleased Forge faction (right^[35]).



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Goals

- more **abstract**, compared to **pillars** and **features**
- **not achievable** in the **absolute** sense
 - design decisions **strive** towards **achieving** the goal^[5]
- main factor that **motivates** people to **keep playing** the game^[38]
- serves as the **‘north star’** for developers and players alike
 - **always** a point of **guidance**, but **never** really **reachable**

Goals (cont.)

- should be **short** and **clear**
- no more than **1-3 goals** per game
 - don't **dilute** their importance, **focalize** development in a **single direction**
- **3 goal types:**
 - continuous goals
 - fixed goals
 - serious goals

Continuous Goals

- popular with **long-living** games
- **example:** League of Legends^[1]
 - climbing the leaderboard is **hard** and **time-consuming** → **resets** every year (season)
 - matchmaking is designed to keep players at **50% win rate**^[39]
 - **infinite** ‘summoner level’ **cap**
 - **never-ending** stream of new playable characters^[41]
 - **constant** updates, patches and rebalancing^[40]
- **goals:**
 - continuously **expanding** game
 - incentivise people to **keep playing** it



Fig. 6. Screenshot of a player's promotion to a higher division

Fixed Goals

- popular with **standalone, story-driven** games
- comes **closest** to being ‘achieved’, but still **not** quite **measurable**
- **example:** ‘Dark Souls’^[m]
 - designed to have a particularly **high level of difficulty**
 - developer states his goal loud and clear:

“Hardship is what gives meaning to the experience. It’s our identity.”^[43]

– Hidetaka Miyazaki, creator of the ‘Souls’ franchise

Serious Goals

- popular with **serious games**
 - games that have a primary **purpose** other than **pure** entertainment
- **examples:**
 - ‘Wii Fit’^[n]: help people get **exercise**
 - ‘Pokémon Go’^[o]: get people **outside** and motivate them to **explore** their **surroundings**

Goals – A Closing Note

- it's absolutely okay to have the **simple** goal of “just having fun”
 - many **successful** games do
- but having a **unique** goal can prove to be very **beneficial**
 - may also give you a **competitive edge** over other games

Recap

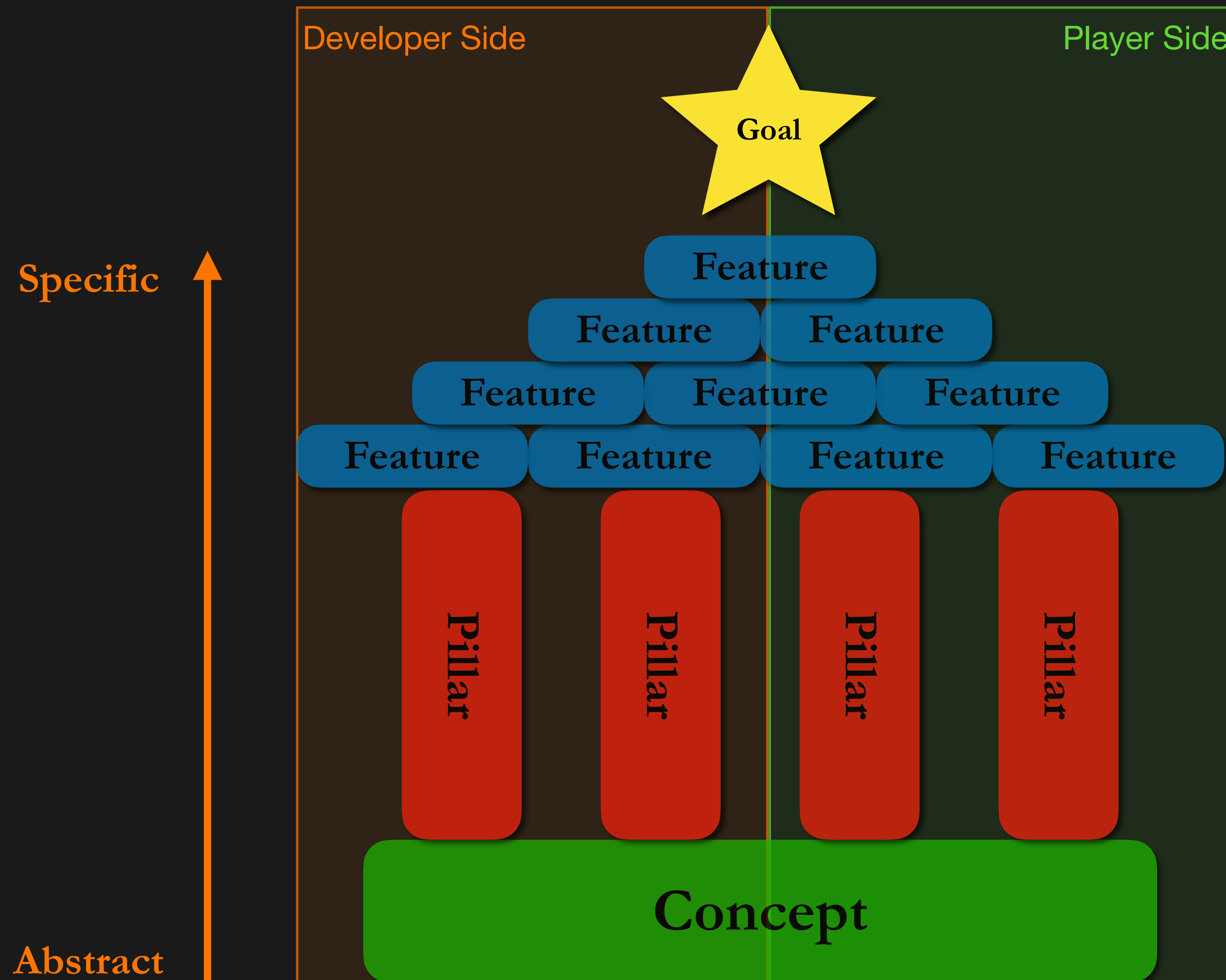


Fig. 7.
Structural overview of
the Ludodome

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In Practice

- inspired by the **Macro/Micro Design** methodology, first presented by Mark Cerny during the D.I.C.E. Summit in 2002^[51]
 - Macro Design: describes the player experience on the **higher abstraction** level
 - Micro Design: depicts a more **detailed description** of the game elements

Macro Design Table

Fig. 8. Uncharted 2 Macro Design spreadsheet^[53]

UNCHARTED 2 Macro Design																				
LEVELS	LOOK DESCRIPTION	TIME OF DAY/ MOOD	ALLY-NPC	ENEMY MODELS	MACRO GAMEPLAY	MACRO FLOW	PLAYER MECHANICS													
							Free Climb/Dyno	Wall Jump	Free Ropes	Pendulum	Monkey Bars	Monkey Swing	Balance Beams	Carry Objects Heavy	Carry Objects Light	Traversal Gameplay v.1				
Warzone																				
war-1-market	Nepalese city broken & burning	High Noon - War-torn & smokey		Laz Army HOT Freedom Fighters	Explore Traverse Minor Gunfights	Basic Gunplay Traversal Gunplay	X	X				X	X	X						X
war-2-streets	Nepalese city broken & burning	High Noon - War-torn & smokey	Chloe-2	Laz Army HOT Freedom Fighters	Explore Traverse Minor Gunfights	Basic Gunplay Traversal Gunplay	X	X				X	X	X						X
war-3-inside war-4-highrise	Nepalese city broken & burning	High Noon - War-torn & smokey	Chloe-2	Laz Army HOT Freedom Fighters	Explore Traverse Minor Gunfights	Basic Gunplay Traversal Gunplay Get to higher ground (hotel)	X	X				X	X	X						X
city	Nepalese city broken & burning	High Noon - War-torn & smokey	Chloe-2	Laz Army HOT Freedom Fighters	Explore Traverse Minor Gunfights	Skirt close to Laz Army	X	X				X	X	X						X
city-2	New area unlocked of City	High Noon - War-torn & smokey	Chloe Elena-1 Cameraman	Laz Army HOT Freedom Fighters	Traverse Major Fight	Basic Gunplay Traversal Gunplay	X	X						X						X
temple	Temple complex built in the middle of the city	mysterious	Chloe Elena-1 Cameraman	Laz Army HOT Freedom Fighters Dead Expeditions	Explore Problem Solve Escape		X	X		X		X	X	X	X	X	X			
city third pass	City + Train Yard	high tension	Elena-1	Laz Army HOT Freedom Fighters	Escape/Fight Chase			X						X						X
Train																				
train intro valley	Transition from warzone city to valley						X													X

Alignment Table

	Pillar 1	Pillar 2	Pillar 3	Pillar 4	...	Pillar X	Goal
Feature 1					...		
Feature 2					...		
Feature 3					...		
Feature 4					...		
Feature 5					...		
Feature 6					...		
...
Feature X					...		

Fig. 9.
Empty Alignment Table

Alignment Table (cont.)

	Pillar 1	Pillar 2	Pillar 3	Pillar 4	...	Pillar X	Goal
Feature 1	✓		✓		...	✓	✓
Feature 2		✓	✗		...		
Feature 3	✓	✓		✓	...	✓	✓
Feature 4	✓	✓			...	✓	✓
Feature 5	✓			✓	...		✓
Feature 6		✓	✓		...	✓	
...		✓		
Feature X	✓		✓		...		✓

Fig. 10.
Filled Alignment Table

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Conclusion

- ✓ Customizable framework to facilitate the documentation and development of modern games
- ✓ Provides a strong foundation for the game production
- ✓ Guides developers throughout the development process
- ✓ Produces a consistent, harmonized compendium of documentation
- ✓ Covers almost all types of game documents recommended by J. Schell in his book “The Art of Game Design”^[2]

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Future Work

-  To be applied and tested in practice
-  Continuous iterative design
-  Development of a suite of tools to facilitate the usage of the Ludodome



Thank you!

References

- [1] Baldwin, M. (2005). Game design document outline. Baldwin Consultant, 24.
- [2] Schell, J. (2008). The Art of Game Design: A book of lenses. CRC press.
- [3] Beck, K. and Beedle, M. and van Bennekum, A. and Cockburn, A. and Cunningham, W. and Fowler, M. and Grenning, J. and Highsmith, J. and Hunt, A. and Jeffries, R. and Kern, J. and Marick, B. and Martin, R. C. and Mellor, S. and Schwaber, K. and Sutherland, J. and Thomas, D. (2001). The agile manifesto. Retrieved from <https://agilemanifesto.org/>.
- [4] Singh, N. (n.d.). Understanding the Difference between Template And Framework. Retrieved from <https://www.techaltair.com/understanding-the-difference-between-template-and-framework/>.
- [5] Dyrda, D. (2020). Game Design Methods and Tools: Documents in Game Development. Lecture: Introduction to Audio for Games, Technical University of Munich, Department of Informatics.
- [6] Andersen, A. (2016). Game Audio Guide: How to Write a (Game-Changing) Audio Design Document Today. Retrieved from <https://www.asoundeffect.com/game-audio-design-document/>.
- [7] Eff, M. (2023). Pillars, Goals, Features & Elements. Retrieved from <https://soundand.design/pillars-goals-features-elements-fe45771b4ff5>.
- [8] Mullich, D. (2018). Game Mechanics Vs. Game Features. Retrieved from <https://davidmullich.com/2018/08/06/game-mechanics-vs-game-features/>.
- [9] Dotsenko, A. (2016). Game Design Framework: On the way to good Game Design. Retrieved from <https://www.gamedeveloper.com/design/game-design-framework-on-the-way-to-good-game-design>.

References (cont.)

- [10] Harmon, P., & Wolf, C. (2016). The state of business process management. BP Trends.
- [11] Atlassian (n.d.). The importance of documentation (because it's way more than a formality). Retrieved from <https://www.atlassian.com/work-management/knowledge-sharing/documentation/importance-of-documentation>.
- [12] Blizzard Entertainment (1998). StarCraft. Retrieved from <http://ftp.blizzard.com/pub/misc/StarCraft.PDF>.
- [13] Pluralsight (2014). Game Concept: How To Come up With a Game Idea. Retrieved from <https://www.pluralsight.com/blog/film-games/creating-game-concept-first-step-getting-game-ground>.
- [14] Wikipedia. (n.d.). Golden Age of Piracy. Retrieved from https://en.wikipedia.org/wiki/Golden_Age_of_Piracy.
- [15] Kubik, R. (2020). Using Design Pillars to Keep Wildfire Swap's Development on Track. Retrieved from <https://ryankubik.com/blog/wildfire-swap-design-pillars>.
- [16] Przybyłowicz, M. and Stroinski, M. (2016). Slavic Adaptation of Music. Retrieved from https://ubm-twideo01.s3.amazonaws.com/o1/vault/gdc2016/Presentations/Przybylowicz_Marcin_SlavicAdaptationOfMusic.pdf.
- [17] Endrissat, N., Islam, G., & Noppeney, C. (2016). Visual organizing: Balancing coordination and creative freedom via mood boards. *Journal of Business Research*, 69(7), 2353-2362.
- [18] Clancy, M. (2023). How to make a moodboard in 10 easy steps. Retrieved from <https://milanote.com/guide/game-design-moodboard>.
- [19] Wikipedia (n.d.). Mood board. Retrieved from https://en.wikipedia.org/wiki/Mood_board.
- [20] Rieuf, V., Bouchard, C., & Aoussat, A. (2015). Immersive moodboards, a comparative study of industrial design inspiration material. *Journal of Design Research*, 13(1), 78-106.
- [21] Midjourney, Inc. (2016). Midjourney Documentation. Retrieved from <https://docs.midjourney.com/>.

References (cont.)

- [22] Jackson, D. M. (2003). Sonic branding. Palgrave Macmillan Books.
- [23] Agostinelli, A., Denk, T. I., Borsos, Z., Engel, J., Verzetti, M., Caillon, A., ... & Frank, C. (2023). MusicLM: Generating music from text. arXiv preprint arXiv:2301.11325.
- [24] Agostinelli, A., Denk, T. I., Borsos, Z., Engel, J., Verzetti, M., Caillon, A., ... & Frank, C. (2023). MusicLM: Generating music from text. Retrieved from <https://google-research.github.io/seanet/musiclm/examples/>.
- [25] Wikipedia (n.d.). Syntax–semantics interface. Retrieved from https://en.wikipedia.org/wiki/Syntax%E2%80%93semantics_interface.
- [26] Sapkowski, A (1990-2013). The Witcher. SuperNowa.
- [27] Gawroński, S., & Bajorek, K. (2020, October). A Real Witcher—Slavic or Universal; from a Book, a Game or a TV Series? In the Circle of Multimedia Adaptations of a Fantasy Series of Novels “The Witcher” by A. Sapkowski. In Arts (Vol. 9, No. 4, p. 102). MDPI.
- [28] Levine, G. (2022). Stray Developers Talked about The Real Cats That Inspired Them. Retrieved from <https://80.lv/articles/stray-developers-talked-about-the-real-cats-that-inspired-them/>.
- [29] Wikipedia (n.d.). User story. Retrieved from https://en.wikipedia.org/wiki/User_story.
- [30] Eff, M. (2023). Mapping & Wayfinding. Retrieved from <https://soundand.design/mapping-wayfinding-5fc21d054898>.
- [31] Rehkopf, M. (n.d.). User stories with examples and a template. Retrieved from <https://www.atlassian.com/agile/project-management/user-stories>.
- [32] Fudge, J. (1999). EA Tops Charts. PC Data, Reston, Virginia. Retrieved from https://web.archive.org/web/20050407232621/http://www.cdmag.com/articles/019/039/pc_data_march99.html.

References (cont.)

- [33] Gamespot (1999). Heroes of Might and Magic III. Retrieved from <https://web.archive.org/web/20190530064822/https://www.gamerankings.com/pc/63965-heroes-of-might-and-magic-iii/index.html>.
- [34] Fandom (n.d.). Forge (town). Retrieved from [https://mightandmagic.fandom.com/wiki/Forge_\(town\)](https://mightandmagic.fandom.com/wiki/Forge_(town)).
- [35] Age of Heroes (n.d.). Forge Town. Retrieved from <http://www.heroesofmightandmagic.com/heroes3ab/forgetown.shtml>.
- [36] Heroes 3 wiki (n.d.). Forge. Retrieved from <https://heroes.thelazy.net/index.php/Forge>
- [37] The 3DO Company (1999). Heroes of Might and Magic III Player Manual. Retrieved from [https://heroes3wog.net/download/\[Heroes%203\]%20Restoration%20of%20Erathia%20Manual.pdf](https://heroes3wog.net/download/[Heroes%203]%20Restoration%20of%20Erathia%20Manual.pdf).
- [38] Gonzalez, L. (2016). How to Write a Game Design Document. Retrieved from <https://www.gamedeveloper.com/business/how-to-write-a-game-design-document>
- [39] Majda, P., Moormann, J., Forbes, B. & Kenna, E. (2018). /DEV: MATCHMAKING REAL TALK. Retrieved from <https://nexus.leagueoflegends.com/en-us/2018/02/dev-matchmaking-real-talk/>
- [40] McIntyre, I. (2023). Here's every update date on Riot's LoL patch schedule for the 2023 season. Retrieved from <https://dotesports.com/league-of-legends/news/league-of-legends-2023-patch-schedule/>.
- [41] Díaz de León, A. (2022). League of Legends' producer confirms Riot will not stop releasing new champions. Retrieved from <https://www.levelup.com/en/news/709256/League-of-Legends-producer-confirms-Riot-will-not-stop-releasing-new-champions/>.
- [42] Wikipedia (n.d.). Soulslike. Retrieved from <https://en.wikipedia.org/wiki/Soulslike>
- [43] Gafarova, O. (2022). Dark Souls Creator Explained Why FromSoftware Games Are So Difficult. Retrieved from <https://80.lv/articles/dark-souls-creator-explained-why-fromsoftware-games-are-so-difficult/>.

References (cont.)

- [44] Wikipedia (n.d.). Serious game. Retrieved from https://en.wikipedia.org/wiki/Serious_game.
- [45] Wikipedia (n.d.). Wii Fit. Retrieved from https://en.wikipedia.org/wiki/Wii_Fit.
- [46] Nintendo (2008). Part 1 - A Truly Ground-breaking Collection of Games. Retrieved from <https://web.archive.org/web/20080708021300/http://www.nintendo.com/wii/what/iwataasks/volume-4/part-1>.
- [47] Ivor, K. (2009). Nintendo Wii Fit for physiotherapy. Retrieved from <https://web.archive.org/web/20091123231417/http://stanford.wellsphere.com/general-medicine-article/nintendo-wii-fit-for-physiotherapy/460917>.
- [48] Wikipedia (n.d.). Fitness game. Retrieved from https://en.wikipedia.org/wiki/Fitness_game.
- [49] Grebey, J. (2016). 'Pokemon Go' Players Have Walked Enough to Reach Pluto. Retrieved from <https://www.inverse.com/article/25517-pokemon-go-players-total-distance-walked-2016>.
- [50] Kain, E. (2016). 'Pokémon GO' Is More Than Just A Game And It's Bringing People Together. Retrieved from <https://www.forbes.com/sites/erikkain/2016/07/11/pokemon-go-is-more-than-just-a-game-its-a-phenomenon-thats-bringing-people-together/#5f4df9864743>.
- [51] Academy of Interactive Arts & Sciences (2012). D.I.C.E. Summit 2002 - Mark Cerny. Retrieved from https://www.youtube.com/watch?v=QOAW9ioWAvE&ab_channel=AcademyofInteractiveArts%26Sciences.
- [52] McInnis, S. (2010). Naughty Dog designer maps out Uncharted 2 development. Retrieved from <https://www.gamespot.com/articles/naughty-dog-designer-maps-out-uncharted-2-development/1100-6251473/>.
- [53] Leadbetter, R. (2015). Among Friends: How Naughty Dog Built Uncharted 2. Retrieved from <https://www.eurogamer.net/digitalfoundry-among-friends-how-naughty-dog-built-uncharted-2>.
- [54] Wikipedia (n.d.). Iterative design. Retrieved from https://en.wikipedia.org/wiki/Iterative_design.

Ludography

- [a] Atlassian (2004). Confluence [Web]. <https://www.atlassian.com/software/confluence>
- [b] Blizzard Entertainment (1998). StarCraft [PC, macOS, Nintendo 64].
- [c] Naughty Dog (2013). The Last of Us [PlayStation 3, Playstation 4].
- [d] Interplay Entertainment, Black Isle Studios, Micro Forté, Bethesda Game Studios, Obsidian Entertainment (1997-present). Fallout [DOS, Microsoft Windows, Mac OS, Mac OS X, Nintendo Switch, PlayStation 2, PlayStation 3, PlayStation 4, PlayStation 5, Xbox, Xbox 360, Xbox One, Xbox Series X/S, iOS, Android].
- [e] CD Projekt Red (2015). The Witcher 3 [PlayStation 4, Windows, Xbox One, Nintendo Switch, PlayStation 5, Xbox Series X/S].
- [f] Milanote (2019). Milanote [Web]. <https://milanote.com/>
- [g] Khusid, A. and Shardin, O. (2004). Miro [Web]. <https://miro.com/index/>
- [h] OpenAI (2022). DALL-E 2 [Web]. <https://openai.com/product/dall-e-2>
- [i] Midjourney, Inc. (2022). Midjourney [Web]. <https://www.midjourney.com/>
- [j] BlueTwelve Studio (2022). Stray [PlayStation 4, Playstation 5, Windows].
- [k] The 3DO Company (1999). Heroes of Might and Magic III: The Restoration of Erathia [Windows, Macintosh, Linux].
- [l] Riot Games (2013). League of Legends [Windows, Mac OS X].
- [m] FromSoftware (2011-2018). Dark Souls (Series) [PlayStation 3, Xbox 360, Windows, PlayStation 4, Xbox One, Nintendo Switch].
- [n] Nintendo (2007). Wii Fit [Wii].
- [o] Niantic (2016). Pokémon Go [iOS, iPadOS, Android].
- [p] Naughty Dog (2009). Uncharted 2: Among Thieves [PlayStation 3].
- [q] Atlassian (2004). Confluence [Web]. <https://www.atlassian.com/software/jira>