Illustrations

2.1.	Top: Splash screens for <i>The Legend of Zelda</i> for the NES (1986). Bottom: <i>The Legend of Zelda: Breath of the Wild</i> for the Nintendo Switch (2017) (image: Nintendo). Screen capture by Andrew Reinhard.	32
2.2.	Map of Fortnite's original Battle Royale Island (2017) (image: https://fortnite-archive.fandom.com/wiki/Battle _Royale_Map [Fortnite Wiki, Creative Commons Attribution 2.0 Generic license]).	38
2.3.	Top: Sample <i>Fortnite</i> player-built "panic" defenses left behind after a firefight. Bottom: Sample <i>Fortnite</i> player-built "wood" fortification (image: Epic Games). Screen capture by Andrew Reinhard.	39
2.4.	Sample, player-built bridge in <i>Death Stranding</i> (image: Kojima Productions). Screen capture by Andrew Reinhard.	42
2.5.	Top (a): Numbered plan of the human-built structures near Capital Knot City, 1 December 2019. Middle (b): Plan of human-built structures around Capital Knot City, 2 December 2019. Bottom (c): Plan of human-built structures around Capital Knot City on 5 December 2019, three days after I razed everything on the map (images: Kojima Productions). Screen captures by Andrew Reinhard.	45
2.6.	Typical <i>Fallout 76</i> map of West Virginia. Circles indicate player CAMPs, and dots indicate active players (image: Bethesda Softworks). Screen capture by Andrew Reinhard.	47
2.7.	Sample <i>Fallout 76</i> player CAMP (image: Bethesda Softworks). Screen capture by Andrew Reinhard.	48
2.8.	Simple <i>Minecraft</i> player-built house (image: Microsoft/Mojang). Screen capture by Andrew Reinhard.	51

3.1.	Beginning of the <i>No Man's Sky</i> patch notes. The full patch notes are available at https://doi.org/10.5281/zenodo.1134549; stable URL: https://doi.org/10.5281/zenodo.1134548. © Andrew Reinhard.	66
3.2.	Software matrix symbols. © Andrew Reinhard.	68
3.3.	Sample, simple software matrix for a small $No\ Man's$ Sky patch. $@$ Andrew Reinhard.	69
3.4.	Organized types and subtypes for the <i>No Man's Sky</i> patches. The full account of types and subtypes for each patch is available at https://doi.org/10.5281/zenodo.1134551; stable URL: https://doi.org/10.5281/zenodo.1134551. © Andrew Reinhard.	70
3.5.	Completed No Man's Sky software matrix, 25.5 \times 44 in. © Andrew Reinhard.	73
3.6.	Detail, <i>No Man's Sky</i> versions 1.03, 1.04, 1.05, 1.06, 1.07, with links. For example, note that for v1.03 gameplay unit 3 links to gameplay unit 11 and visual unit 22, all dealing with related aspects of creature diversity and appearance. © Andrew Reinhard.	74
3.7.	Detail, No Man's Sky versions 1.08, 1.09, 1.10. In this figure, there is one link from unit 87 (v1.08) to unit 94 (v1.09), which deals with continued improvement of loading corrupted save-files. In this example, we see the resolution of one bug that is improved in two consecutive patches, hence the link. © Andrew Reinhard.	74
3.8.	Detail, <i>No Man's Sky</i> versions 1.12, 1.13, 1.20. Note that there are no links between any of these patches; each of the three patches deals with its own issues instead of improving upon past fixes/enhancements. © Andrew Reinhard.	75
3.9.	Detail, No Man's Sky versions 1.22, 1.23, 1.24. In v1.23, gameplay unit 514 links to visuals unit 517, two improvements in the same patch for the Colossus exocraft vehicle. Unlike the link in Figure 3.7, this link is horizontal (same patch, different functionality) instead of vertical (same functionality, different patch). © Andrew Reinhard.	<i>7</i> 5

3.10.	Promotional image for the Pathfinder Update, <i>No Man's Sky</i> v1.20 (image: Hello Games). Screen capture by Andrew Reinhard.	78
4.1.	Star map of the Galactic Hub region, 22 June 2018, showing the capital planet, Lennon, and related, human-occupied worlds (image: Hello Games). Screen capture by Andrew Reinhard.	84
4.2.	View of Lennon's portal surrounded by communication stations left by other players. The black-and-white icons are visible in space and invite people to find them. The icon containing the shape of a person shows another human player, something that was once nearly impossible to encounter. During my work on Lennon, I would frequently see other players visiting as heritage tourists (image: Hello Games). Screen capture by Andrew Reinhard.	85
4.3.	nmsportals.github.io tool displaying portal coordinates and glyphs, which can then be used for fast travel. Public domain.	87
4.4.	Special icon and notification of the location of a player's base (image: Hello Games). Screen capture by Andrew Reinhard.	88
4.5.	Player-base identification and communication station indicators on the abandoned capital world in the Legacy Hub (image: Hello Games). Screen capture by Andrew Reinhard.	89
4.6.	Sample time-map showing the location of a base, a portal, and communication stations. © Andrew Reinhard.	90
4.7.	Sample state plan indicating numbered communication stations. © Andrew Reinhard.	91
	Sample site photo including the data from the head-up display (HUD) (image: Hello Games). Screen capture by Andrew Reinhard.	92
4.9.	Sample of onsite georeferencing on "Dancing Bear." © Andrew Reinhard.	93
4.10.	Semi-buried player base, "Langley" (image: Hello Games). Screen capture by Andrew Reinhard.	94

4.11.	Player base, "Horner," in its original context (<i>top</i>), and after having been relocated/excavated (<i>bottom</i>) (images: Hello Games). Screen captures by Andrew Reinhard.	95
4.12.	Sample communication station (image: Hello Games). Screen capture by Andrew Reinhard.	96
4.13.	Comm stations near the portal on the capital of Lennon (Drogradur NO425) with an overlying grid and details of the central cluster of communication stations at Lennon's portal (images: Hello Games). Screen captures by Andrew Reinhard.	97
4.14.	A Class 1 abandoned site, "Dancing Bear," showing comm stations as evidence of the location of a player's settlement, now completely disappeared. The comm stations float in the air, which shows that the topography of the planet changed. Normally comm stations float ca. 1 m above the surface, but these are so far above the planet's current surface that they would require a starship to visit (image: Hello Games). Screen capture by Andrew Reinhard.	100
4.15.	A Class 2 abandoned site, "Panda's," showing a complete player base situated in the landscape without any damage (image: Hello Games). Screen capture by Andrew Reinhard.	101
4.16.	A Class 3 abandoned site, "Valhalla," as it was originally (a) and as it was after the Atlas Rises update (b). Note how the landscape changed from lush to arid, and the topography changed as well, which left the base suspended and disarticulated (images: Hello Games). Screen captures by Andrew Reinhard.	102
4.17.	A communication station found at the abandoned base "Langley" indicating that the architect has relocated to the "Hilbert" region of Galactic Hub 2.0, established after the Atlas Rises update (image: Hello Games). Screen capture by Andrew Reinhard.	103
4.18.	Comm station positions showing past topography at Ty Beecham's Pearl Farm (image: Hello Games). Screen	
	capture by Andrew Reinhard.	105

4.19.	Georeferencing of hollyworks' pearl farm on Holly's Blue Moon Paradise. © Andrew Reinhard.	105
5.1.	Timothy Cook's topographic map of Skyrim derived from <i>Edler Scrolls V: Skyrim</i> . Source: https://www .nexusmods.com/skyrim/mods/36159. Public domain.	118
5.2.	(a) Player-built fortification in <i>Fortnite</i> . Note the purpose-built "salt box" construction of the fortification (<i>left</i>) and the impromptu "lean-to" construction (<i>right</i>), with an opposing player on the far right for scale. (b) Player-activated, ready-made "InstaFort," which self-constructs when a player tosses its "seed" into the landscape. By chance, Chapter 3, Season 3 of <i>Fortnite</i> features a playable Indiana Jones avatar, pictured in the foreground (images: Epic Games). Screen captures by Andrew Reinhard.	121
5.3.	Player-built base in <i>No Man's Sky</i> (image: Hello Games). Screen capture by Andrew Reinhard.	122
5.4.	(a) Drone-captured image above a player-built base (circled) in <i>No Man's Sky</i> , part of the image set used to create a digital elevation model (DEM). (b) Drone-captured image above a town featuring temporary player-built fortifications (circled) in <i>Fortnite</i> , part of the image set used to create a DEM (image a: Hello Games; image b: Epic Games). Screen captures by Andrew Reinhard.	125
5.5.	(a) Rendered terrain map of Battle Royale Island in Fortnite. (b) Detail of rendered terrain map in Fortnite showing player fortifications (circled). (c) View from the side of a rendered terrain map of a site (circled) in No Man's Sky in Metashape Pro. (d) Top view of a rendered terrain map of a site (circled) in No Man's Sky in Metashape Pro (images a and b: Epic Games; images c and d: Hello Games). © Andrew Reinhard and Sara Zaia.	127
5.6.	(a) Contour map of <i>Fortnite</i> 's Battle Royale Island created in QGIS. (b) Detail of a contour map created in QGIS of a <i>Fortnite</i> town with player fortification (circled). (c) Contour map created in QGIS of a player base (circled) in <i>No Man's Sky</i> (images a and b: Epic Games; image c: Hello Games). Screenshots by Andrew Reinhard.	128

6.1.	Nordic buildings outside the town of Whiterun, <i>Skyrim</i> (image: Bethesda Softworks). Screen capture by Andrew Reinhard.	139
6.2.	Promotional photo of Sony PlayStation Virtual Reality (PSVR) hardware. © Sony.	139
6.3.	(a) Screen capture of a <i>Skyrim</i> village taken through the PSVR headset. (b) Photo of the same scene as displayed on-screen (images: Bethesda Softworks). Screen captures by Andrew Reinhard.	142
6.4.	(a) Rusticated masonry in a <i>Skyrim</i> building as seen from a distance. (b) Flat texture of rusticated <i>Skyrim</i> masonry as seen up close (images: Bethesda Softworks). Screen captures by Andrew Reinhard.	144
6.5.	Dense point cloud prior to creating the solid mesh for the pickaxe. © Andrew Reinhard.	145
6.6.	3D mesh of the pickaxe prior to cleaning. $\mathbb C$ Andrew Reinhard.	146
6.7.	Ancient Nord pickaxe to use in the photogrammetry experiment (image: Bethesda Softworks). Screen capture by Andrew Reinhard.	147
6.8.	Scanned (<i>left</i>) and 3D-printed (<i>right</i>) examples of the same Nord pickaxe (image: Bethesda Softworks). Printed object © Andrew Reinhard.	148
6.9.	Second attempt at printing the Nord pickaxe. © Andrew Reinhard.	148
6.10.	A typical tavern tankard in <i>Skyrim VR</i> (image: Bethesda Softworks). Screen capture by Andrew Reinhard.	153
7.1.	Atari's 1983 landfill dumping published in the Alamogordo Daily News. Public domain.	159
7.2.	Sampling of excavated, boxed and loose, Atari games. © Andrew Reinhard.	160
7.3.	Examples of the four types of Atari games recovered: (a) loose cartridges, (b) boxed cartridges, (c) blister packs, (d) "six packs." © Andrew Reinhard.	161

7.4.	Atari game with evidence of it being returned/unsold	
	merchandise. © Andrew Reinhard.	162
7.5.	Atari Force comic book and Atari game catalog recovered at the Alamogordo excavations. © Andrew Reinhard.	163
7.6.	Excavated <i>Yars' Revenge</i> cartridge in very good condition. © Andrew Reinhard.	164