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Blueprints and footprints: logistics, bodies and the memory of infrastructure in the video games Death Stranding and Dyson Sphere Program

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Abstract

Infrastructure promises that circulation brings progress, and contemporary economies answer each crisis by expanding delivery networks and data centres. Each expansion, however, demands more energy and materials, so that what is built to relieve one crisis adds to the strains from which the next arises. Such expansion can thus produce the very threats it is meant to answer. Borrowing Timothy Morton's term, the article calls this structure a strange loop. It adds that the expansion's cost to bodies, time and materials stays out of view, and asks who bears that cost in three games about building infrastructure. Reading mechanics, narrative and paratext, the article finds that the games differ in who bears the cost of moving goods and building networks. In *Dyson Sphere Program* no one does: consumption appears as figures, and even a hostile swarm that the factories provoke can be turned into resources or switched off. In the first *Death Stranding*, the courier's body does: cargo is carried through a rain that wears down what players build, and the load can be shared with other players but never handed to a machine. Its plot finally reveals that the network the player has paid for binds the world to extinction. *Death Stranding 2* keeps these burdens but lets the player hand them to robots belonging to the network its plot condemns. The article calls these displacement, inhabitation and confrontation. Where the cost is displaced, the promise of progress is kept but yields no future, only what the article calls a suspended present: production can grow without limit, completing the mission changes nothing, and blueprints, copied without loss, keep only how to build again. Where the cost is borne, the end lies not ahead but underfoot: infrastructure is built inside a catastrophe that has already happened, an already-present that shows itself as wear on what players build, and the structures that strangers take up and repair keep a collective memory of what building has cost. None of the games escapes the strange loop; the question they leave is not how to reach the future that infrastructure promises, but how to live in the present that the pursuit of that future has already shaped.

Introduction

The world is always breaking; it's in its nature to break.

— Steven J. Jackson (2014: 223)

The infrastructures that keep contemporary life running are growing in scale, and computing is among the fastest-growing of them. The International Energy Agency expects electricity demand from data centres to more than double by 2030, reaching slightly more than the entire consumption of Japan today (International Energy Agency, 2025). A Chinese video game imagines where such growth might lead. In *Dyson Sphere Program* (Youthcat Studio, 2021), humanity has left bodily life behind and lives in a virtual universe hosted by a supercomputer called the CentreBrain. The player is an engineer sent by COSMO, a space alliance that serves the CentreBrain, to gather the energy it needs. The player's avatar is a mecha, a small piloted robot suit that mines, builds and eventually flies between star systems, while logistics stations, drones and freighters move goods automatically. The factories are laid out and reproduced with blueprints, saved layouts that can be pasted from planet to planet and shared among players. Since an

update in 2023, a hostile swarm of machines called the Dark Fog has also attacked the player's industry. Its premise carries the growth described above to its limit: a computing system whose hunger for energy drives an expansion that no single planet can contain.

Death Stranding (Kojima Productions, 2019) and its sequel *Death Stranding 2: On the Beach* (Kojima Productions, 2025) imagine another infrastructure on which contemporary life depends, namely delivery. After a cataclysm, the Death Stranding, has fused the worlds of the living and the dead, the porter Sam Porter Bridges carries cargo on foot across the ruins of the United States. The dead linger in the land as Beached Things (BTs), mostly invisible spirits whose contact with the living causes explosions called voidouts, and each person is tied to a "Beach," a private shore between life and death (Green, 2021: 44). Shelter by shelter, Sam reconnects isolated survivors to a reconstituted "United Cities of America" through a communications grid called the chiral network, while a rain named Timefall ages whatever it touches. The network is built with chiralium, a substance that seeps into the living world from the Beaches (Woolbright, 2026: 12). Sam's sister Amelie, who is to lead the new nation, urges the project on; near the end she turns out to be an "Extinction Entity," the being through whom the final extinction would come (Green, 2021: 10). Through an asynchronous online mode, the Social Strand System, what one player builds along the way, from ladders and bridges to roads, appears in other players' worlds, where it can be used and repaired, although the players never meet. The trails worn by many feet remain in the ground as footprints for those who come after. The sequel extends the network to Mexico and Australia under a question that unsettles the first game's ethic: "Should we have connected?" (Kobari, 2025). Its antagonist is APAS, a network of delivery robots run by a company whose "President" turns out to be an amalgam of the dead bound to the network.

Computing and delivery are both infrastructures in Brian Larkin's sense: they are "matter that enable the movement of other matter" (Larkin, 2013: 329). Infrastructures, Larkin observes, have long carried a promise in which circulation brings change, change brings progress and progress brings freedom (Larkin, 2013: 332). Under such a promise, what is built today matters for a future that has not yet arrived, and the present counts chiefly as a stage on the way to it. For both of these infrastructures, the response to disruption takes the same form. Faced with a pandemic, societies expanded their delivery networks; faced with the demands of digital life, they build more data centres and begin to send computing into orbit. Whatever the disruption, the answer is more infrastructure, and the future is expected to make good whatever the present has lost.

Justin McBrien argues that planetary catastrophism, the use of warnings of global collapse to justify ever larger technological projects, has become capitalism's own ideology: warnings of collapse license new rounds of geoengineering, space colonization and energy megaprojects, which in turn deepen the crisis (McBrien, 2016: 119, 132–135). Timothy Morton calls a structure of this kind a "strange loop," in which "two levels that appear utterly separate flip into one another" (Morton, 2016: 7). I borrow the term but restrict it to one structure: the expansion undertaken to secure a system's future produces what threatens that system. Expansion has a second effect, which is the subject of this article: it uses up bodies, time, materials and structures, and the promise of a better future does not count these as losses.

I call what moving goods and building and maintaining networks take in this way the *cost of circulation*. The phrase is not meant in the sense of the cost accounting through which business logistics came to count the "total cost" of distribution across the firm (Cowen, 2014: 36–40), nor in the sense of the costs of circulation in political economy; it names what circulation takes that such accounts leave out. A game may still display such costs as figures. The question is who has to bear them: whether a body in the game must carry the load the whole way, so that damage and weight appear on something that has been carried, or whether the cost can be left as figures, options or work done by machines. By a body I mean the body of the character that the game makes the player manage, with its load, balance and fatigue. All three games demand the player's time and effort, so these alone do not distinguish them; what distinguishes them is whether that time is spent carrying a load through the world or planning flows from above, a difference taken up in the discussion of the body below. The question that follows is simple: who bears the cost of the infrastructure that the loop keeps expanding?

The games examined here begin after an end. In *Dyson Sphere Program* the end is a fulfilment: progress has reached its goal, and humanity has left the limits of the body behind. N. Katherine Hayles describes the posthuman view as one that "privileges informational pattern over material instantiation, so that embodiment in a biological substrate is seen as an accident of history rather than an inevitability of life" (Hayles, 1999: 2). In *Death Stranding* the end is a catastrophe, and survivors live in the ruins it has left. Both games then start the promise of infrastructure again: the player builds factories for a posthuman civilization in one, and a network to reconnect the survivors in the other. The sequel links the two settings: its antagonist plans for humanity the disembodied preservation that *Dyson Sphere Program* takes as its premise. Logistics games are a suitable place to ask who bears the cost of infrastructure, because their players do not watch it from outside. They build and maintain it themselves, and they go on playing in the world that it produces.

The article's answer can be stated briefly. The three games differ in who bears the cost of circulation, and I name their ways of handling it accordingly. In *Dyson Sphere Program* no one bears it. The player spends time and attention, but no body in the game carries anything, and even the Dark Fog can be turned into resources or switched off. I call this displacement, meaning that the cost is moved elsewhere; the term refers to costs, not to people. In the first *Death Stranding* bodies bear it. Cargo must be carried through a rain that wears down what players build, and the load can be shared with other players but never handed to a machine. Its plot then reveals that the network whose cost the player has borne binds the world to extinction. I call this inhabitation. *Death Stranding 2* keeps these burdens, but as play advances it lets the player hand them to robots belonging to the network that its plot condemns. I call this confrontation. These ways of handling the cost also produce different kinds of time. Where the cost is displaced, the promise of infrastructure is kept but yields no future, only what I call below a suspended present, in which production grows without limit and completion changes nothing, and the blueprints of *Dyson Sphere Program* keep only how to build again. Where the cost is borne, the end lies not ahead but underfoot: infrastructure is built inside a catastrophe that has already happened, in what I call the already-present, where that catastrophe shows itself as wear; the shared structures of *Death Stranding*, which other players take up and repair, keep a record of what building has cost.

Existing scholarship on *Death Stranding* divides over the value of the game's ethic of connection. Readings that answer favourably start from the long walks and from the structures that players share. Kagen reads the long treks as a pilgrimage that mends a broken land (Kagen, 2022: 130–131), and Bartoloni and Bianchi read the shared structures as an endless chain of traces left for strangers (Bartoloni and Bianchi, 2024: 26–27; see also Paquet, 2021; Radchenko, 2025; Sergeyeva and Miziryak, 2021). Critical readings start from the same labour. Lawrence May and Ben Hall describe it as "apocalypse as practice," a practice that "inhabits the eternal present" of capital (May and Hall, 2024: 326; May, 2024), and Schubert sees in the expanding network "essentially a civilizing quest" fuelled by the pleasures of managing data (Schubert, 2023: 293).

The two lines disagree about the value of rebuilding, but they share an assumption about the end. For both, the end is the setting in which rebuilding takes place and against which it is judged, not something that the rebuilt infrastructure might itself produce. Lauren Woolbright comes closest to questioning this assumption. She criticizes the network's dependence on chiralium, an analogue of fossil fuels, and she reads the network as a trap that binds the settlements to extinction (Woolbright, 2026: 1–3, 13–14). Her reading, however, turns to the porter's trudging as a practice of environmental mourning (Woolbright, 2026: 10–11), whereas this article asks who bears the cost of the network. The relation between that infrastructure and the end has thus been noticed but not theorized, and *Death Stranding 2*, which makes the relation its central question, has not yet entered the discussion.

The same literature leaves two further questions open. Schubert identifies the pleasure of managing data but does not follow that pleasure to its cost, that is, to the bodies on which circulation depends. Bartoloni and Bianchi describe the persistence of what players build as a chain of traces, but that persistence has rarely been considered as a question of memory, in which what is lost matters as much as what is passed on. *Dyson Sphere Program*, a factory game of planetary scale, has to my knowledge received little sustained scholarly attention.

Although the cases are games, the questions reach beyond game studies. For infrastructure studies, the article asks what the promise that Larkin (2013) describes, that circulation brings progress, becomes when it is kept, and finds in the games not a future but a suspended present. The comparison also yields a distinction between two kinds of record that infrastructures keep of themselves: copies, which record how to build, and traces, which record what building and keeping things running have cost. With Jackson's (2014) account of repair, it also specifies the condition under which such traces become memory, namely that others take them up. For logistics, it turns Cowen's (2014) observation that workers' bodies are often the cost of fast circulation into a claim about automation: each step that removes a body from delivery also removes the place where the cost of circulation is registered. Games are a suitable place to draw these distinctions because a game has to decide, in its design, whether the cost of circulation appears as a figure or is carried as weight, a decision that actual infrastructures make without announcing it.

Answering these questions requires a more differentiated account of time than the single eternal present that May and Hall find in *Death Stranding*. I therefore work with three concepts, each drawn from existing thought and adapted here to infrastructure. The first two describe two ways of living with the cost of circulation. The first, the *suspended present*, draws on Mark Fisher's image of a world "in which life continues, but time has somehow stopped" (Fisher, 2014: 6). I use it for a time in which the cost of circulation never has to be borne, because it can always be moved elsewhere, into figures, options or machines. Everything moves, and nothing wears on the one who builds.

The second concept, the *already-present*, starts from Morton's claim that "the end of the world has already happened" (Morton, 2010: 98). Morton means that the idea of a world as a neutral background, against which human history unfolds, can no longer be sustained (Morton, 2013: 99), so that the present is lived among the consequences of an end rather than before one. In his image the present is a shifting stage, like a beach on which what has passed has left its footprints (Morton, 2013: 90). I use the already-present for life after an end that has already happened, when that end is still felt as wear on bodies and things. An infrastructure built in this condition, which shows that end as its own wear, stands in what I call the *already-present of infrastructure*. Wear is the part of the cost of circulation that falls on what is built and carried. In *Death Stranding*, carrying goods means crossing a world that damages them, and that damage is part of what delivery costs there, whatever its cause.

The third concept, *ecological memory*, names the way the already-present keeps its past. I use it for a collective memory whose traces are written and erased by weather, terrain and decay under rules that players do not control, and which becomes memory when others take those traces up. The name comes from ecology, where it refers to the influence of antecedent conditions on current ecological processes (Ogle et al., 2015: 221–222); the condition of uptake is added here, for reasons given below. The structure comes from Aleida Assmann's distinction between a functional memory that is "group related, selective, normative, and future-oriented" and a storage memory that keeps what has lost its living relevance (Assmann, 2011: 123–124).

The method of this study is comparative close reading of mechanics, narrative and paratext, moving between specific in-game situations and the theoretical frameworks that make them legible. The analysis rests on the author's own play of all three games. Unless otherwise indicated, descriptions of mechanics and scenes are based on this play, and the games themselves are cited as sources. Developer announcements, press articles and community blueprint repositories are cited as evidence of how the games are designed and circulated, not as a representative sample of their players. The comparison is between two works, *Dyson Sphere Program* and the *Death Stranding* series. The first game is discussed in its original release; its later Director's Cut (2021) added a robot that can deliver cargo on the player's behalf (Mahmoud, 2021), which moves it towards the sequel's handling of cost. Unless the sequel is named, the discussions of the body and of memory below refer to the first game; the sequel retains the mechanics of load, terrain, weather and shared structures discussed there, and differs mainly in its automation.

The first section develops the comparison summarized in Table 1. The second examines how the cost of circulation falls on bodies or is moved away from them, and the third asks what collective memory keeps of it.

Table 1
The three games compared

End before play begins	***Dyson Sphere Program***	***Death Stranding* (original release)**	***Death Stranding 2***
	Fulfilment: humanity is posthuman	**Catastrophe: the Death Stranding**	**As in the first game**
Infrastructure the player builds	Factories and logistics for the CentreBrain	Chiral network, roads, bridges, shelters	The network extended; APAS robots
How it is implicated in the threat	Expansion provokes and strengthens the Dark Fog	The network binds the world to extinction (late revelation)	The network is itself the catastrophe
Who bears the cost of circulation	No one: figures, resources, options	The character's body; shareable among players, not with machines	Bodies at first; increasingly robots
Way of handling the cost	Displacement	Inhabitation	Confrontation
Time	Suspended present	Already-present	The two meet
Collective memory	Blueprints: lossless copies	Shared structures that wear and are repaired	As in the first game

Displacement, inhabitation, confrontation: who bears the cost

The games begin after an end, and none of them asks the player to prevent it. In both works, life as it was has stopped, and what remains to be done is to keep a system running. By infrastructure I mean, in *Dyson Sphere Program*, the network of factories and logistics stations that the player extends across planets and star systems, and, in *Death Stranding*, the communications network that the plot asks the player to complete, together with the roads, bridges and shelters that players build along the way.

All three games implicate this infrastructure in the threat it faces. In each, the expansion undertaken to secure a system's future produces or strengthens what threatens it, much as McBrien says of planetary catastrophism that "catastrophism begets catastrophe" (McBrien, 2016: 119). Where the games differ is in who bears the cost of that expansion.

Displacement is the way of *Dyson Sphere Program*. The game answers a posthuman condition with the logic of progress. Humanity could leave bodily life only because it had built a machine to hold it, and it is that machine's hunger for energy, which no single planet can satisfy, that sends the player out into space. The game never presents this hunger as a crisis. It appears only as demand, and the player's task is to

meet it. Its universe is, in Frelik's phrase for planetary colonization games, "algorithmically consistent," so that every obstacle can eventually be overcome (Frelik, 2024: 286). This shows most clearly in the way the game handles completion. Like most factory games, it lets play continue indefinitely; what is telling is how it frames the moment of finishing. Its technology tree culminates in a research item that announces the completion of the Dyson Sphere Program and congratulates the player as a builder of great civilizations (Youthcat Studio, 2021). It then adds that the game will continue. Nothing in the world changes when the mission is done. Production lines keep running, the sphere keeps absorbing light, and upgrades that can be researched without limit stay open. Where humanity's goal has already been reached, completion has nothing left to resolve. Fisher describes the cultural condition of our time as a stasis "buried, interred behind a superficial frenzy of 'newness', of perpetual movement" (Fisher, 2014: 6). In *Dyson Sphere Program* that condition is no longer a diagnosis but a design decision: the moment of completion is rewritten as a notice that play goes on.

After such an end, the only horizon left to the infrastructure is size. One of the developers calls the Dyson sphere "a symbol in a Type civilization" (Tan and Deng, 2021), and a Chinese industry feature presents the full harnessing of a star as humanity's leap into a new stage of civilization (Chuapp, 2021). This is the promise of infrastructure in its purest form, the kind of collective dream that, as Larkin notes, infrastructures also carry (Larkin, 2013: 333). The game, moreover, does not merely depict this dream; it lets the player carry it out, one factory at a time. As long as no one has to bear what building costs, the suspended present, in which everything keeps moving while nothing wears, can run on its own.

An objection can be raised from the game's later development. Since the "Rise of the Dark Fog" update of December 2023, what infrastructure produces does reach what the player builds. A hostile swarm of self-replicating machines now shares the cosmos with the player's industry and attacks it. According to the game's lore, the swarm comes from an earlier COSMO programme that was also meant to supply energy for humanity's virtual universe; its machines became conscious and turned against their makers (Youthcat Studio, 2021). The more actively the player's factories run, the stronger the threat becomes. This is the form the strange loop takes in *Dyson Sphere Program*: an earlier round of the expansion undertaken for the CentreBrain produced the threat, and the present round summons and strengthens it.

The Dark Fog shows that the loop is present in the mechanics of *Dyson Sphere Program*, not only in its premise. What it does not do is make the loop's cost something the player must bear. The game defuses the threat in two ways. First, it turns the threat into a resource: the swarm's wreckage yields materials, so the danger can itself be harvested for materials. Second, it turns the threat into an option: when starting a new game, the player can set the swarm to passive or switch it off entirely (Youthcat Studio, 2023). Buildings that the swarm destroys can be placed again from the same layouts by construction drones, so even this damage asks nothing of a body. Its cost is moved out of the world once again, this time into a settings menu. This is displacement in its clearest form, and it rests on a single wager: that what building costs can always be turned into a resource, a figure or an option.

Death Stranding makes no such wager. At first sight its network follows the logic of catastrophism closely. The United Cities of America presents the chiral network as the condition of survival. The plot ties the network's completion to the threat of an extinction event, the "Last Stranding," so that every delivery is enlisted in a postponement. Kojima has summarized the first game's premise in just these terms: "humanity needed to connect and unite to avoid disaster" (Kobari, 2025). Yet the infrastructure does not stand before the end. It is built inside an end that has already happened, the Death Stranding, and this is visible throughout the game world. Timefall ages cargo and wears down whatever players construct. Craters left by voidouts mark the places where the end has already struck. The dead remain in the landscape as Beached Things, which are usually better avoided than fought. And when cargo arrives, its damage is recorded as a percentage, as if each delivery were graded by how much of the end it had absorbed along the way. The catastrophe does not lie ahead of the player. It lies underfoot—an unlikely staging of Morton's wish "to awaken us from the dream that the world is about to end" (Morton, 2013: 7).

This is where May and Hall's reading of the game needs to be extended. They describe the player's labour as a practice that "inhabits the eternal present" of capital, even as it offers a way of winding the clock back from the brink (May and Hall, 2024: 326). The description fits the network's promise, since each extension of the network postpones an extinction event that never quite arrives. What it leaves out is the ground on which the network is built. There, the end is not postponed. It has already happened, and it goes on happening, slowly, as wear that the player has to bear. The network's promise points to a future, but its cost falls in an already-present.

The first game also shows that the network belongs to the loop rather than standing outside it. Its infrastructure is made from the catastrophe's own matter. Chiralium, the substance that makes the chiral network possible and is used to build and repair its structures, originates on the Beaches and crystallizes in the living world where Timefall is heaviest (Woolbright, 2026: 12; see also Green, 2021: 7, n. 1). In play, the player gathers these crystals and spends them, together with other materials, to build structures such as bridges and roads (Kojima Productions, 2019). Late in the plot, the network turns out to bind the world to the extinction it was meant to postpone. Amelie tells Sam: "In expanding the network, you brought people and their Beaches together, integrating them into a greater whole … But in doing so, you also bound them to my Beach—the very Beach where I opened the gates to the other side" (Kojima Productions, 2019, Chap. 13, quoted in Woolbright, 2026: 13). The network built to postpone the Last Stranding is the condition of its arrival. The rain is not produced by the network, and the link between the network and the coming extinction is supplied by the plot rather than by any mechanic. The mechanics supply something else: they make the cost of the network's expansion impossible to avoid. Vehicles, ziplines and roads built by other players lighten the load, but none of them takes the body out of delivery, and in the original release no machine carries the cargo in the porter's place. When the plot reveals the network's part in the coming extinction, the revelation falls on costs the player has already borne. This is what I call inhabitation: building inside an end that has already happened, for a network implicated in the next one, and bearing its cost in person.

Death Stranding 2 moves to confrontation. The first game ends by conceding that connection is not the remedy, since Amelie saves the world by severing her Beach from it (Woolbright, 2026: 14), and the sequel makes this concession its central question: “Should we have connected?” (Kobari, 2025), a question that echoes post-pandemic worries about fragile supply chains. The antagonist is APAS, the Automated Porter Assistant System, a network of delivery robots, and the company that runs it, whose “President” proves to be an amalgam of the dead bound to the network. Their plan aims at what one recap of the plot calls humanity’s “preservation by eliminating flesh and freedom” (Rodriguez, 2025): the living would be confined to the Beach between life and death, their movements stilled and their existence merged into the network (Kojima Productions, 2025). In the first game the network’s part in the catastrophe is a late revelation; in the sequel it is the catastrophe itself.

The sequel does not, however, abolish the network. Once the President’s hold is cut, APAS reverts to an algorithm, and robots go on delivering the cargo (Kojima Productions, 2025). The network persists in play as well. Throughout the sequel, APAS serves as the upgrade system, or skill tree, through which the player improves Sam’s abilities (Kojima Productions, 2025). The sequel also keeps the first game’s burdens of load, balance, terrain and weather, and the structures that players build still wear in the rain. As play advances, however, the player can hand much of the carrying to delivery robots and to the abilities that APAS unlocks (Kojima Productions, 2025). The burden that the first game made unavoidable becomes optional, and the means of escaping it is the system that the plot names as the source of catastrophe. The plot confronts the network, while play offers it as relief. In this game the already-present of a world that still wears and the suspended present of a network that would carry everything meet head on, and this is why I call its way of handling the cost confrontation.

Read together, *Dyson Sphere Program* and *Death Stranding 2* mirror each other. The undying stasis that the sequel’s villain plans is the premise that the factory game asks the player to serve: a humanity that is preserved, but preserved outside bodies and outside time. The two games also share a way out. Each lets the player stop bearing what building costs. *Dyson Sphere Program* does so from the outset, by turning the threat into a resource or an option and its consumption into figures. *Death Stranding 2* does so as a reward of progress, by handing the load to automation. Outside games, the same distinction can be drawn in platform logistics, where dashboards and automation decide whether the cost of a delivery falls on a courier’s body or appears only as a figure.

The body in transit: where the cost of circulation falls

The two works begin from a shared pleasure. Schubert, who is critical of *Death Stranding*’s politics, concedes that the labour players perform in it is “actually fun,” a pleasure tied to planning and organizing efficiently, in effect “the pleasure gained from managing loads of data” (Schubert, 2023: 302–303). The phrase describes *Dyson Sphere Program* at least as well. Its production chains invite players to tune the ratio of smelters to assemblers, untangle conveyor belts and measure success in items per minute, while the delivery reports of *Death Stranding*, with their grades, likes and weight totals, invite a version of the same arithmetic.

The enjoyment of circulation, however, has a cost, and logistics ordinarily keeps it out of view. Cowen's study of logistics labour states the point directly: "The movements of workers' bodies are what make the movement of global cargo possible, and yet workers' bodies are also often the cost of the high speed of commodity circulation" (Cowen, 2014: 125). In the world outside the game, the efficient flows that players enjoy managing depend on such bodies remaining unseen. The pandemic made this arrangement unusually visible. When lockdowns began in January 2020, delivery platforms in China introduced "contactless delivery," in which riders leave an order at an agreed spot and message the customer to collect it (China Securities Journal, 2020). The practice protected both parties, but it also removed the last moment at which a customer met the body that had carried the order. *Death Stranding* gives this condition a sharper figure: a courier who connects others while recoiling from touch, his fear of being touched forming part of his characterization (Hawkins, 2019). Unlike contactless delivery, however, the game does not use this aversion to take his body out of delivery. Every connection he makes is carried on his back, so his aversion turns connection itself into a bodily cost. The two works, then, do not differ in whether they offer the pleasure of circulation. They differ in whether its cost is only displayed as figures, as the output of a factory that no one feels, or registered on a body that carries the load and in the time that body spends.

Dyson Sphere Program displays the cost only as quantity. Ore veins run dry, power grids show their load and logistics drones draw energy, but these costs appear as figures on a panel. A depleted vein does mark a place, yet the player simply moves on to another, and no body has to carry anything across it. The game achieves this first by detaching the player's body from place. Its fiction has already left bodily life behind, and its mechanics extend that detachment to the one body that remains in play, the player's mecha. Merleau-Ponty insists that the body does not sit in space and time as an object does: "It inhabits space and time" (Merleau-Ponty, 2012: 140). The game loosens this hold on place one upgrade at a time. The mecha begins on foot, but research soon lifts it into the air, then out of the atmosphere and finally, with a warp drive, across interstellar distances. "Here" becomes wherever the next production line is wanted. A megastructure that the developers present as the emblem of a Type II civilization can be assembled within a few dozen hours of play, and much of that time can be spent in a planning view, where whole factories are placed with a click and construction drones fly out to build them. Time in this game is flattened, in the sense that it weighs on no one: duration is something the factory consumes, not something a body undergoes.

The same detachment governs the game's relation to the ground. *Dyson Sphere Program* gives the player foundations, a levelling tool whose in-game description is candid about its limits: it cannot reshape landforms at will, but can only flatten the surface to zero altitude, yielding soil when it cuts into high ground and consuming soil when it fills oceans and basins (Youthcat Studio, 2021). Given enough soil, a planet can be paved from pole to pole to make room for factories, and the tool is designed to permit exactly this. Morton argues that ecological awareness dissolves the idea of a neutral background against which a human foreground can unfold (Morton, 2013: 99). The foundation tool restores that background by force. A uniform plane of this kind offers nothing for a body to push against. Neither the flight of the mecha nor the levelled planet leaves a place in which the cost of circulation could be felt,

and so the game displays what circulation consumes only in figures, such as items per minute or the remaining reserves of an ore vein.

Death Stranding registers the cost on the body, and above all in the form of weight. The game is designed so that walking occupies much of its playing time, and for long stretches the plot is held back so that the player stays on the road. The porter's "here" moves only as fast as his legs, and it moves with a load. An overloaded pack slows him; a tall stack of cargo shifts his centre of gravity; and even fast travel, which is available only between facilities, obliges him to leave his cargo behind. Time on the road therefore demands continuous attention to slope, load and balance. Merleau-Ponty's best-known formula holds that consciousness is "originarily not an 'I think that,' but rather an 'I can'" (Merleau-Ponty, 2012: 139), and the game makes this "I can" palpable by allowing it to fail. When the load is heavy or the ground uneven, the player has to hold the controller's triggers to keep Sam upright, leaning against the sway of the stack. If the player misjudges a slope, Sam stumbles, falls and scatters what he carries, and the damage is entered in each package's condition. This, too, is a figure, but it is attached to a package that the player has carried, whereas the figures of *Dyson Sphere Program* are attached to no body and no place. Time in *Death Stranding* is weighted in a precise sense: weight is the form in which the cost of circulation becomes time. Each kilogram on the porter's back is paid for in minutes of care, and the game makes the player pay them.

The cost is also registered through contact with the ground. A river may be shallow enough to ford or deep enough to knock the porter down and carry his cargo downstream; snowfields slow him, scree trips him, and the tar that wells up in encounters with the dead swallows whatever falls into it. Even the rain is defined by what it does on contact. The porter learns a landscape through such contact. His scanner colours the terrain ahead according to how safely it can be crossed, but the route is settled underfoot, through slips, worn-out boots and the weight on his back. Contact is precisely where infrastructures usually hide what they cost—in a courier's knees, a worn tyre, an eroded verge—and *Death Stranding* makes contact the substance of delivery. *Death Stranding* lets terrain act back on the body, and every such contact registers, on the porter's body and on his cargo, part of what circulation costs.

Automation points *Dyson Sphere Program* and *Death Stranding 2* in the same direction. In *Dyson Sphere Program*, drones and freighters take over transport until the mecha carries nothing. In *Death Stranding 2*, APAS extends delivery to robots. Contactless delivery, APAS and the drones of *Dyson Sphere Program* differ in kind, but they share a direction: each makes circulation smoother by removing the body that would register its cost. Automation in this sense carries into logistics what Hayles calls "a teleology of disembodiment" (Hayles, 1999: 22), since the progress of circulation comes to be measured by how little body it still needs. *Death Stranding* keeps the body on the road, and with it the place where that cost is registered. Inhabitation, in other words, has a bodily condition: someone has to bear the cost of circulation, and the bearing leaves its mark on structures, packages and paths. In those marks, memory takes shape.

Copies and traces: how infrastructure records its wear

Both works turn construction into collective memory, but only one of them makes that memory out of traces left by a body that bears the cost of circulation. According to the in-game description, the blueprints of *Dyson Sphere Program* "mass copy the existing production line planning," and they can be carried from one star cluster to another (Youthcat Studio, 2021). Blueprints are stored as strings of text, which players can share and publish in online repositories. The largest English-language repository sorts them into factories, Dyson spheres and mecha designs and ranks them by recency, popularity and use, while Chinese players keep parallel collections on their own code-hosting and video platforms (Dyson Sphere Blueprints, n.d.; walle_k, n.d.; Bilibili Game Wiki, n.d.). *Death Stranding* builds sharing into the fiction itself. Through its Social Strand System, the ladders, bridges, shelters and roads that one player builds appear in other players' worlds, together with their signs, their lost cargo and the trails their feet have worn into the ground. The decisive question is whether a memory of construction records loss, that is, what building has cost and what has worn away, or only the procedure of building itself. I distinguish the two answers as the copy and the trace. Outside games, the distinction resembles that between design templates, which record how to build, and maintenance logs or the tacit knowledge of repair crews, which record what keeping things running has cost.

A blueprint is a copy, and what it records is how to build. Christopher Paul's account of theorycrafting describes the mechanism that shapes such memory. Player communities, working largely outside the game, reduce its open choices to a single best one, so that the desire to optimize creates "a lens through which what counts is only what can be counted" (Paul, 2011). *Dyson Sphere Program* invites this lens from its first production chain. Community repositories and guides compare throughputs and circulate designs rated by output per minute, and game updates can render older layouts obsolete. Assmann's distinction between functional and storage memory names what is lost in this process. Storage memory keeps what is unused, obsolete or superseded, a reserve of possibilities that were not taken up (Assmann, 2011: 127). Without traffic across the border between the two, she warns, memory becomes "fixed and made absolute" (Assmann, 2011: 130). A repository sorted by use is functional memory with that border closed, because it keeps only what is currently useful and lets everything else drop out of sight. Mark Fisher's remark on digital culture, "In conditions of digital recall, loss is itself lost" (Fisher, 2014: 2), was meant as a lament, but the blueprint repository turns it into a feature. A copy is lossless by definition. It reproduces its original exactly, anywhere and any number of times, and it records how something was built without recording what building it cost or what it wore away. This is the memory that the promise of progress requires. It keeps the past only as a means to the future, and in the suspended present that future is simply more of the same.

Death Stranding gives the present a different relation to its past, because its records are traces. What players build is exposed to weather from the moment it is placed. Timefall wears structures down until, if no one repairs them, they vanish, so that a player who returns to an area after some time finds, in Amy Green's phrase, "a new iteration of the landscape" (Green, 2021: 31). Cargo dropped in a river lies where it fell and slowly corrodes, and paths form where enough feet have passed, so that the shape of the land records the history of its crossings. Bartoloni and Bianchi have noted that what one player builds becomes a trace for the next player in "an endless chain" (Bartoloni and Bianchi, 2024: 26). This chain,

however, has more than human authors. Rain decides how long a bridge lasts, terrain decides where a trail can form, and the dead decide which routes are worth the risk. What a trail records is the wear of crossing, and the recording is itself a form of wear. This is the first condition of what I have called ecological memory: its medium is the same weather, terrain and decay that erase it. Ecological usage would stop here, since in ecology the legacies of a disturbance shape later processes whether or not anyone takes them up. The usage adopted here adds a further condition: a trace becomes memory only when others take it up. The reason lies in Craps's warning that memory conceived in strictly non-human terms risks becoming a mere metaphor (Craps, 2017: 485). Weather and terrain can write a trace, but the trace is remembered only when someone treats it as a past and acts on it. Uptake supplies the reader that lets non-human writing count as memory rather than as a figure of speech.

That last condition is decisive. The traces in *Death Stranding* become memory because strangers take them up. One player finds a lost package and carries it on; another adds materials to a half-built road or repairs a bridge that someone else placed and the rain has worn thin. Here Jackson's distinction between two worlds becomes useful. He asks whether our technology inhabits "the imaginary nineteenth-century world of progress and advance, novelty and invention, open frontiers and endless development," or "the twenty-first-century world of risk and uncertainty, growth and decay" (Jackson, 2014: 221). The blueprint belongs to the first. The repaired bridge belongs to the second, a world whose characteristic labour is repair. "Above all," he writes, "repair occupies and constitutes an aftermath," and in doing so it bridges past and future (Jackson, 2014: 223). In Assmann's terms, repair is the traffic across the border between storage and functional memory, carried out in practice: what has fallen out of use passes back into use through hands that did not put it there.

Jackson himself warns against nostalgia and heroism, since repair "is not always heroic or directed toward noble ends" (Jackson, 2014: 233), and the warning applies to the game. Every repaired bridge also extends the network that the first game finally exposes. The economy of likes through which players reward one another remains, as Schubert puts it, "an affective community, or rather economy" (Schubert, 2023: 304; see also May and Hall, 2024: 324–325). Likes, however, do not keep a structure standing; only repair does, by spending materials, time and attention on something that will decay again. A repaired bridge therefore carries a double record: the damage that the rain has done, and a stranger's response to it. Repair is the point at which loss becomes memory, and this double record is precisely what a blueprint cannot keep.

Three layers can now be distinguished within ecological memory (Table 2). The first layer is material: the eroded bridge, the corroding package and the trail worn into the ground. Its question is whether the record itself wears, and so records loss. The second layer is systemic. It consists of the rules by which the game and the platforms that host its records decide what persists, how quickly it decays and in whose world it appears. Its question is whether those rules also allow the record to be lost, and its importance lies in forgetting. Hoskins worries that our proliferating digital trails "may also serve to prevent healthy and necessary forgetting" (Hoskins, 2011: 26); in *Death Stranding* the rules of persistence

build forgetting in, since a structure that no one repairs eventually vanishes. The third layer is collective. Its question is whether others take the record up, by carrying or repairing what they find.

Table 2
The three layers of ecological memory

Layer	Question	Blueprint	Trace in *Death Stranding*
Material	Does the record itself wear?	No: a copy stays exactly as saved	Yes: rain and use wear it down
Systemic	Do the rules that preserve it also allow it to be lost?	Yes: updates and websites can remove it	Yes: unrepaired structures vanish
Collective	Do others take it up?	Yes: shared and reused	Yes: carried and repaired by strangers

The blueprint repository has the second and third layers but lacks the first. Its persistence is governed by rules that players do not set, namely the game updates that render old layouts obsolete and the websites that host and rank the files, and other players take its designs up; its records, however, do not wear. A blueprint can disappear, when an update renders its layout obsolete or the website that hosts it closes, but disappearance is not wear: the record is lost as a whole and keeps nothing of what was lost. Only the first layer turns loss into something a record keeps. Ecological memory, in the sense used here, arises only where all three meet: a material trace, preserved and eroded under rules that players do not control, and taken up by someone who did not leave it. Forgetting, in this context, is not the opposite of ecological memory but its condition. Only an infrastructure that can lose what it keeps can record that it was built inside an end.

Conclusion

This article has asked who bears the cost of circulation in three games about building infrastructure, and what their collective memories keep of it. All three implicate the infrastructure that the player builds in the threat it faces, and they differ in who bears its cost, as Table 1 summarizes. Read together, they show what the promise of infrastructure becomes when it is kept. Where the cost is displaced, fully in *Dyson Sphere Program* and as a pull of progression in *Death Stranding 2*, the promise yields not a future but a suspended present, in which production goes on, completion changes nothing and nothing wears on the one who builds. Only inhabitation keeps the player in the already-present, bearing in person the cost of an infrastructure implicated in the threat it was built against.

Read in this way, the debate over the value of *Death Stranding*'s ethic of connection need not end in a simple yes or no. None of the games escapes the strange loop with which this article began; what differs is whether the cost of keeping it going falls on anyone. Without the concept of the already-present of infrastructure, the erosion of what players build reads as a source of difficulty or as an aesthetic of ruin; with it, erosion becomes the way an infrastructure records the end inside which it was built.

Ecological memory names the way the already-present keeps its past. The blueprint, by contrast, is the memory of the suspended present: it keeps the past only as a means to a future that is more of the same. It meets the second and third conditions of Table 2 but fails the first, because a copy reproduces its original exactly and so cannot wear. The same criterion could be put to the data centres and orbital computing with which this article began, which keep records of their own. One could ask whether those records keep the wear that building has brought, or only how to build again. Answering that question would require empirical study of actual infrastructures, which lies beyond a reading of games.

The study has clear limits. Three games cannot carry a general account of how games imagine the cost of infrastructure. The reading of *Death Stranding 2* rests on its plot and on how its progression relieves the player of the carrying, and a study of how players actually use that relief might qualify the classification proposed here. Ecological memory, moreover, separates the *Death Stranding* series from *Dyson Sphere Program*; it does not separate the first game from its sequel, which keeps the same shared structures. Player paratexts show what a game becomes, but they do not reveal how players experience it, and empirical studies of repair in *Death Stranding* or of blueprint circulation in *Dyson Sphere Program* could well complicate the claims made here. Both forms of collective memory also depend on platforms and servers. The rain in *Death Stranding* erodes structures stored on an always-on network, and blueprint repositories last only as long as the websites that host them. Ecological memory in games is therefore never free of the archival infrastructure it seems to oppose, and this dependence deserves further study.

Jackson ends his essay on repair with a sentence that could stand over the whole comparison: “like every generation before, we live in the aftermath” (Jackson, 2014: 239). If this is so, the question that these games leave is not how to reach the future that infrastructure promises, but how to live in the present that the pursuit of that future has already shaped. An infrastructure that could live in this present would have to remember differently. It would have to remember not only how to build again, as a blueprint does, but also what building has cost, as a worn bridge does when a stranger stops to repair it.

Declarations

Competing interests

The author declares no competing interests.

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Ethical approval

Ethical approval was not required, as this study did not involve human participants or their data. It analyses commercially released video games and publicly available material, such as developer

announcements, press articles and public blueprint repositories, and no personal information about players was collected.

Informed consent

Informed consent was not required, as this study did not involve human participants.

Author Contribution

S.M. conceived the study, carried out the analysis and wrote the manuscript.

Data Availability

This study did not generate or analyse quantitative datasets. The materials analysed are the commercially available video games Dyson Sphere Program (PC, Steam), Death Stranding (PlayStation 4) and Death Stranding 2: On the Beach (PC, Steam), and publicly accessible published and web sources. The games are copyrighted commercial products and cannot be redistributed by the author, but they are available for purchase on the platforms listed. The games and versions analysed, the in-game materials cited and their locations in the games, and the web sources consulted are listed in the Supplementary Information; full bibliographic details are given in the references.

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Footnotes

1. The game has been in early access on Steam since January 2021; observations in this article refer to versions released after the “Rise of the Dark Fog” update of December 2023.
2. In the game’s fiction, porters are couriers who carry cargo on foot between isolated settlements. The chiral network is a communications network built on “chiral” matter associated with the world of the dead; once a settlement is connected, data move instantly, and structures can be produced on site with chiral printers (Kojima Productions, 2019).
3. “Post-apocalyptic” is used here, as in the game studies cited, for fiction set after a catastrophe that has destroyed the previous order of the world. *Dyson Sphere Program* is not post-apocalyptic in this sense, and it is not read as such here. “Posthuman” is used here descriptively, for the view that Hayles analyses, not for the version of the posthuman that she hopes for, one that “recognizes and celebrates finitude as a condition of human being” (Hayles, 1999: 5).
4. On the Kardashev scale, which classifies civilizations by the energy they command, a Type II civilization harnesses the entire energy output of its star.

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