FERRET

Realistic worlds that run in any browser

A 3D engine for games, scenes and simulations built on the laws of physics.



Screenshot: a level rendered by Ferret

What Ferret is

A 3D engine built on Babylon.js. Babylon draws the picture; Ferret adds everything a living world needs.

Layer	What it gives
Physics	Sixteen laws of nature, from gravity to fission
Gameplay	Characters, animation, AI, zones, triggers
Worlds	Levels, streaming, packages, an editor
People	Networking, avatars, shared state
Reach	Browsers, OS Beroun, VR headsets



Screenshot: a courtyard level in Ferret, filmic tone mapping and cascaded sun shadows

THE MAIN IDEA

The world is computed, not drawn.

Real units

Metres, kilograms, seconds, newtons, pascals, kelvins.

Repeatable

A fixed step: the same inputs always give the same result.

Where needed

Each law switches on for a world, a level, a zone or one object.

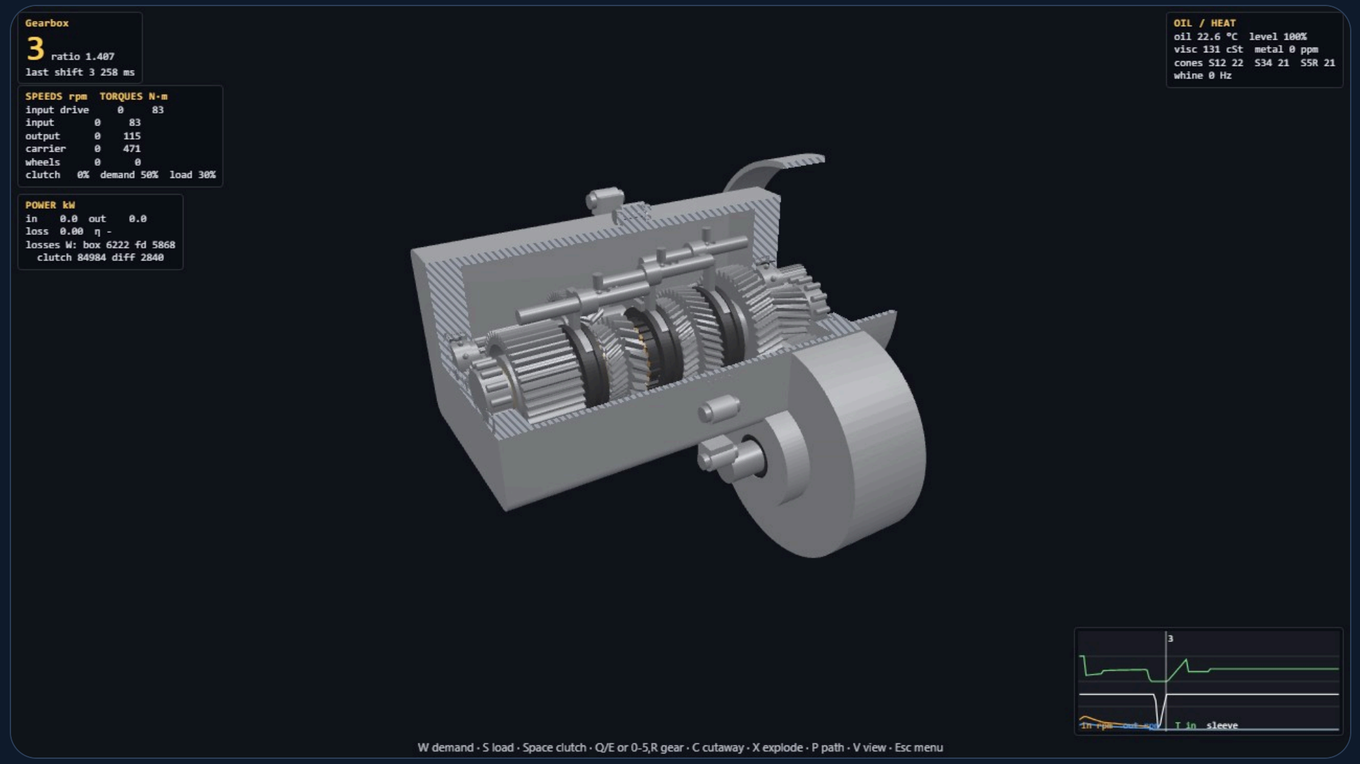
Sixteen laws of nature, each a separate module

Gravity	Air and water drag	Friction	Elastic collisions
Material strength	Stretching, ropes	Soil and digging	Explosions
Heat	Machines	Combustion, gas	Chemistry
Nuclear	Electricity	Ships, balloons	Liquids

Independent and composable: they meet in shared material data, not in each other’s code. Two rigid-body kernels sit underneath, and a project can add its own laws through the same interface.

MACHINES · A WORKING EXAMPLE

A five-speed gearbox from one file of numbers



141

solid parts, checked for clashes, meshing and ratios

Shafts, synchronisers, forks and oil move from the machine's state. Oil heats, cones wear, and a shift without the clutch is refused.

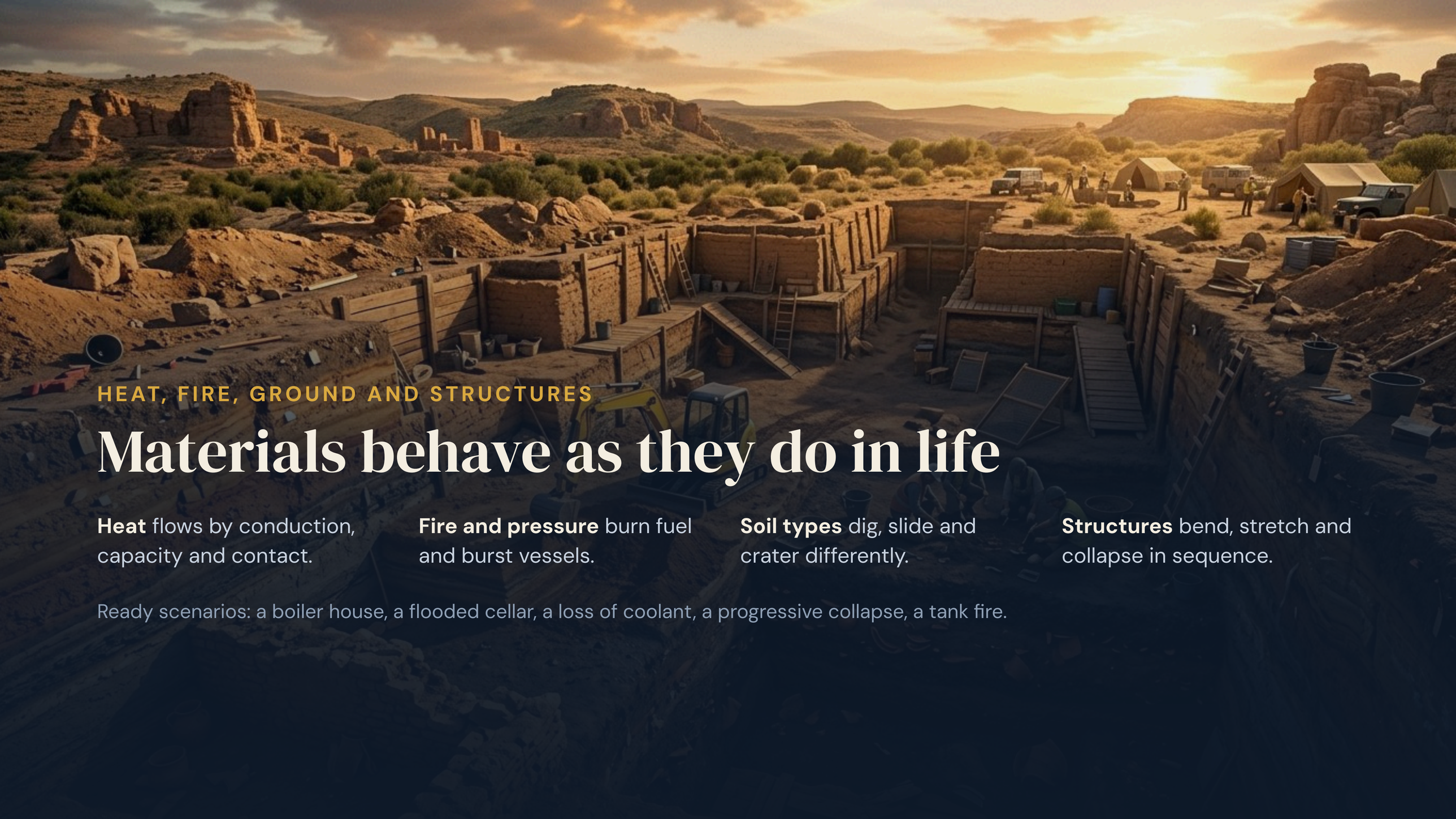
Screenshot: the gearbox bench in Ferret, cutaway view in 3rd gear

MOTION, WATER AND AIR

Forces, flows and vessels

- **Actuators:** forces and torques at chosen points, constant, periodic or by a curve
- **A motion language** for strokes that wait on conditions, like an oar entering water
- **One field of wind and currents** read by physics, ships and render
- **Vessels and liquids:** ships, submarines, balloons, flooding





HEAT, FIRE, GROUND AND STRUCTURES

Materials behave as they do in life

Heat flows by conduction, capacity and contact.

Fire and pressure burn fuel and burst vessels.

Soil types dig, slide and crater differently.

Structures bend, stretch and collapse in sequence.

Ready scenarios: a boiler house, a flooded cellar, a loss of coolant, a progressive collapse, a tank fire.



ELECTRICITY

Circuits that load the machines driving them

- Sources: batteries, generators, the grid
- Loads: lamps, heaters, motors
- Wires that heat up and fuses that blow
- A generator gets harder to turn with every lamp

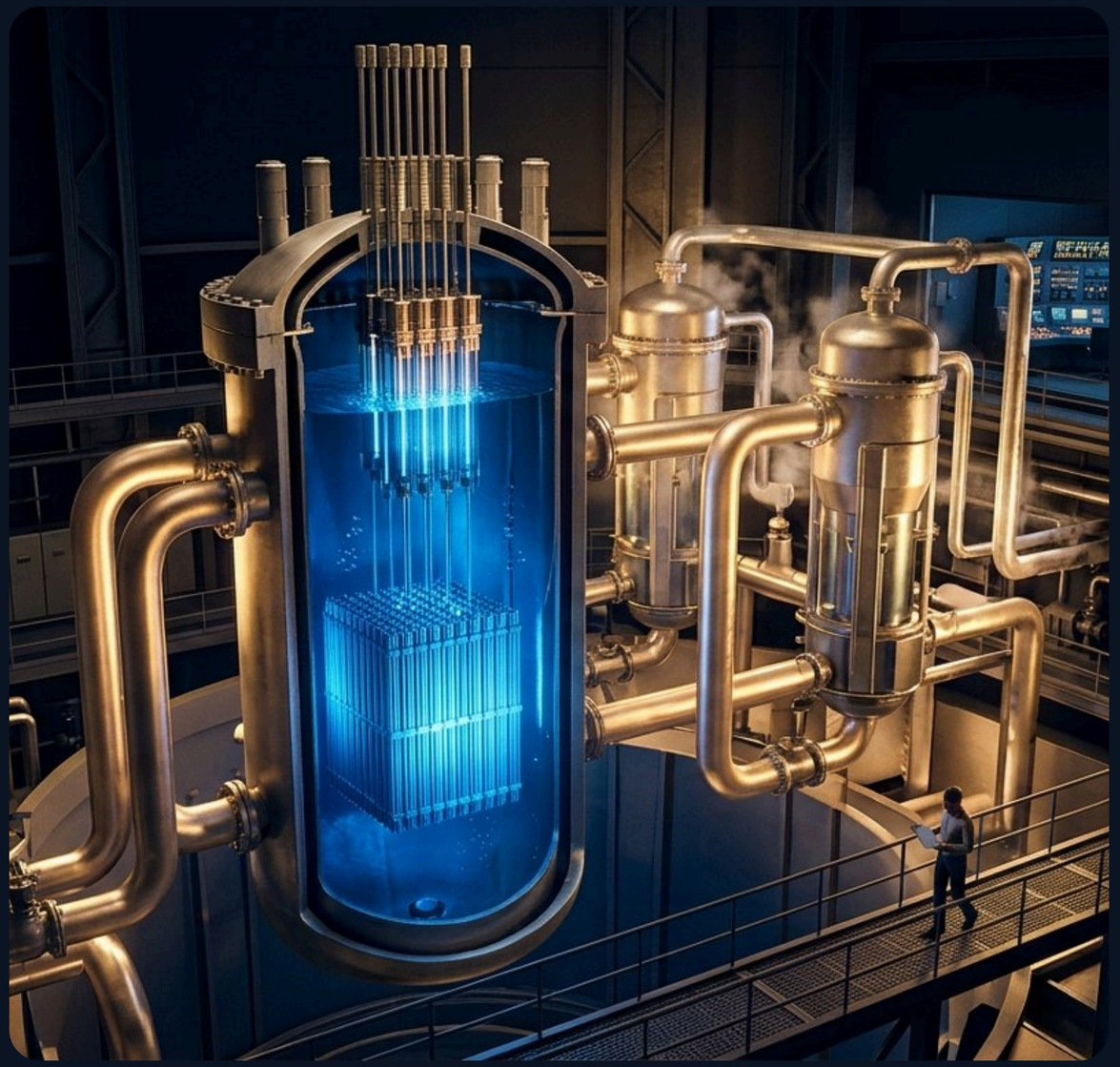
CHEMISTRY

Written the way a chemist writes it

$$CH_4 + 2\,O_2 \rightarrow CO_2 + 2\,H_2O$$

- The full periodic table and a standard library of substances
- Equations balanced and checked atom by atom
- Rates, reaction heat, pH, solubility
- Ignition and runaway thresholds per vessel





NUCLEAR PROCESSES

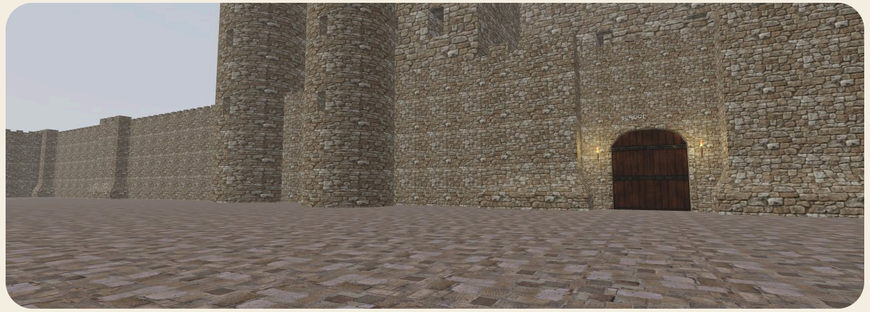
A reactor that can be started, held and scrammed

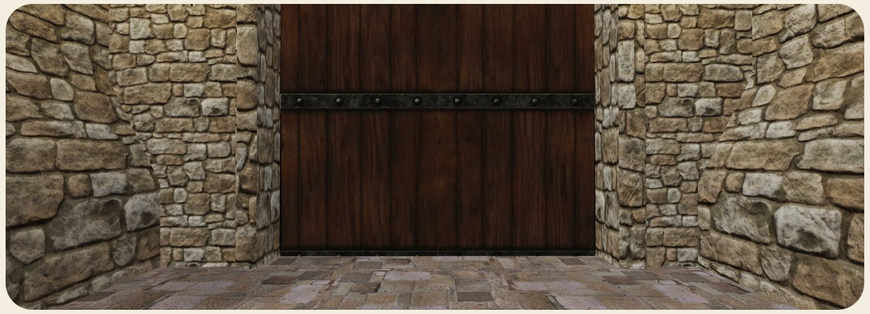
- Point kinetics with delayed neutrons
- Control rods, temperature feedback, xenon, decay heat
- Decay chains computed exactly at any time step
- Dose through real shielding: distance, half-value layers, time
- Critical masses, activation, fallout that decays and washes off

WORLDS FROM UNREAL ENGINE 5

Studio-made levels come over whole







Levels, characters, animations and animation blueprints pass through the export pipeline, with automatic checks that the look and behaviour match the original.

Screenshots: a castle level exported from Unreal Engine 5 and rendered by Ferret in a browser

AN INTERIOR, IMPORTED THE SAME WAY

A school hall with live web pages on its walls







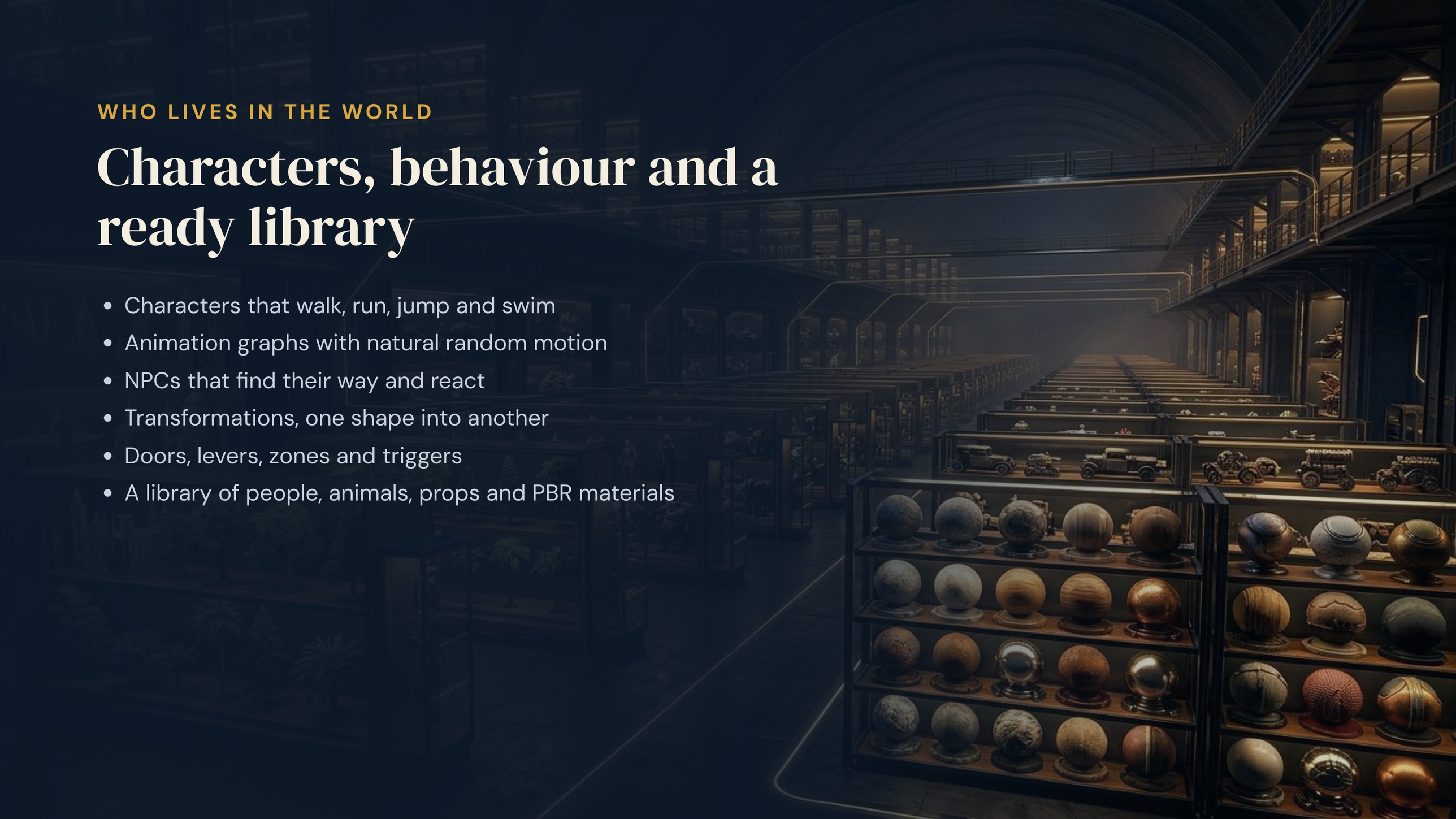
Doors lead to other levels, screens on the walls show real web pages, and visitors walk it together with their own avatars.

Screenshots: the school hall level running in Ferret

WHO LIVES IN THE WORLD

Characters, behaviour and a ready library

- Characters that walk, run, jump and swim
- Animation graphs with natural random motion
- NPCs that find their way and react
- Transformations, one shape into another
- Doors, levers, zones and triggers
- A library of people, animals, props and PBR materials



THE LEVEL EDITOR

Built by hand or by an AI engine, in one history

Every gesture is a command. A person and Caroline, the AI engine of OS Beroun, or Claude, share one undo history, one check and one save.

- Place, snap, array and retexture assets
- Live sun, sky and lamps; baked light for weak devices
- Switch on physics, place zones and behaviours



ACCESS

The browser is the widest door there is.

One build

The same world on every device, nothing to port.

Nothing to install

A link opens it; a cache keeps it offline.

Modest hardware

WebGL2 baseline, quality tiers, 640×480 to 4K.

From pocket consoles to VR headsets

Device	Runs in	Controls
Pocket consoles, TV boxes	OS Beroun	Sticks, buttons
Android phones, tablets	OS Beroun, browser	Touch, pad
Laptops, desktops	Any browser	Keyboard, mouse
iPhone, iPad	Safari	Touch sticks
Meta Quest, PC VR	WebXR browser	Hands, controllers



Projects bind actions, not keys: the engine maps every device to them, so one world serves them all.

AN UNORTHODOX PLATFORM

IntelliCat: the same worlds in a pocket

A low-cost console on OS Beroun with Caroline inside. The castle courtyard and the gearbox run on it unchanged, on a 640×480 screen with sticks and buttons.







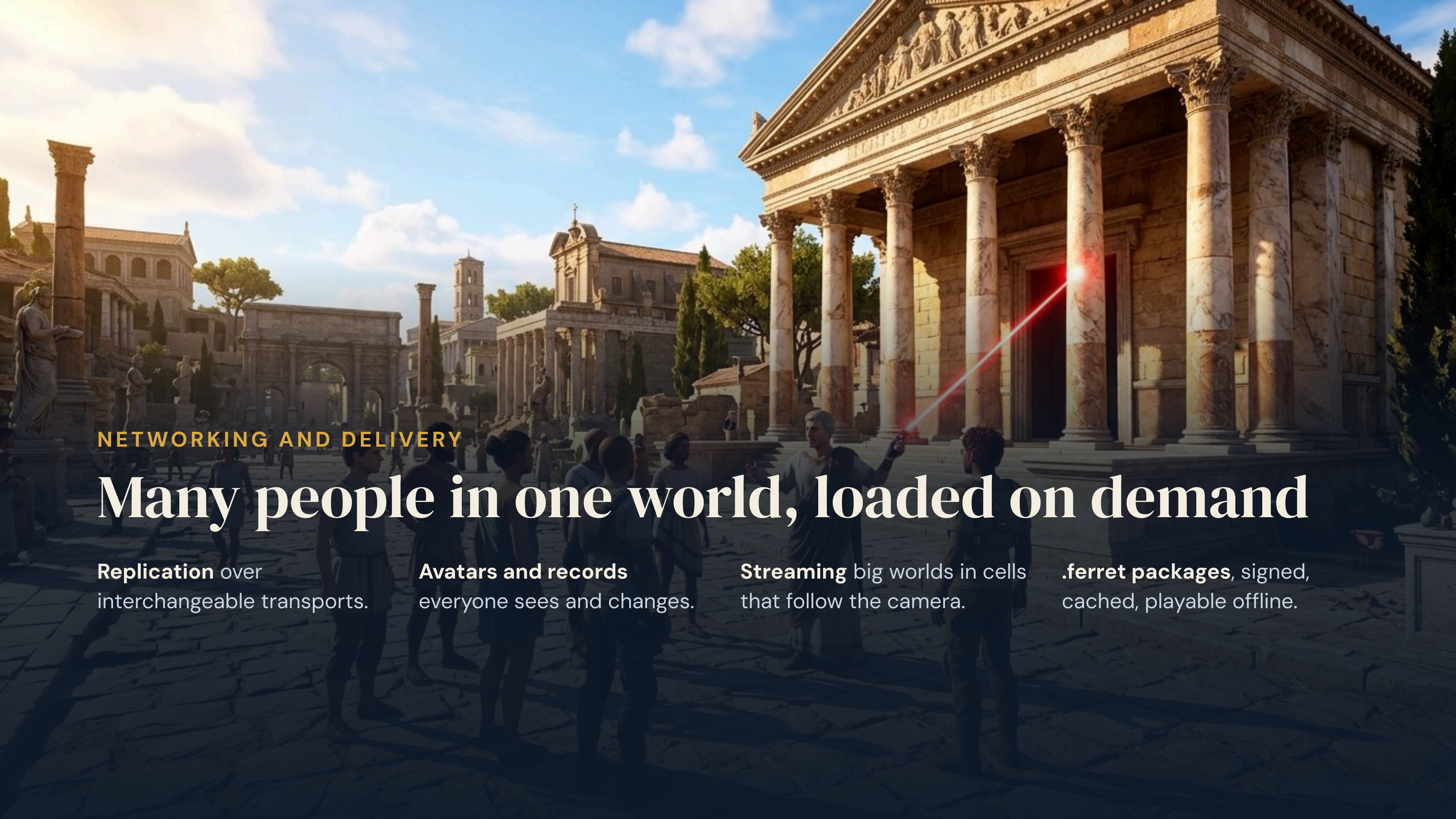
Screenshots: Ferret on the IntelliCat simulator, the console’s own 640×480 frames

VIRTUAL REALITY

The same world, around you

- WebXR in the headset’s browser: Meta Quest first, PC VR too
- The headset is the camera; hands and controllers are input
- Point at, touch and grab objects that obey physics
- Menus float in the world; comfort settings for movement
- Headsets and flat screens share one session





NETWORKING AND DELIVERY

Many people in one world, loaded on demand

Replication over interchangeable transports.

Avatars and records everyone sees and changes.

Streaming big worlds in cells that follow the camera.

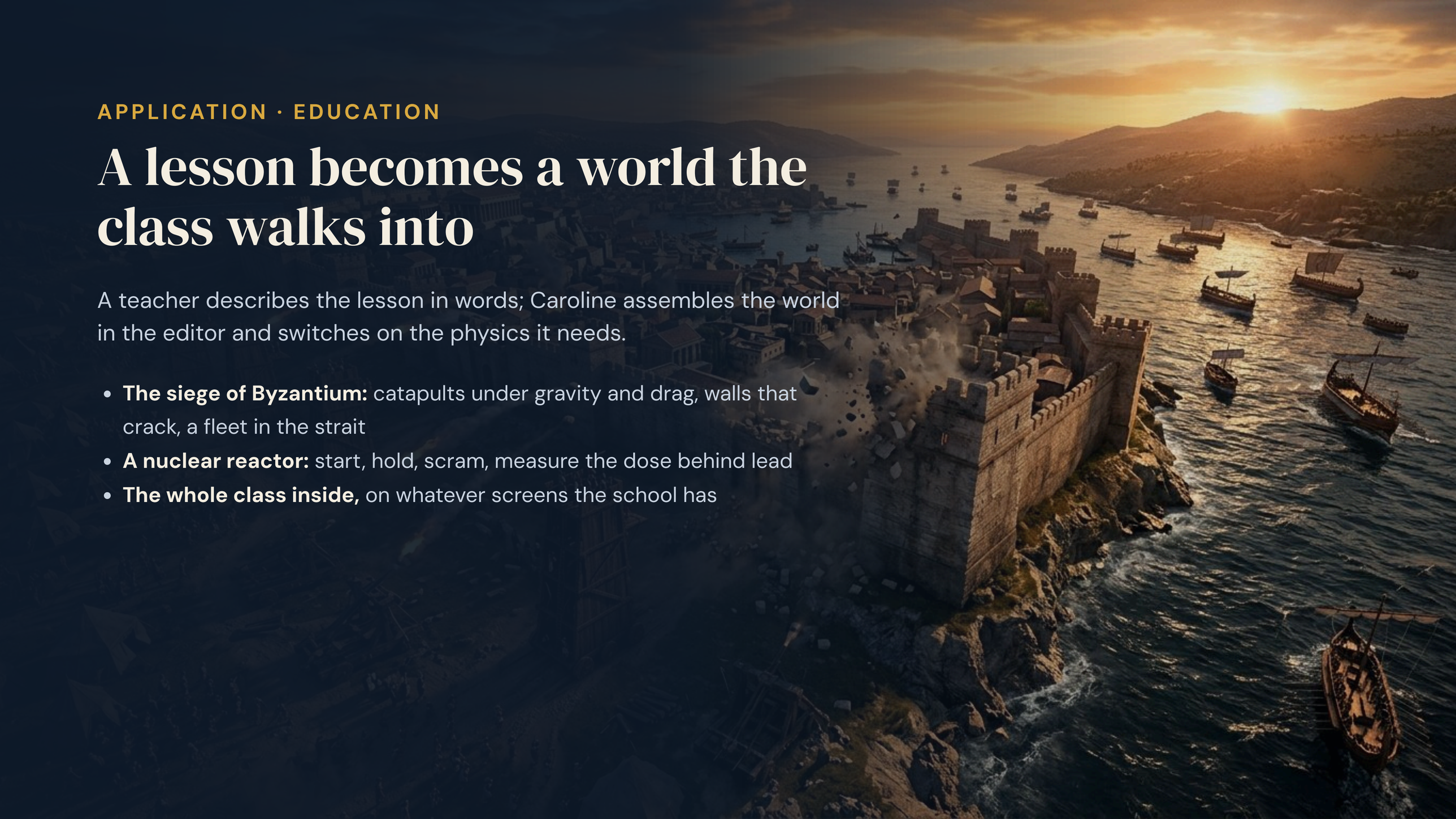
.ferret packages, signed, cached, playable offline.

APPLICATION · EDUCATION

A lesson becomes a world the class walks into

A teacher describes the lesson in words; Caroline assembles the world in the editor and switches on the physics it needs.

- **The siege of Byzantium:** catapults under gravity and drag, walls that crack, a fleet in the strait
- **A nuclear reactor:** start, hold, scram, measure the dose behind lead
- **The whole class inside,** on whatever screens the school has



Where realistic worlds are used

Field	Examples
Schools	History you stand inside, physics and chemistry you can try
Universities	Machines, reactors and structures taken apart and run
Training	Boiler houses, floods and fires practised without risk
Engineering	Drivetrains, circuits and vessels checked on a bench
Museums	Lost cities and sites rebuilt for visitors to walk
Games	Worlds where every effect has a physical cause



Real laws. Any screen.

Ferret: a 3D engine for realistic worlds, open under the MIT licence.

ferret3d.com/help