- started in 2012
- distributed team
- small core supported by external contractors
- focus on vertical slices

GUNHOUSE

XBOX ONE

Download on the App Store

Jump

PS4™

Download on Apple TV

PS VITA™

Google Play

PlayStation®Vita

NINTENDO SWITCH™

Get it from Microsoft

itch.io

Available at amazon

Humble Original

UBM
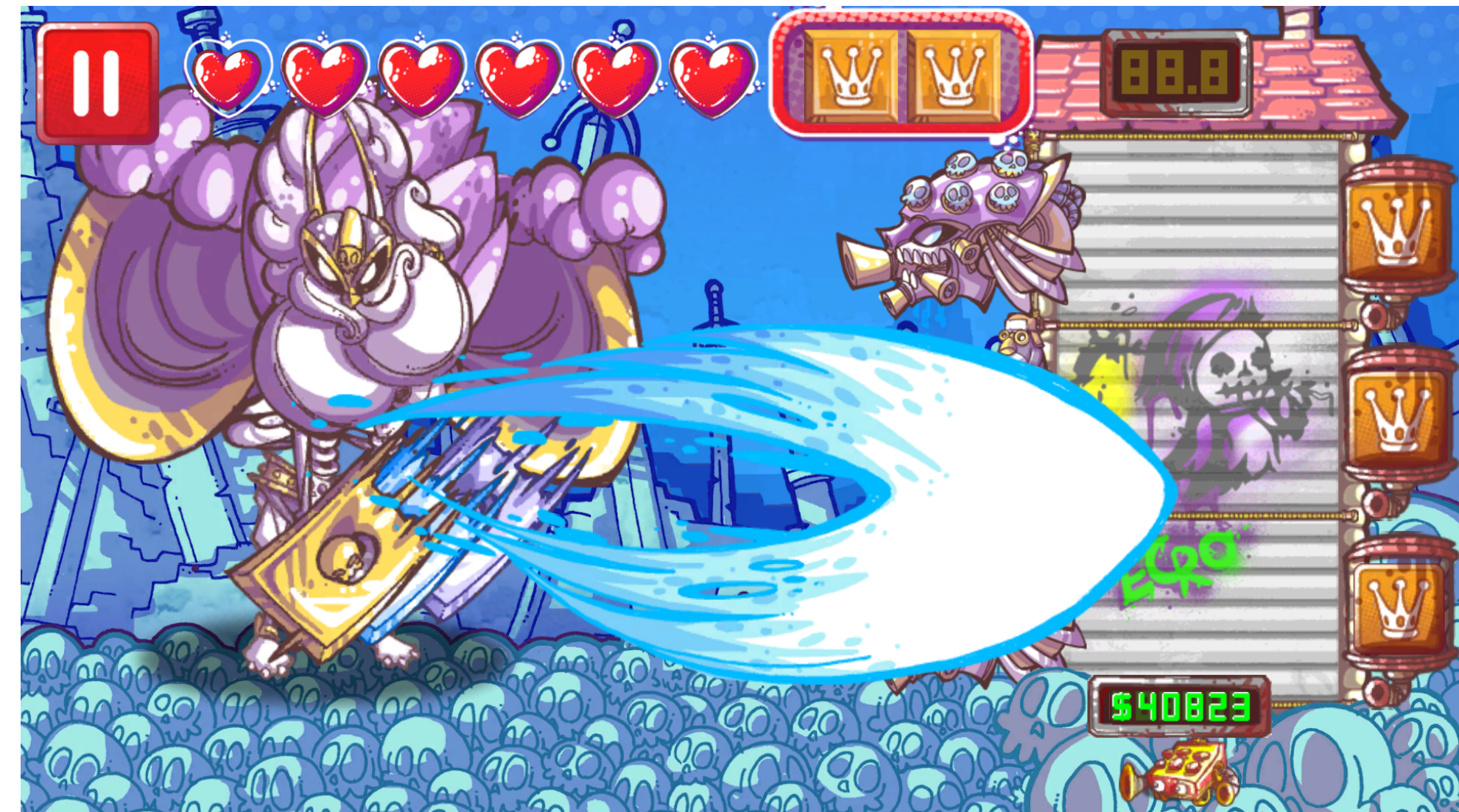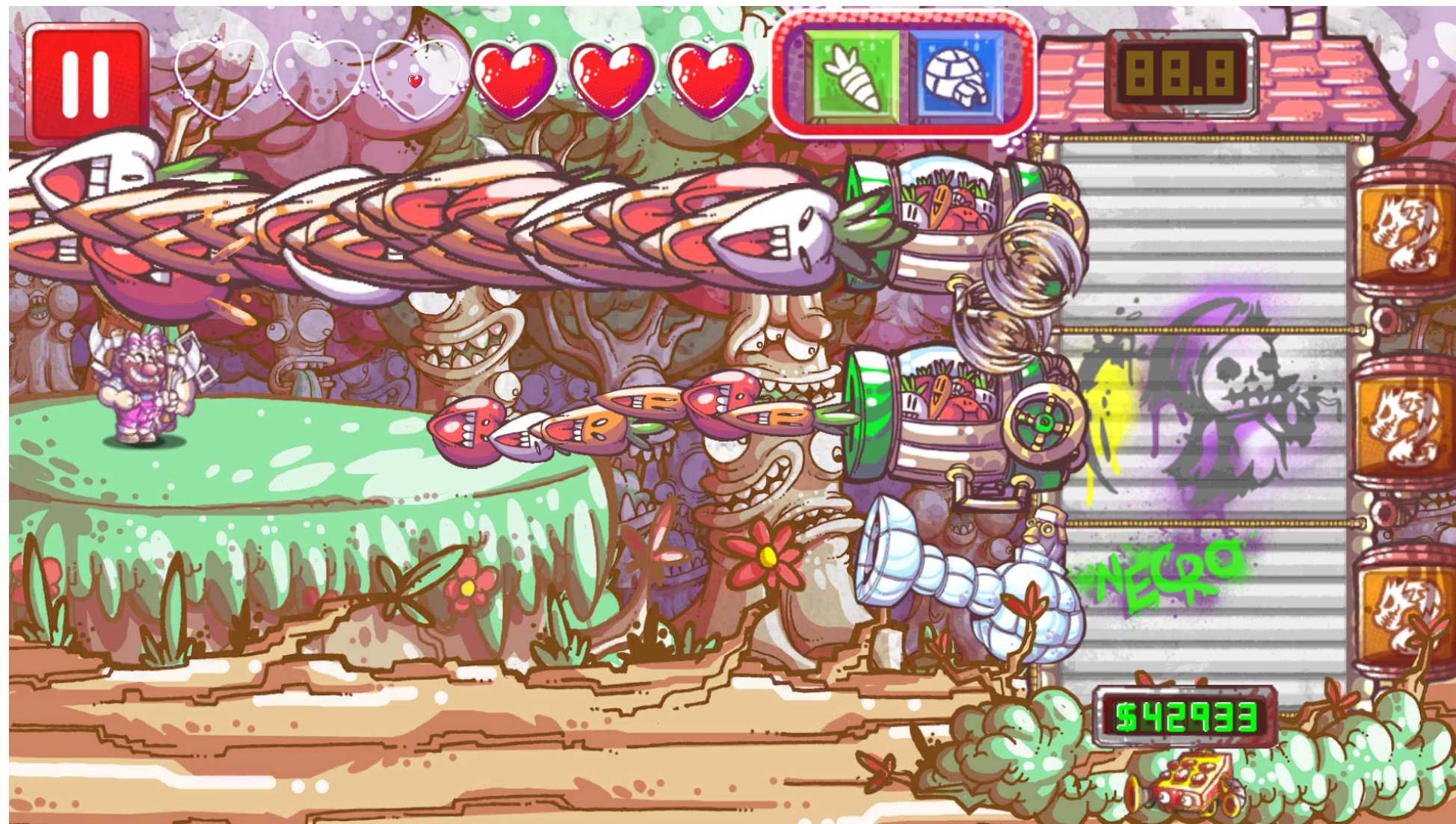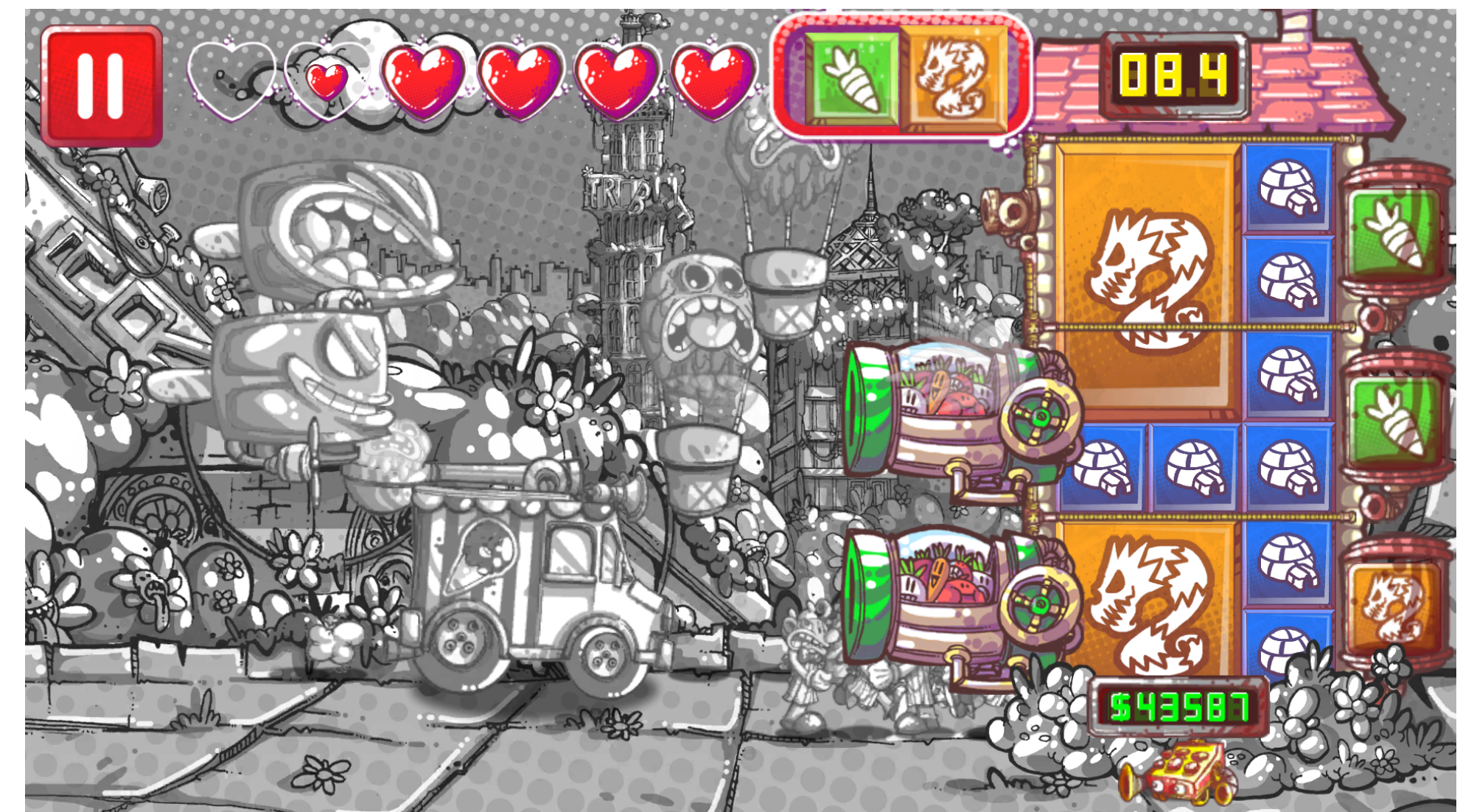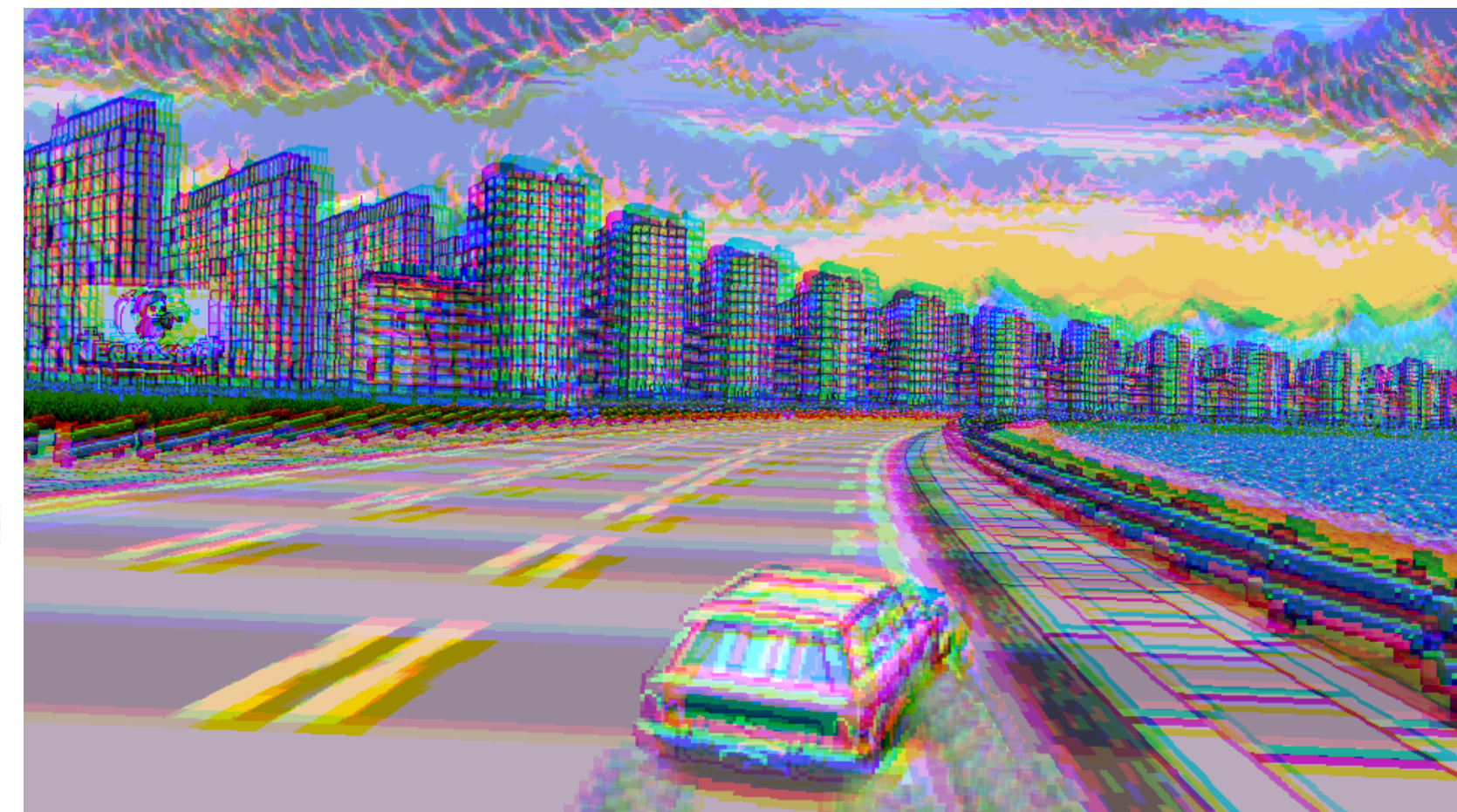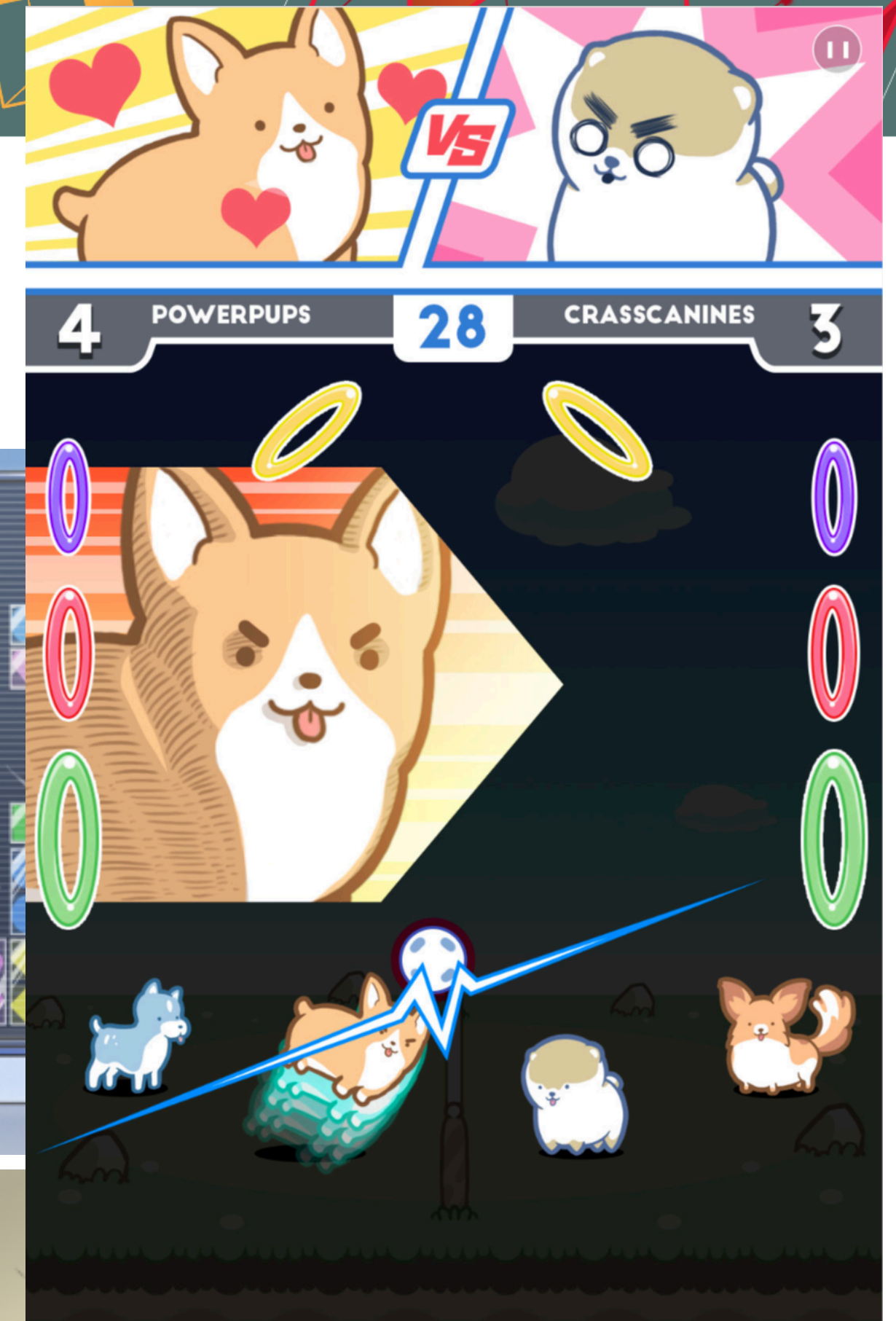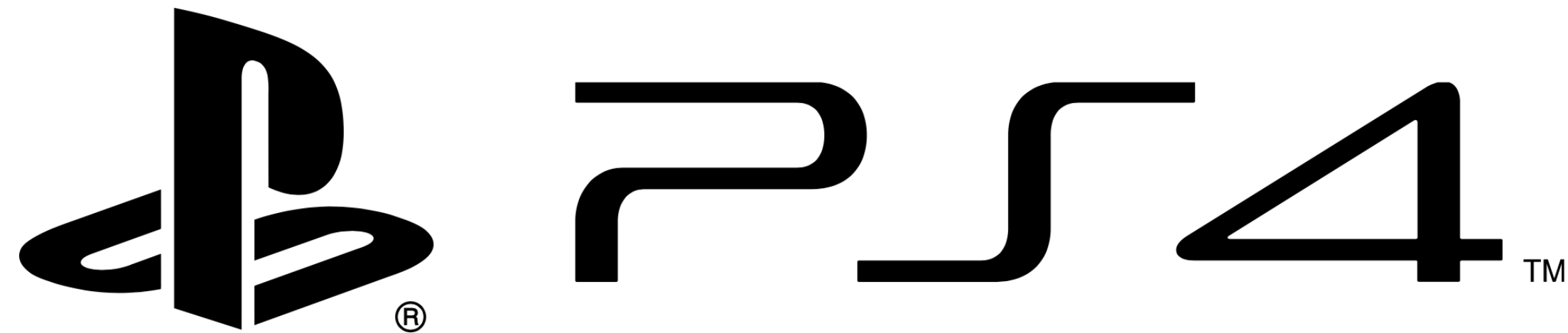
JUST USE UNITY/UNREAL/GAMEMAKER!!

- sure?! we use an engine too!

- we just don't want our writer/designer/??? to learn an entire engine to work on our game

- the first step to greatness is hateness

UBM
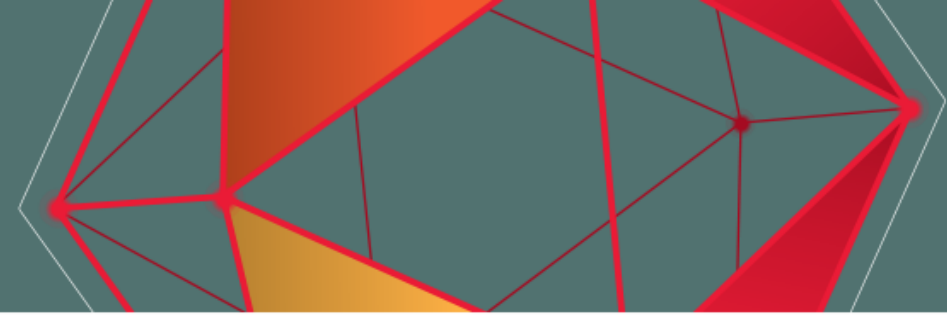
#TOOLBIAS

- the tool sets the limit on your vision
- you make the rules, the software shouldn't force you to compromise your vision
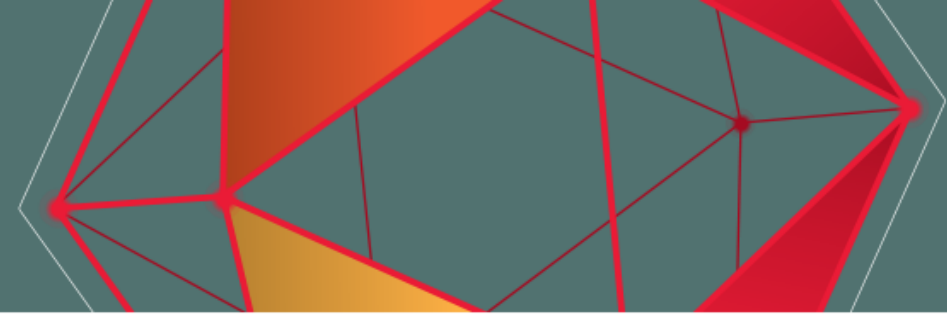
HOW YOU START [EXAMPLE]

- **problem**: we need to create levels in Oh, Deer!

- **requirement:** needs to work on multiple (niche) platforms

- **user**: designer needs to make levels, not the programmer

- **solution**: we need a tool!

THE ACTUAL PROBLEM

- what interface will best aid in solving this problem
- the programmers job is to understand the data.
- how much time and compromise can I afford?

GOOD: ERROR REDUCTION

- users shouldn't have to learn 80% of the features to know how to use 20%

- can't export or build a broken dataset

- don't have to search through your spreadsheet to find some piece of invalid json/xml
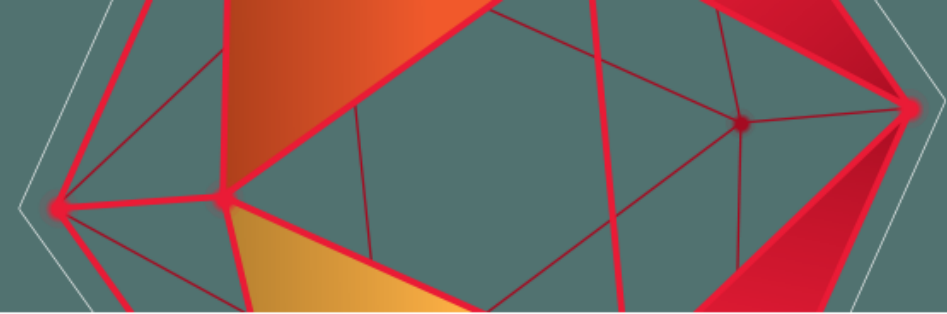
GOOD: SPECIFIC

• design for the problems you have today, not the ones you think you'll have tomorrow

• customise the tool to amplify your creativity

TARGET USER

- who is it for?
- what makes them happy?
- respect their time

API DESIGN

- entire topic within itself
- just be aware this is **extremely important**
- look at existing APIs (stb, imgui, tiny, sokol)
- talk by Casey https://youtu.be/ZQ5_u8Lgvyk

IMPORTANT TO US

- what's the least amount of work to finish the game.
- if you want your tool feature complete you're never going to ship a game.
- figure out what's important to you!

OH, DEER! SCRIPTING

- the designer needs to make tracks!
- our designer was willing to compromise and use a custom scripting tool
- create a limited editor and data format

[Oh, Deer! Script Editor] [road - FULL.sod]

New   Open   Save   Save As   ☑ Auto   EXPORT

```
 1  #
 2  #          SYSTEM
 3  #
 4  #
 5  #
 6  #
 7  #
 8  #
 9  SegmentLength          ( 250 )
10  SegmentDivide          ( 1 )
11  FieldOfView            ( 125 )
12  CameraHeight           ( 1000 )
13  DrawingDistance        ( 100 )
14                                          # min 0 - max 1000
15  MasterVolume           ( 0 )
16
17  #
18  #          BACKGROUNDS
19  #
20  #
21  #
22  #
23  #
24  #
25  Background ( Name       bg_1 X        1648 Y           0 W        400 H        224 RateX 0.025 Scroll  -60 Offset  -50 )
26  Background ( Name       bg_2 X        1648 Y         224 W        400 H        144 RateX  0.08 RateY    1 Offset  140 )
27  Background ( Name       bg_3 X        1648 Y         368 W        400 H         88 RateX   0.3 RateY  0.9 Offset  240 )
28
29  #                                  #
30  #        TILE ONE                  #
31  #                                  #
32  #                                  #
33  #                                  #
34  Background ( Name bg_neutral1_layer4 X 1648 Y       0 W    400 H      224 RateX 0.025 Scroll  -60 Offset  -50 )
35  Background ( Name bg_neutral1_layer3 X 1627 Y     274 W    421 H      152 RateX 0.06 RateY  0.6  Offset 140 )
36  Background ( Name bg_neutral1_layer2 X 1648 Y     386 W    400 H       79 RateX 0.01 RateY  0.6  Offset  40 )
37  Background ( Name bg_neutral1_layer1 X 1648 Y     455 W    400 H       68 RateX  0.2 RateY  0.9  Offset 220 )
38  #  ──────────────────────────────────                       #
39
40  #
```

[Oh, Deer! Script Editor] [road - FULL.sod]
New   Open   Save   Save As   ☐ Auto   EXPORT

```
 85
 86   SPRITES
 87
 88
 89
 90
 91
 92
 93
 94
 95         GENERIC
 96
 97
 98
 99   Sprite ( Name deer       X 1528 Y -128 W  49 H  46   Type Deer     CX   8 CY  0 CW  31 CH  25
100        Vert Anim 5 1.3
101        0 1000.1
102        1 100.1
103        2 100.1
104        3 100.1
105        4 100.1 )
106
107   Sprite ( Name deer_down X 1577 Y -128 W  50 H  47   Type DownDeer CX   8 CY  0 CW  31 CH  25
108        Vert Anim 5 1.3
109        0 1000.1
110        1 100.1
111        2 100.1
112        3 100.1
113        4 100.1 )
114
115   Sprite ( Name deer_up   X 1488 Y -128 W  40 H  42   Type UpDeer   CX   3 CY  0 CW  31 CH  25
116        Vert Anim 5 1.3
117        0 1000.1
118        1 100.1
119        2 100.1
120        3 100.1
121        4 100.1 )
122
123   Sprite ( Name blood              X 1507 Y 199 W  30 H  30   Type None     CX   0 CY  0 CW   0 CH
124        Anim 4 1
125        0 79 0
```

[Oh, Deer! Script Editor] [road - FULL.sod]
New   Open   Save   Save As

```
145
146
147         CAR
148
149
150
151   Sprite ( Name drift_smoke  X 1478 Y -128 W  10 H  10   Type None   CX
152   Sprite ( Name curve_sign   X 1414 Y -128 W  44 H  32   Type Solid  CX
153
154
155
156
157         MILE ONE
158
159
160
161
162   Sprite ( Name m1_billboard_1        X    0 Y   0 W  133 H 122   Type Solid
163   Sprite ( Name m1_billboard_2        X  133 Y   0 W  165 H  89   Type Solid
164   Sprite ( Name m1_billboard_3        X  298 Y   0 W  147 H  96   Type Solid
165   Sprite ( Name m1_building_1         X  245 Y 298 W  144 H 257   Type Solid
166   Sprite ( Name m1_building_2         X  675 Y 181 W  176 H 416   Type Solid
167   Sprite ( Name m1_building_3         X  851 Y 180 W  391 H 427   Type Solid
168   Sprite ( Name m1_cliff_1            X  445 Y   0 W  245 H 181   Type Solid
169   Sprite ( Name m1_cliff_2            X    0 Y 329 W  245 H 179   Type Solid
170   Sprite ( Name m1_cliff_pattern      X 1268 Y 525 W  780 H 181   Type Solid
171   Sprite ( Name m1_eletric_post_1     X  389 Y 340 W   56 H 167   Type Solid
172   Sprite ( Name m1_eletric_post_2     X  445 Y 340 W   56 H 167   Type Solid
173   Sprite ( Name m1_flower_field_1     X    0 Y 745 W 2025 H  12   Type None
174   Sprite ( Name m1_flower_field_2     X    0 Y 757 W 2025 H  11   Type None
175   Sprite ( Name m1_mile_marker        X  453 Y 507 W   48 H 116   Type Solid
176   Sprite ( Name m1_picked_fence_big   X  780 Y 706 W 1268 H  39   Type Solid
177   Sprite ( Name m1_picked_fence_small X  375 Y 188 W  188 H  39   Type Solid
178   Sprite ( Name m1_rail               X  133 Y  89 W   41 H  28   Type Solid
179   Sprite ( Name m1_rock_1             X  690 Y 105 W   40 H  36   Type Solid
180   Sprite ( Name m1_rock_2             X  690 Y  63 W   73 H  42   Type Solid
181   Sprite ( Name m1_rock_3             X  375 Y  96 W   64 H  45   Type Solid
182   Sprite ( Name m1_rock_4             X  389 Y 296 W  104 H  44   Type Solid
183   Sprite ( Name m1_rock_5             X  690 Y   0 W   74 H  63   Type Solid
184   Sprite ( Name m1_shrub_1            X  174 Y  89 W   39 H  29   Type Solid
185   Sprite ( Name m1_shrub_2            X  375 Y 150 W   43 H  34   Type Solid
```

[Oh, Deer! Script Editor] [road - FULL.sod]

New   Open   Save   Save As   ☐ Auto   EXPORT   #

```
538  #
539  #          MILE ONE
540  #
541  #
542  #
543  BeginMile ( mile1 )
544      BackgroundAdd ( bg_neutral1_layer4 )
545      BackgroundAdd ( bg_neutral1_layer2 )
546      BackgroundAdd ( bg_neutral1_layer3 )
547      BackgroundAdd ( bg_neutral1_layer1 )
548
549      StartPoint ( 10 )
550      SpriteAdd ( Name m1_rail At 10 X 480 Y 0 Each 1 For 790 )
551      SpriteAdd ( Name m1_rail Flip At 10 X -480 Y 0 Each 1 For 601 )
552      SpriteAdd ( Name m1_mile_marker At 20 X 360 Each 5 For 15 )
553      SpriteAdd ( Name m1_tribune At 15 X -1100 Each 5 For 10 )
554      SpriteAdd ( Name m1_building_1 At 65 X -1050 Each 5 For 30 )
555      SpriteAdd ( Name m1_shrub_4 At 57 X -900 Each 10 For 15 )
556      SpriteAdd ( Name m1_shrub_4 At 57 X -1300 Each 10 For 15 )
557      SpriteAdd ( Name m1_shrub_4 At 57 X -1700 Each 10 For 15 )
558      SpriteAdd ( Name m1_building_2 At 18 X -1850 Each 5 For 40 )
559      SpriteAdd ( Name m1_building_2 At 21 X -1850 Each 5 For 40 )
560      SpriteAdd ( Name m1_building_3 At 70 X 1250 Each 7 For 31 )
561      SpriteAdd ( Name m1_billboard_1 At 15 X 950 Each 5 For 11 )
562      SpriteAdd ( Name m1_billboard_2 At 17 X 1400 Each 5 For 12 )
563      SpriteAdd ( Name m1_building_2 At 21 X 2350 Each 5 For 80 )
564      SpriteAdd ( Name m1_building_1 At 15 X 1850 Each 5 For 20 )
565      SpriteAdd ( Name m1_start_point At 20 X 0 )
566      Straight ( Hold 80 Y 0 )
567      CurveRight ( Enter 50 Leave 10 Angle 45 Y -10 )
568      CurveLeft ( Enter 50 Leave 20 Angle 45 Y -10 )
569      SpriteAdd ( Name m1_billboard_3 At 5 X -950 Each 5 For 11 )
570      SpriteAdd ( Name m1_building_2 At 0 X -2000 Each 5 For 40 )
571      SpriteAdd ( Name m1_building_2 At 0 X -2000 Each 5 For 40 )
572      SpriteAdd ( Name m1_shrub_3 At 61 X -900 Each 7 For 48 )
573      SpriteAdd ( Name m1_building_3 Flip At 57 X -1250 Each 7 For 49 )
574      SpriteAdd ( Name m1_tribune At 7 X -1350 Each 5 For 10 )
575      CurveLeft ( Enter 10 Hold 50 Leave 10 Angle 30 Y 0 )
576      SpriteAdd ( Name m1_building_1 At 8 X 950 Each 5 For 26 )
577      SpriteAdd ( Name m1_building_2 At 7 X 1250 Each 5 For 26 )
578      Straight ( Hold 30 Y -5 )
```

UBM

[Oh, Deer! Script Editor] [road - FULL.sod]

New   Open   Save   Save As

```
442  #    _____    #
443  #                                                       #
444  #    ┌───────────────────────────────────────────┐     #
445  #    │                                             │     #
446  #    │  (___ \ /\ (_____ _____)_\|___\   │  │     #
447  #    │   ___) )    (_   _    (_)   )) | | | \\  │     #
448  #    │  (___/ /\ \|  | (   | (_ )  (| | | \\   │     #
449  #    │  | |   | |__| |  |__| (    (  | | |__))  │     #
450  #    │  |_|   |____|\___)\____)____)  |_|_| |_(___/  │   #
451  #    └───────────────────────────────────────────┘     #
452  #
453  #BeginPattern(deer_triforce)
454  #    SpriteAdd(Name normal_deer  At 0 X    0         SpdZ 600 )
455  #    SpriteAdd(Name normal_deer  At 1 X   50 SpdX  6 SpdZ 300 )
456  #    SpriteAdd(Name normal_deer  At 1 X  -50 SpdX -6 SpdZ 300 )
457  #    SpriteAdd(Name normal_deer  At 2 X    0         SpdZ 630 )
458  #    SpriteAdd(Name normal_deer  At 2 X  100 SpdX  4 SpdZ 400 )
459  #    SpriteAdd(Name normal_deer  At 2 X -100 SpdX -4 SpdZ 400 )
460  #EndPattern()
461  #
462  #BeginPattern ( diag_line_deers )
463  #    SpriteAdd ( Name normal_deer At 0 X -315 )
464  #    SpriteAdd ( Name normal_deer At 1 X -245 )
465  #    SpriteAdd ( Name normal_deer At 2 X -175 )
466  #    SpriteAdd ( Name normal_deer At 3 X -105 )
467  #    SpriteAdd ( Name normal_deer At 4 X  -35 )
468  #    SpriteAdd ( Name normal_deer At 5 X   35 )
469  #    SpriteAdd ( Name normal_deer At 6 X  105 )
470  #    SpriteAdd ( Name normal_deer At 7 X  175 )
471  #    SpriteAdd ( Name normal_deer At 8 X  245 )
472  #    SpriteAdd ( Name normal_deer At 9 X  315 )
473  #EndPattern ()
474  #
475  #BeginPattern ( dark_line_left)
476  #    SpriteAdd ( Name dark_deer At 0 X -200 )
477  #    SpriteAdd ( Name dark_deer At 0 X -150 )
478  #    SpriteAdd ( Name dark_deer At 0 X -100 )
479  #    SpriteAdd ( Name dark_deer At 0 X -50 )
480  #    SpriteAdd ( Name dark_deer At 0 X -0 )
481  #    SpriteAdd ( Name dark_deer At 0 X 50 )
482  #    SpriteAdd ( Name dark_deer At 0 X 100 )
```

```csharp
public static Script GetTrackData()
{
    Script script = new Script(10, 250f, 1, 125f, 1000f, 100, 256f, 4, 0f);

    GetSpriteInfo(script);

    script.backgrounds.Add(new Background(1648f, 0f, 400f, 224f, 0.025f, 0f, -50f, -60f));
    /* ...... */

    script.patterns.Add(new List <SpriteAdd> () { /* ...... */ });

    script.settings.Add(new Setting("Dark", 0, 5));
    script.settings.Add(new Setting("Neutral", 5, 10));
    script.settings.Add(new Setting("Light", 10, 15));

    script.entries.Add(new ScriptEntry(Entry.Mile, 1));
    /* ...... */

    GetMile(1, script);
    GetMile(2, script);
    /* ...... */

    return script;
}
```

```c
SCRIPT road_script =
{
    0, 16, 250.f, 1, 115.f, 1000.f, 100, 256.f, 4, 235,
    &script_sprites[0], 20, &script_backgrounds[0], 13,
    &script_pattern_bill_count[0], &script_patterns[0],
    3, &script_settings[0], 15, &script_entries[0], 6,
    &script_miles[0], 0, NULL, 0, NULL
};

INIT_BACKGROUND script_backgrounds[20] =
{
    { 1648.0f, 0.0f, 400.0f, 224.0f, 0.1f, 0.0f, 50.0f, -50.0f },
    { 1627.0f, 224.0f, 421.0f, 152.0f, 0.2f, 1.1f, 20.0f, 0.0f },
    { 1648.0f, 455.0f, 400.0f, 68.0f, 0.5f, 1.5f, 40.0f, 0.0f },
    { 1648.0f, 376.0f, 400.0f, 79.0f, 0.01f, 1.2f, 0.0f, 0.0f },
    /* ...... */
};

ENTRY_SETTING script_settings[3] = {
    { "Dark", 0, 5 }, { "Neutral", 5, 10 }, { "Light", 10, 15 } };

ENTRY_BILLBOARD script_pattern_v_deer[3] =
{
    { 0, 2, 70.f, 0.0f, 0, 0, 0.0f, 0.0f, 0.0f, 0.0f,
      0.0f, 0.0f, 0.0f, 0.0f, 0.0f, FALSE, FALSE, TRUE },
    { 0, 1, 0.0f, 0.0f, 0, 0, 0.0f, 0.0f, 0.0f, 0.0f,
      0.0f, 0.0f, 0.0f, 0.0f, 0.0f, FALSE, FALSE, TRUE },
    { 0, 2, -70.f, 0.0f, 0, 0, 0.0f, 0.0f, 0.0f, 0.0f,
      0.0f, 0.0f, 0.0f, 0.0f, 0.0f, FALSE, FALSE, TRUE }
};
/* ...... */

INIT_MILE script_miles[6] =
{
    { "track_id", 129, &script_mile_entries[0],
      30, &script_mile_road_entries[0], 95,
      &script_mile_bill_entries[0], 0, NULL, 4,
      &script_mile_backgrounds[0], &survival_chunk_entries,
      &survival_entries, &sroad_entries, &billboard_entries,
      &pattern_entries },
    /* ...... */
}
```

UBM

```csharp
static void GetSprite(Script script)
{
    script.sprites.Add(new Sprite("deer", 1528f, -128f, 49f, 46f, 1f,
                        COLLISION_TYPE.DEER, 8f, 0f, 31f, 25f, true, true, /* frame data */ ));
    script.sprites.Add(new Sprite("m1_tree_1", 287f, 122f, 88f, 128f, 1f,
                        COLLISION_TYPE.SOLID, 0f, 0f, 10f, 10f, false, false));
    script.sprites.Add(new Sprite("m1_tribune", 501f, 227f, 174f, 481f, 1f,
                        COLLISION_TYPE.SOLID, 0f, 0f, 154f, 100f, false, false))
    script.sprites.Add(new Sprite("m1_sea_pattern", 764f, 0f, 616f, 20f, 1f,
                        COLLISION_TYPE.NONE, 0f, 0f, 0f, 0f, true, true, /* fram
    script.sprites.Add(new Sprite("m1_sea_tip", 764f, 60f, 427f, 20f, 1f,
                        COLLISION_TYPE.NONE, 0f, 0f, 0f, 0f, true, true, /* fram
    script.sprites.Add(new Sprite("m2_waterfall", 664f, 0f, 152f, 219f, 1f,
                        COLLISION_TYPE.SOLID, -16f, 0f, 120f, 250f, true, false,
    script.sprites.Add(new Sprite("m2_overhang_side", 1070f, 219f, 137f, 213f, 1f,
                        COLLISION_TYPE.SOLID, 30f, 0f, 77f, 250f, false, false))
    script.sprites.Add(new Sprite("m2_overhang_top", 761f, 219f, 309f, 113f, 1f,
                        COLLISION_TYPE.NONE, 0f, 0f, 0f, 0f, false, false));
    script.sprites.Add(new Sprite("m2_overhang_water", 512f, 219f, 83f, 165f, 1f,
                        COLLISION_TYPE.NONE, 0f, 0f, 0f, 0f, true, false, /* fra
}
```

```c
FRAME script_sprite_deer_animation_0[5] = {
    { 0, 1000.1000f }, { 1, 100.1000f },
    { 2, 100.1000f }, { 3, 100.1000f },
    { 4, 100.1000f } };
u32 script_sprite_deer_frames_count[1] =  { 5 };
FRAME* script_sprite_deer_animations[1] = { script_sprite_deer_animation_0 };
float script_sprite_deer_timings[1] = { 1.3000f };

INIT_SPRITE script_sprites[235] =
{
    { "deer", 1528.00f, -0128.00f, 0049.00f, 0046.00f, 0001.00f,
      COLLISION_TYPE_DEER, 0008.00f, 0000.00f, 0031.00f, 0025.00f,
      TRUE, TRUE, 1, &script_sprite_deer_frames_count[0],
      &script_sprite_deer_animations[0], &script_sprite_deer_timings[0] },
    { "m1_building_1", 0245.00f, 0298.00f, 0144.00f, 0257.00f, 0001.00f,
      COLLISION_TYPE_SOLID, 0000.00f, 0000.00f, 0140.00f, 0119.00f,
      FALSE, FALSE, 0, NULL, NULL, NULL },
    /* ...... */
};
```
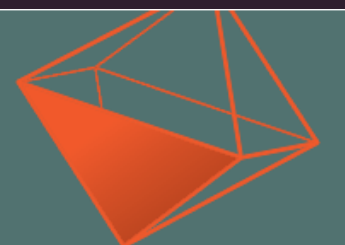
```csharp
static void GetMile(int trackIndex, Script script)
{
    script.miles.Add(new Mile(trackIndex,
        new List <ScriptEntry> () {
            new ScriptEntry(Entry.Sprite, 0),
            /* ...... */
            new ScriptEntry(Entry.Sprite, 15),
            new ScriptEntry(Entry.Road, 0),
            new ScriptEntry(Entry.Ground, 2),
        },
        new List <Road> () {
            new Road(10, 50, 10, 30f, 0f),
            /* ...... */
        },
        new List <SpriteAdd> () {
            new SpriteAdd(37, 10, 480f, 0f, 1, 790,
                          0f, 0f, 0f, 0f, 0f, 0f, 0f, 0f, 0f,
                          false, false, true),
            new SpriteAdd(34, 20, 360f, 0f, 5, 15,
                          0f, 0f, 0f, 0f, 0f, 0f, 0f, 0f, 0f,
                          false, false, true),
            /* ...... */
        },
        new List <SpritePattern> () { /* ...... */ })
    );
}
```

```c
ENTRY script_miles_mile1_entries[129] =
{
    { SPRITE_ENTRY, 11 }, { SPRITE_ENTRY, 13 },
    { ROAD_ENTRY, 0 }, { ROAD_ENTRY, 1 },
    { ROAD_ENTRY, 2 }, { SPRITE_ENTRY, 16 },
    /* ...... */
};

ENTRY_ROAD script_miles_mile1_road_entries[30] =
{
    { 0, 80, 0, 0.0f, 0.0f }, { 50, 0, 10, -45.f, -10.f },
    { 50, 0, 20, 45.f, -10.f }, { 10, 50, 10, 30.f, 0.0f },
    /* ...... */
};

ENTRY_BILLBOARD script_miles_mile1_bill_entries[95] =
{
    {  37, 10, 480.f, 0.0f, 1, 790, 0.0f, 0.0f, 0.0f,
       0.0f, 0.0f, 0.0f, 0.0f, 0.0f, 0.0f, FALSE, FALSE, TRUE },
    {  37, 10, -480.f, 0.0f, 1, 601, 0.0f, 0.0f, 0.0f,
       0.0f, 0.0f, 0.0f, 0.0f, 0.0f, 0.0f, FALSE, TRUE, TRUE },
    /* ...... */
};

u32 script_miles_mile2_neutral_backgrounds[4] = { 4, 7, 5, 6 };
```
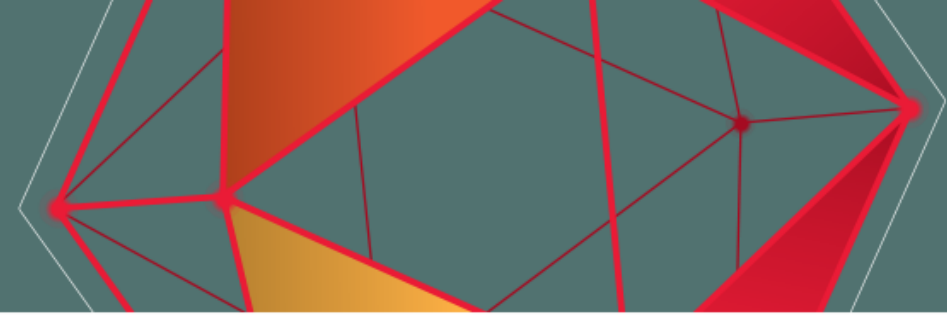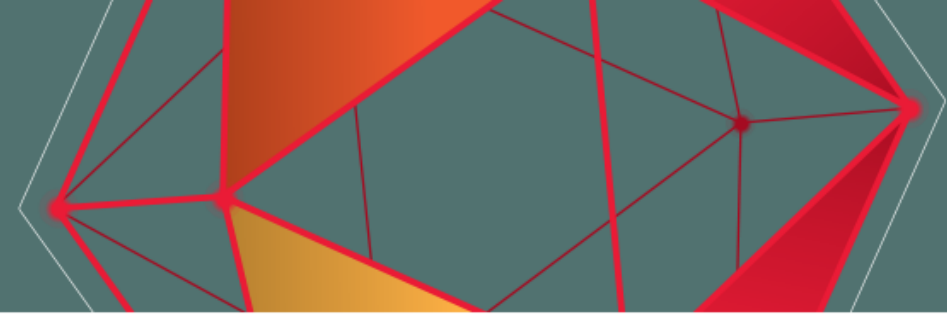
GOOD: OH, DEER! SCRIPTING

- data format can be translated into any language
- hot reloading
- no slow deserialization at runtime.
- tight set of valid keywords to know

BAD: OH, DEER! SCRIPTING

- the terrain should have been tied to the road
- it was hard to keep the layout of a level in your head
- it was difficult to insert patterns later in the process
- designer didn't understand how to make patterns

OH, DEER! LESSONS

- we should have thought more about the data

- the API and scripting format should have been documented

- a basic visual editor would have made the game better

ANOTHER EXAMPLE

- **problem**: we need to create skeletal animations in Gunhouse

- **requirement:** needs to work on playstation mobile

- **user**: artist doesn't know how to code

- **solution**: we need a tool!

GOOD: GUNHOUSE

- artist can now use spriter, a specific tool for their task

- programmer can now work with known data, the spriter format

HONK: GUNHOUSE

- things change!
- playstation mobile shuts down
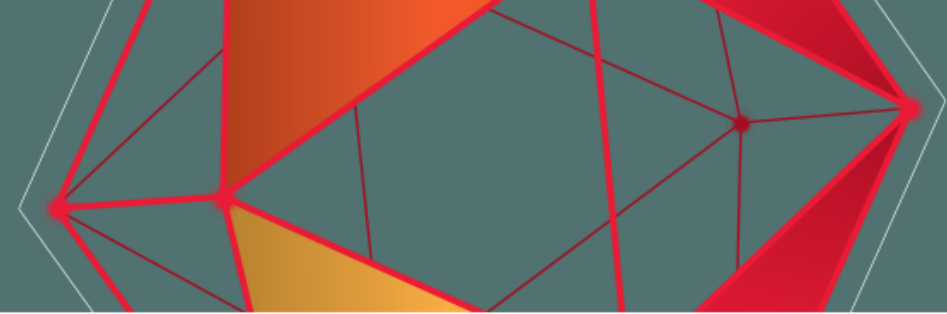- we now need to port the game to a new platform

GOOD: GUNHOUSE

- we used a documented data format

- just needed to create an import script to transform the data to the new engine

- animator doesn't need to come in again and recheck everything

- reduced porting time by several months

GUNHOUSE LESSONS

- it's okay to use existing tools

- without using a tool at the start we would have had to write one anyway to port the game

- you can avoid duplicate work later in development if you evaluate earlier in production

QUESTIONS?

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