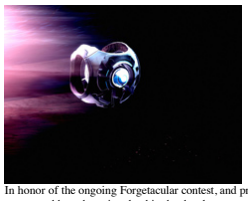
Chris Carney is a giver. Not only has our stout multiplayer stalwart created some of the most iconic spaces found inside our stable of Halo titles, he's also more than happy to share some of his secret madness with aspiring designers, Forge aficionados, and game enthusiasts alike. Pull up a chair, put on your thinking caps, and get ready for Chris Carney's crash course in multiplayer map design.



In honor of the ongoing Forgetacular contest, and primarily in response to Eric and Dave Gasca's near constant "insistence," I thought that I would describe how I design a multiplayer map. I have been fortunate enough to design multiplayer maps for all of our Halo games and have been involved in the development of a wide range of environments from the narrow confines of Prisoner to the massive wasteland of Boneyard. My goal here is to explain how I create and develop these types of spaces using a well-worn and well-tested methodology.

Since Forge is a vastly improved experience in Reach and while floating and phasing together pieces is a blast, creating a fun map can be intimidating. When any of us decides to embark on creating an environment, we become a designer – bringing our own intuition, education, experience, biases and even unique genetic makeup to the challenge. This variety produces a wide range of results which is one of the things I love about architecture. No two buildings are ever the same. Everyone has a preferred method for design and these processes can differ substantially.

When we consider the early design process, this variety is especially evident. For example, in order to generate ideas all-star architect Frank Gehry begins by scribbling small sketches or using crumpled bits of paper to produce buildings that are highly innovative and extremely popular. Santiago Calatrava, on the other hand, uses the bones of animals and the nature of the skeleton as inspiration to create structures that are visually stunning. Ultimately, no one approach is perfect and experience is the critical guide. So let us begin.

EAT THE PATH

As Joe Ski stated quite well several weeks ago, you need to be very specific about your intent. The three things to consider when beginning any multiplayer space:

1. **Number of players**. Is the map going to be focused on 4 – 8, 8 – 12 or 12 – 16 players? I recommend that while you can shoot for other player counts, such as an amazing 1 v 1 map, these buckets tend to be the most flexible.
2. **Primary and secondary gametypes**. A single flag CTF map is not always going to also host an amazing game of Team Slayer. Choose one or two gametypes and focus on making them rock solid. Usually, if your space is well thought out, other gametypes will be easy to add further down the road.
3. **Vehicles**. Nothing changes scale on a multiplayer map as much as the inclusion of vehicles. They are fast and need plenty of room to be fun. Make a call on whether you want to support vehicles early on in the process. Also realize that designing maps that work well for infantry and vehicles is a tough challenge and usually is the most time intensive of all map designs.

Once these decisions have been made, then it is time to move into the process we call "paper design." This does not mean that you must use paper to work out your ideas. Since my background is in architecture, I prefer paper at this point. I can crank out ideas quickly, while working out elements in my head. Here again, process can vary wildly. For instance while Gehry may insist on building cardboard models early in his process, Calatrava uses watercolors. You just want to start by using a method in which you can comfortably work out your ideas.

Some designers prefer to dive directly into 3D using Forge or modeling software such as Studio Max or even Google's SketchUp (which is free and relatively easy to use). The legendary Steve Cotton, for example, is extremely proficient at iterating on early ideas in 3D, as he is skilled at not attaching himself too much to geometry. He will completely turn a space upside down or swiftly rotate a mountain range 90 degrees in order to better understand his ideas. I, however, often become too attached to models that I build on the computer – I don't want to remove something since it looks cool or took a long time to construct – so I iterate on paper as long as I can until an idea starts rolling. For most maps I will go through at least 5 to 10 ideas on paper before I start building in 3D. In my experience, this allows for me to be more focused and confident in my design once I start construction.

Below is the first paper drawing that I produced for Halo 2's Lockout.

Initially I was trying to accomplish several things. First, I wanted to build a small 4 – 8 player space that had isolated combat spaces (rooms) that were connected by bridges. This way the player could see where the opposition was moving, but not know exactly where they ended up. Second, I liked the idea of a map hanging exposed over an abyss, so that players who moved well through the space would be rewarded. Specifically, the space needed to be easy to run through, but also contain "bonus" exposed ledges and jumps that would provide shortcuts for the more adventurous. Finally, I wanted the map to have different combat experiences on each floor. The lowest floor would emphasize close range combat, the middle level room to room clearing utilizing the bridges, and the top level would feature tower to tower mid-range donging. While Lockout was successful, for The Cage I decided to return to this original paper design to see if there was a different direction I could take. One of the elements I really enjoyed about Halo 2's Ascension and Halo 3's The Pit was that players could move around the entire circumference of the level while experiencing different sight lines in towards the center of the map and then could choose when to strike or when to keep moving. I wanted to see if I could incorporate a similar feature. In addition, both Lockout and Guardian were designed around a central hub that organized the environment and provided one large dominant combat space. Was there a way that we could break this up by stretching the map into multiple large combat spaces where one was not more dominant than the other?

So to use The Cage as our example, it started off as a small to mid-sized, 4 – 8 player map, intended for Team Slayer and map possession gametypes such as Stockpile that was going to use some ideas from Lockout and feature outer circulation similar to Ascension and the Pit.

THE FOUR ANCIENT ELEMENTS

Once this initial direction was set, I then began to work through the seven multiplayer design elements that are essential. The first is of these is **Simplicity**. The player needs to understand the map quickly, since their minds are going to be filled with other critical thoughts such as "I need to shoot that fool in the head." Therefore, it is always good to distill the map down to core, simple elements. Lockout, for all of its complexity, is a center square surrounded by four structures. Countdown is a central launch bay surrounded by rings of hallways. Boardwalk is a long, man made park that is also a bridge. Spire is a hill with a tower. Hemorrhage is a wide box canyon, etc. I certainly don't claim that this is always successful, but the simpler the map, the easier it is for the player to comprehend. Less is more.

The second element is **Orientation**. This is a fundamental design decision that will impact many aspects of the environment. In Halo, the act of spawning in multiplayer is a confusing experience. We place you, the player, somewhere randomly on the map and in milliseconds you need to understand where you are and decide where you want to go, all while avoiding incoming gunfire. Since the nature of an assembled collection of Forerunner pieces was potentially already a confusing experience, I wanted to be very heavy handed about orienting the player. Thus I decided to hang The Cage off of a wide, high cliff that could be easily seen from any point in the environment.

Navigation is the third element. The player needs to easily understand how to get from point A to point B. Long, structural walkways, well lit doors and rooms, and clear paths of suggested movement need to be a core part of the design. Whether it is too much contrast in the lighting, an excess of visual detail, or just a jumbled layout, if a player is confused as to how to move around the space, the level is going to struggle.

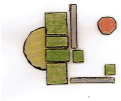
One thing to point out is that as a player runs through your level they will be building and updating their own mental map of the environment. Your job, as a map designer is to make this experience as enjoyable as possible. If you screw up any of these first three elements, you will be compensating for this during the rest of the entire design process. For example, Halo 2's Waterworks was a large map that we spent several man years finishing. We reacted to early feedback from the Alpha about the map being confusing by spending a good deal of time with different lighting schemes and visual solutions to differentiate the sides (the green side with the light shaft versus the icy side with the fog). Yet, after we shipped, many of us still became completely turned around in the space. The design was just too confusing.

Flow, or circulation, is the fourth element to consider. Your map should be fun to run around on even without combat. More specifically, you should feel like a ninja running across easy-to-see ledges, jumping on well-placed rocks, and swiftly leaping to perfect bits of cover. It is here that playtesting early versions of your map will help define what feels good. I hate using the term "feel" since it is inherently nebulous, but flow is definitely the hardest characteristic to define. This is also where you starting considering good spots to draw the player for weapon placement and areas to better define as hard points. I have also found that we are more successful at creating good flow in a map when we can play and iterate on these environments for a significant period of time.

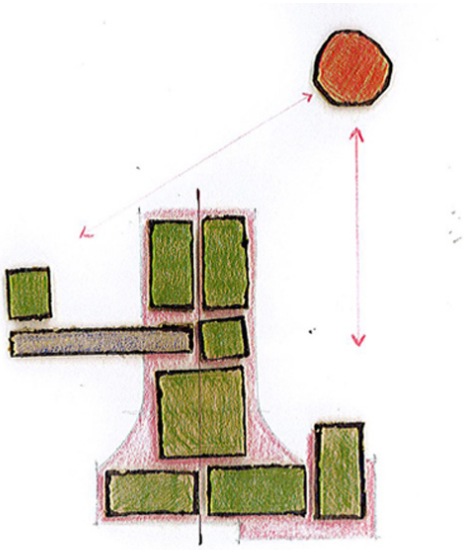
CAGE IT UP

Since The Cage was going to use a pattern of isolated combat spaces, similar to Lockout, I began laying out the level in plan (i.e. top down). Instead of using delicate paper models or elegant water colors, I instead chose a preschool accessible collection of colored cardboard cutouts to start composing ideas (note: we actually experimented with Legos a bit when designing Halo 3 multiplayer maps. Blocks are fun). The green boxes represented rooms, the blue rectangles were bridges or walkways, the yellow circle was a central platform, and the red circles were areas that needed to be traveled to directly using teleporters, man cannons or jumping. While not appropriate for every map, this method was great for my cliff hanging aspirations and again, allowed for me to quickly iterate through ideas.

In the first drawing below, I started with a line of rooms that was at the center of the level with an open space to the left and a series of platforms to the right. These three areas would be good pockets for combat and I did not want much overlap. Lockout and Guardian style maps are great, but I wanted The Cage to be a bit larger and not rely on one singular area to control. I still wanted good views across the map so that a player could understand the environment quickly (and their **orientation**), but these views needed to be discrete so there were not positions that could easily dominate. I also envisioned some of the rooms (the green boxes) being more open than others, similar to the sword platform in Lockout, to assist with establishing these views. Yet, after some consideration, the three areas in this layout felt too separated from one another and also did not suggest a **flow** that allowed the player to easily move around the exterior of the map, so I moved on.



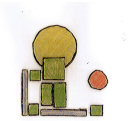
In this second iteration, I removed the central platform (the yellow circle) and started using the hanging platform (red circle) to help define a path around the level. In these smaller environments, one-way paths are excellent ways to force a specific direction of circulation. This creates movement that is predictable – you know when someone drops down for the Shotgun on Lockout that they will eventually end up by the man cannon – but also allows for players to build map strategies. For example, a player may jump down for the Shotgun knowing that his teammates already have the base of the man cannon locked down. So I wanted to incorporate this idea of one-way travel by using man cannons to the platform and back. At this point, the collection of green blocks was suggesting more of a large structure, which was another way to isolate pockets for combat. Yet again, the outer circulation was not working and the overall collection of rooms was confusing.



THE FINAL ELEMENTS

The fifth element on the list are spaces that I call **hard points**. These are areas that you want to feel memorable on a map, which are also great spots for concentrated combat. This can be a small structure, cave, intersection of two paths or any other moment in the environment that you want to feel significant. From a game play perspective, these are also great spots for a hill, territory, stockpile, or team spawn. When selecting these areas, the goal is to think about cover patterns that allow players to approach or defend the area. In addition, what are the sight lines between **hard points** on the map? These views and the spatial relationship between these areas are also critical ingredients in establishing **flow** and easy **navigation**. The flashing red light tower on the Cage and the Visitor Center on Boardwalk are both good examples. Finally, these areas often contain the infamous "three or more ways to access" and enough room to stage a layered defense, while also feeling like an integral part of the environment.

During the next iteration of The Cage, I brought back the central platform, since it was a unique space that aided in **orientation** and **navigation** which might help clean up my jumble of rooms. I also kept thinking of that outer path of circulation and the one-way movement to the platform. Now the idea was beginning to come together. I started considering the lower corners of the environment as great spots for a **hard point** or at least areas for good weapons. The long walkways also reminded me of the long bridge on Ascension and again provided good **navigation** clues.



The next iteration included extending an arm to the man cannon platform and the addition of the cliff wall, which in the back of my mind I think I always considered lying on the bottom.

This brings us to the sixth element, which is the layout of **Game Objects**. Prepare to iterate on this a bunch. Start with power weapons. As you design the map there are certain spots in the environment to which you will want to draw the player to in order to better define **flow**. Power weapons are a great way to fit the bill. When selecting the appropriate location for a power weapon, one strategy is to avoid placing a weapon in an area that is ideal for its use, such as spawning a Sniper Rifle on a "hard to access ledge with a great view of the map." Make the player earn it. Other weapon layout strategies include emphasizing risk versus reward, such as running across the bottom of the launch bay for the Shotgun on Countdown or grabbing the Rocket Launcher on Reflection. In addition, for team games, setting up power weapons that are at the 50 yard line, like the Concussion Rifle on Zealot or Spartan Laser on Valhalla, is also a great technique. Setting up **game objects** also involves developing strategies for team spawns. Where should teams spawn in a symmetrical gametype or in a multi-team game? **Hard points** are usually ideal spots for this, but again, consider the sight lines and proximity of these areas to one another.

The final element is actually an activity – **iteration**. Playtest. Playtest. Playtest. Challenge your original assumptions and see if players use the map as it was designed. Also, look for other opportunities that you might not have considered. Keep evaluating the respawn timers on your power weapons and the proximity of something such as a Rocket Launcher to a team spawn. Is any part of the map too easy to control? Do people get confused? Does the **flow** feel logical? Can you easily **orient** yourself when respawning or quickly **navigate** a flag return route across the map? Here is where playing the map with friends will really pay huge dividends.

LOCK IT DOWN

At this point with The Cage it was time to move away from the crayons and colored cardboard into the world of sketching. The layout below is similar to the previous one, but I started to better define the shapes of each space. I sheared off a corner of the central platform to make it asymmetrical and easier for overall **orientation** and also aligned a structure to follow that new diagonal edge. In addition, the dark walls that bisect the central collection of rooms into three spaces (triangle, rectangle and half circle), were intended to be large, tall walls that divided the map into, again, our three combat pockets. It was fine if they overlapped a bit, but I did not want one space to be able to control all three. The outer circulation here is working well and I knew that I wanted to have a man cannon on the right edge, though had not finalized where. I also was starting to design the map in three dimensions, as this entire experience was not all going to exist on one flat plane. One side of the map, maybe cliff side, was going to be higher than the rest and the other sections were to cascade away from that in elevation.

Then it was time to go into Forge. Since I already felt confident about the layout, I was actually able to assemble the map over the course of a few days. Below is the final version of The Cage from above (in perspective). You can see the path of circulation around the map and also that the man cannon landing became attached to the level (that idea actually came from that second drawing). Once working in Forge, I was able to construct some more one-way paths, such as the drop off in the middle towards the cliff and the hole that drops down to the plasma launcher, in addition to establishing hard points. I have also highlighted in red the two wall sections, which still divide the map into three areas, although the lower section later became a room. However, this was the fun stuff where evaluating different pieces and adjusting locations made the level come alive.

While working in Forge I also decided that instead of making the level cascade away from the cliff in elevation, I was instead going to start it high on the outside (near the grenade launcher) and descend the paths towards the cliff. This would help to reveal the cliff and help the player **orient** themselves quickly. In the final layout, the environment actually drops rotationally, similar to a cork screw, towards the bottom platform with the Plasma Launcher, which works well with the overall **flow**. I also added a Forerunner mast to the rock wall to assist with **orientation**, as well as a blinking red antenna on the tower. Those lower corners became the location for the Sniper Rifle in addition to the man cannon launch. The Shotgun, Plasma Launcher, and Grenade Launcher also found logical homes in the geometry.

SHIP IT

Hopefully this gives a good, albeit brief, overview of a design process and will help to guide your future Forge creations. I have definitely breezed over large parts of this process, such as getting specific about good theory behind laying out game objects and understanding overall scale, but that is for later discussions. A couple of final things to consider when using Forge. The best map designs in Forge often use fewer pieces. Let the terrain and safe zones do the heavy lifting on Forge World and then use small pieces to define **hard points** and augment your design (the "column," for instance, is great for man-sized cover). Also, using too many pieces can easily get in the way of awesome Halo gameplay. Just create logical moments in the environment for the game to shine and the engine will take care of the rest. Finally, don't be afraid to try crazy ideas, as some of those may end up being unique and lead to something completely awesome. In the end, building in Forge should just be fun.

Good luck!