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Game Design for Managers

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By Chris Pruett <c_pruett@efn.org>

Game design is the study of building games that are fun. Like most things, games can often be broken down into fundamental components, and new games can be built by reconnecting those components in different ways. A good game designer plays games to discover new components, or new configurations of well-understood components that work particularly well. These components are rules for proto-games, fundamental guidelines that are not quite complete on their own but can create entertainment when properly retrofitted with content. The game industry jargon for these basic components is game mechanics.

Today I want to discuss one of the most fundamental mechanics in video games: resource management. Generally, the idea behind the resource management mechanic is that the player has some resource that is slowly drained over time and must be replenished before it runs out. If the resource expires, the game may become harder, or the game may be over. Replenishing the resource usually involves the player playing the game skillfully; loss of the resource is often a punishment for not playing the game deftly enough. This mechanic has been a game design staple since before there were video games (Monopoly is a resource management game where the resources are money, property, and hotels), and it continues to be applied to modern games because it has proven to be quite versatile.
A scene from *Burnout*. Note the large red numbers indicating the remaining time within which the player must reach the next checkpoint.

One of the most common forms of the resource management mechanic is a time limit. The player must complete a challenge (finish a level, find an item, etc) before time runs out.

For example, many racing games require the player to reach a checkpoint within a certain time limit; if time expires before the player reaches the checkpoint, the game is over. Each checkpoint may add time to the clock, so a player who passes a checkpoint with time to spare will end up with a little extra time to reach the subsequent checkpoint. A player who can consistently reach each checkpoint with time to spare will quickly accumulate enough time on the clock that the time limit is no longer likely to be the cause of the end of the game. Racing games use this mechanic because it gives novice players an immediate short-term goal: get to the next checkpoint without running out of time. Once they have learned how to do that, they can focus on the real goal of the game, which is to come in first in the race. This application of the resource management mechanic also allows game developers to tune each track for difficulty: if a race needs to be made harder to really challenge the player, the time limit between checkpoints can be decreased, which effectively decreases the player’s margin for error. It is important to note that not all games with time limits are employing the resource management mechanic; games like *Super Mario Bros.* that have a time limit that can never be paused or extended are not resource management games because there is no way for the player to actively manage the resource.

Another extremely common example of resource management as a game design mechanic is the player’s health. Many games give the player a limited amount of “health,” a value that is decreased every time the player is damaged by an enemy or obstacle. If the health value ever reaches zero, the player dies and must restart the game. However, the player can usually improve his health by finding special items (“first aid kit” is a common metaphor). This system of finding items to improve a resource that is reduced when the player fails is extremely common, and it ties into another core video game mechanic: item collection. Health is usually represented
as a bar that shrinks as the player is hurt and lengthens as the player heals. Though rare in modern games, many titles from the 1980s represented health as a row of small circles or heart shapes that could be empty or filled; this scheme often implied that a single hit from an enemy would deplete one unit of health, and cause one of the shapes in the row to change from full to empty.  

Zelda represents health as heart shapes. These vanish when the player is hurt. Management of health as a resource has lead to a huge number of second-order game mechanics. For example, some games allow the player to pick up health-replenishing items and save them for later use, which can cause players to hoard these items just in case they run into a particularly challenging section. Other games force health to be replenished whenever a health item is touched, which can lead players to actively avoid health items when they are healthy so that they can return to get the item when their health level drops low. These sorts of decisions are what game designers are striving to create; giving the player decisions based on trade-offs that are linked to player performance is a formula for both challenge and entertainment.

So far I have discussed relatively simple implementations of the resource management mechanic, but to illustrate the level of depth this mechanic can provide, I would like to discuss a much more complex example. Resident Evil is a seminal horror game that was released by Capcom for the Sony Playstation in 1996. This game takes resource management mechanics and, in combination with item collection mechanics, creates complicated second-order resource management game play.

The premise for Resident Evil’s resource management seems simple. The player must worry about his health being depleted by the zombies that roam the mansion he finds himself trapped within. Health can be replenished by finding certain items: first aid health spray and green herbs. The first aid spray completely restores the player’s health, while the green herb only improves health incrementally. The initial challenge to the player is to avoid getting attacked by the zombies because these two health items are quite scarce (especially the first aid spray), and if
they run out of these items the chances that the player’s character will perish increases dramatically.

This is a pretty straight-forward resource management premise, but Resident Evil adds a lot more complexity into the game by mixing in item management elements. The player can only hold a few items in his inventory at a time, so health items are competing for space with other necessary objects like bullets and keys. If the player’s inventory is full, he won’t be able to carry health items around even if he finds them, and space is so limited that the inventory fills up very quickly. The player is given a special room in which he can leave items for later use, but this creates a secondary challenge: the player must now consider what sort of challenges they are likely to face in the next few minutes of game play. If there are likely to be a lot of enemies, the player needs to make sure that he has enough herbs and bullets in his inventory to survive the encounter. If the next room is likely to contain an item puzzle or a locked door, the player needs to make sure that he has space to carry keys. The moment-to-moment scenarios that the game presents are varied enough that the player cannot really anticipate what he will need, and must periodically make a tough decision about which resources to leave behind. This mechanic dramatically increases the tension invoked by the game, which, as a horror game, is one of the primary goals of the game design.

Resident Evil actually contains several more layers of complexity. Eventually new types of herbs are introduced: a blue herb, which can cure poisoning, and a red herb, which can increase the potency of other herbs when combined with them. Item combination itself increases the size of the problem space, as items cannot be split apart once combined. On top of all this, Resident Evil makes ammunition and even the ability to save the game resources that be carefully managed due to scarcity. In fact, the placement of items in the Resident Evil mansion creates a management cycle: if the player runs out of ammunition, he can effectively trade health items for the ability to progress by just running away from enemies and healing when he is damaged. Eventually, when the player finds more bullets, he will realize that he is now low on health items, and so the management challenge is reversed. What is fascinating about this game is that it structures a common game mechanic in such a way that the mechanic actively builds tension and suspense. The Resident Evil game designers deftly appropriated the core idea of resource management and implemented it in a way that served the thematic needs of their game.2

If mechanics are the DNA of a video game, resource management is one of the repeating sequences that can be traced back to the dawn of video game life. Though there are many other core mechanics that appear again and again in modern game design, few have been implemented with such variety as resource management. The best game designers are those that understand not only the precedent for existing mechanics, but also how those mechanics can be altered or reconfigured to produce specific forms of game play.

1 For example, Prince of Persia, a seminal game in the Western Platformer genre, represented health as three bottles of potion. A full bottle represented a unit of life, and taking damage from an enemy or a fall would deplete one bottle at a time. The prince could find potions throughout
the game and drink them, restoring all bottles to their full status, and sometimes adding additional bottles to the row, thus increasing the number of times the prince could be damaged before dying. You can play a snippet of Prince of Persia right in your browser here; http://www.maniacworld.com/prince_of_persia.htm

2 It is important to note that complex resource management schemes do not always go as smoothly as Resident Evil. Illbleed is another horror game that tried to implement a complex system of interdependent resources and failed on almost every level. I discussed its problems in some detail in my review of the game here: http://www.dreamdawn.com/sh/info.php?name=Illbleed (shameless plug)

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24 THOUGHTS ON “GAME DESIGN FOR MANAGERS”

Tuyet
on January 31, 2014 at 7:51 PM said:

I like the valuable information you provide
in your articles. I will bookmark your blog and check again here regularly.
I am quite certain I will learn lots of new stuff right here!
Best of luck for the next!

Anneliese
on January 31, 2014 at 7:58 PM said:

Link exchange is nothing else but it is just placing the other person’s weblog link on your page at appropriate place and other person will also do same in favor of you.

Garland
on January 31, 2014 at 7:58 PM said:

Tremendous things here. I am very satisfied to see your
post. Thank you a lot and I’m looking forward to touch you. Will you kindly drop me a mail?

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**Carley**  
**on January 31, 2014 at 8:01 PM said:**

I must thank you for the efforts you’ve put in penning this blog. I’m hoping to view the same high-grade blog posts from you later on as well. In fact, your creative writing abilities has encouraged me to get my own website now 😊

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**Denese**  
**on January 31, 2014 at 8:02 PM said:**

He was presently eagerly courted by way of a Kimkins follower, who promised him fast weight loss, and provided a link with a site which required $60 for membership.

Undertaking a second job should not be for that sole purpose of funding your amount of money or getting beyond debt, but instead sticking with wisdom “don’t keep your eggs in one basket” particularly in these days of economic instability. You are advised to see their website for every one of the necessary information about working for the great company.

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**gta v online**  
**on February 1, 2014 at 3:11 PM said:**

Have you ever thought about publishing an ebook or guest authoring on other sites? I have a blog centered on the same subjects you discuss and would really like to have you share some stories/information. I know my subscribers would value your work. If you are even remotely interested, feel free to send me an email.
farm game
on February 2, 2014 at 1:50 AM said:

Good day! I just would like to offer you a big thumbs up for the great information you have here on this post.

I will be coming back to your website for more soon.

translate english to portuguese
on February 2, 2014 at 6:10 AM said:

It is really cheap and affordable simply because from the growing competition with this sector. Then Mahmood, another one of the guys who have been harassing us, attended Samieh and tried to consider her away with him by force. We are already quite busy the past number of years learning plenty of stuff.

housing and urban development website
on February 2, 2014 at 7:01 AM said:

I have read so many posts on the topic of the blogger lovers except this post is truly a nice piece of writing, keep it up.

swiss watch prices
on February 2, 2014 at 7:16 AM said:

hey there and thank you for your information –
I have definitely picked up anything new from right here.
I did however expertise a few technical points using this web site, as I experienced to
reload the website a lot of times
previous to I could get it to load properly.

I had been wondering if your web hosting is OK?
Not that I’m complaining, but slow loading instances times will sometimes affect your placement in google and could damage your high quality score if advertising and marketing with Adwords.

Anyway I’m adding this RSS to my email and could look out for much more of your respective interesting content. Ensure that you update this again very soon.

floor coverings for bathrooms
on February 2, 2014 at 7:17 AM said:

If you are going for most excellent contents like me, just go to see this web site everyday as it offers quality contents, thanks

dentysta dla dzieci warszawa
on February 2, 2014 at 7:18 AM said:

I love what you guys are usually up too. This kind of clever work and exposure! Keep up the very good works guys I’ve you guys to my own blogroll.

kartenlegen partnerschaft
on February 2, 2014 at 7:18 AM said:

Excellent post. I will be facing many of these issues as well..

Dexter
Howdy I am so grateful I found your web site, I really found you by error, while I was searching on Digg for something else, Nonetheless I am here now and would just like to say thanks a lot for a incredible post and a all round interesting blog (I also love the theme/design), I don’t have time to read through it all at the minute but I have saved it and also added your RSS feeds, so when I have time I will be back to read more, Please do keep up the great work.

Hey there! I’m at work surfing around your blog from my new apple iphone! Just wanted to say I love reading your blog and look forward to all your posts! Carry on the superb work!

I all the time emailed this website post page to all my contacts, for the reason that if like to read it next my links will too.

This is my first time go to see at here and i am actually happy to read everthing at one place.
on **February 2, 2014 at 8:50 AM** said:

I’m extremely impressed with your writing skills as well as with the layout on your blog. Is this a paid theme or did you customize it yourself? Anyway keep up the nice quality writing, it’s rare to see a nice blog like this one nowadays.

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**http://yw.Vipdoor.info/**  
on **February 2, 2014 at 8:52 AM** said:

An interesting discussion is worth comment. I do believe that you need to write more on this subject, it might not be a taboo subject but typically people do not discuss such subjects.

To the next! Kind regards!!

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**seebestattung für sebastian - trauerfeier in heimatort**  
on **February 2, 2014 at 8:54 AM** said:

Its such as you read my thoughts! You appear to grasp so much approximately this, such as you wrote the ebook in it or something. I think that you simply can do with some percent to force the message home a bit, but other than that, that is great blog. A fantastic read. I’ll certainly be back.

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**seebestattung gran canaria**  
on **February 2, 2014 at 8:56 AM** said:

This is really interesting, You’re a very skilled blogger. I have joined your rss feed and look forward to seeking more of your fantastic post. Also, I’ve shared your site in my social networks!
weight loss shakes for women
on February 2, 2014 at 8:57 AM said:

Hey there! Quick question that’s totally off topic. Do you know how to make your site mobile friendly?
My web site looks weird when browsing from my iphone.
I’m trying to find a template or plugin that might be able to correct this issue.
If you have any recommendations, please share. Many thanks!

executive security services international
on February 2, 2014 at 9:21 AM said:

This is really interesting, You are a very skilled blogger.
I’ve joined your rss feed and look forward to seeking more of your great post.
Also, I have shared your website in my social networks!

pure green coffee bean extract
on February 5, 2014 at 2:33 PM said:

What a stuff of un-ambiguity and preserveness of precious familiarity about unexpected emotions.