

THE DATA CRACKER

A DEAD SPACE 2 VISUAL GAME ANALYTIC TOOL



GDC 

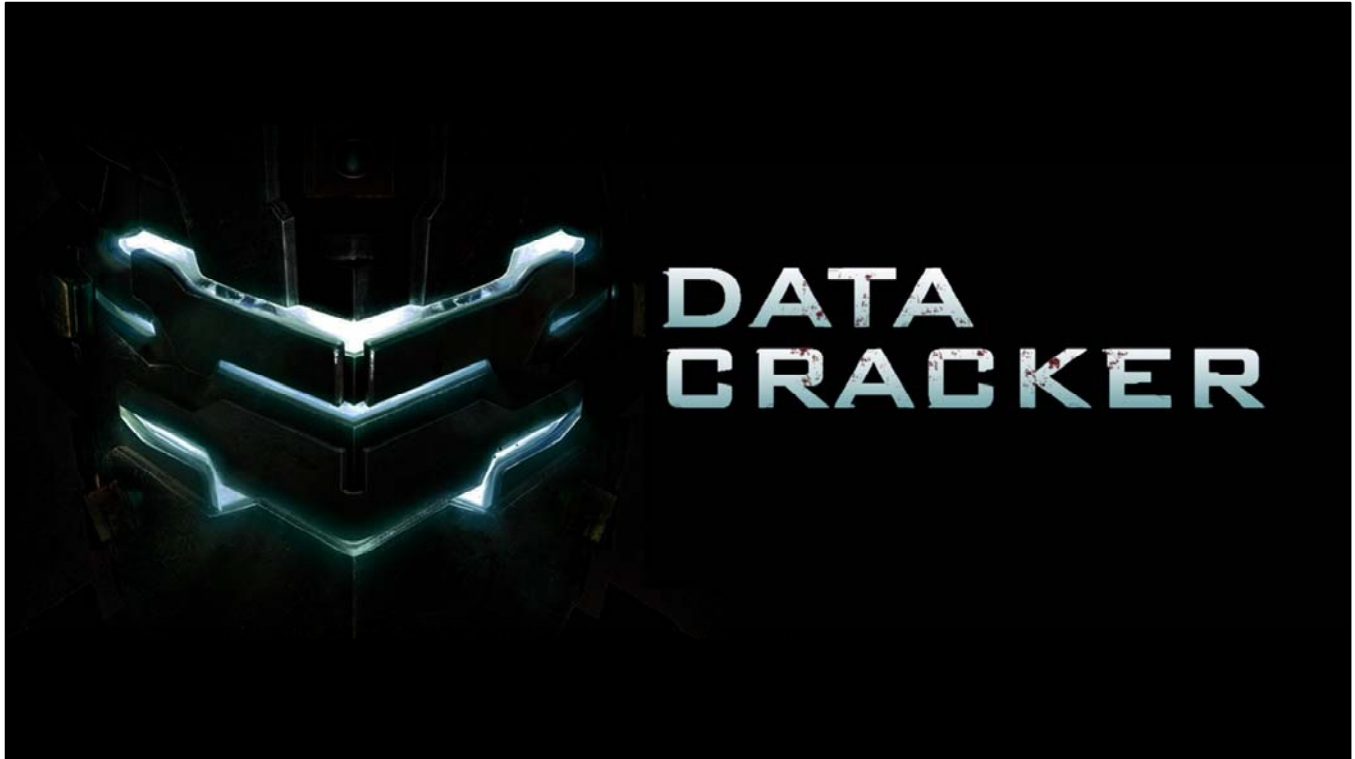
@BENMEDLER



My name is Ben Medler and I'm currently a Ph.D. student at Georgia Tech where I study player motivation and build visual analytic tools for monitoring player behavior.

The work I'll be presented today involved a small team at EA consisting of my fellow developer Jeff Lane, a Master student at Great Northern Way and our manager Michael John a senior creative director at EA, who was also a big influence on this talk.

The tool we built was for the game Dead Space 2, and I'm going to assume everyone here has heard of game.



The tool is called Data Cracker and is a game analytic system for logging and analyzing Dead Space 2 multiplayer matches. If you haven't played the DS2 multiplayer that's okay I will provide some explanation for the examples related to Dead Space 2. And this talk is more about building game analytic tools in general.

GAME ANALYTICS



Game Analytics is a sexy topic in the games industry right now, and seems to have inspired equal amounts of fascination, suspicion, and a fair amount of fear.

GAME ANALYTICS



Not all of the fear and suspicion is unfounded. The prevailing view of analytics is driven by business outcomes and when you hear marketers speak about analytics it does get scary.



These business metrics dominate the analytic conversation because they are easier to measure and make great copy for investors.

GAME ANALYTICS

BORING



They are also boring, and seriously sell short the potential of analytics to create stronger connections between designers and players.



Data Cracker is a little scratch at the surface of creating a tool to dig into this latter goal, something Michael John calls “Play Intelligence” instead of “Business Intelligence”. It’s about getting further involved in the player’s experience.

What I have here today is not a complete solution, and I’ll get into that at the end, but the goal of this tool, of Data Cracker, from start to finish has been to inform the Dead Space team about how their game is being played.



Having this as our goal we wanted to meet two specific criteria:

We wanted the tool to be *useful*

We wanted the tool to be *used*

I'll briefly go into the tech behind Data Cracker and show a demo to set the stage, but it's these two elements that are mostly what this talk is about.

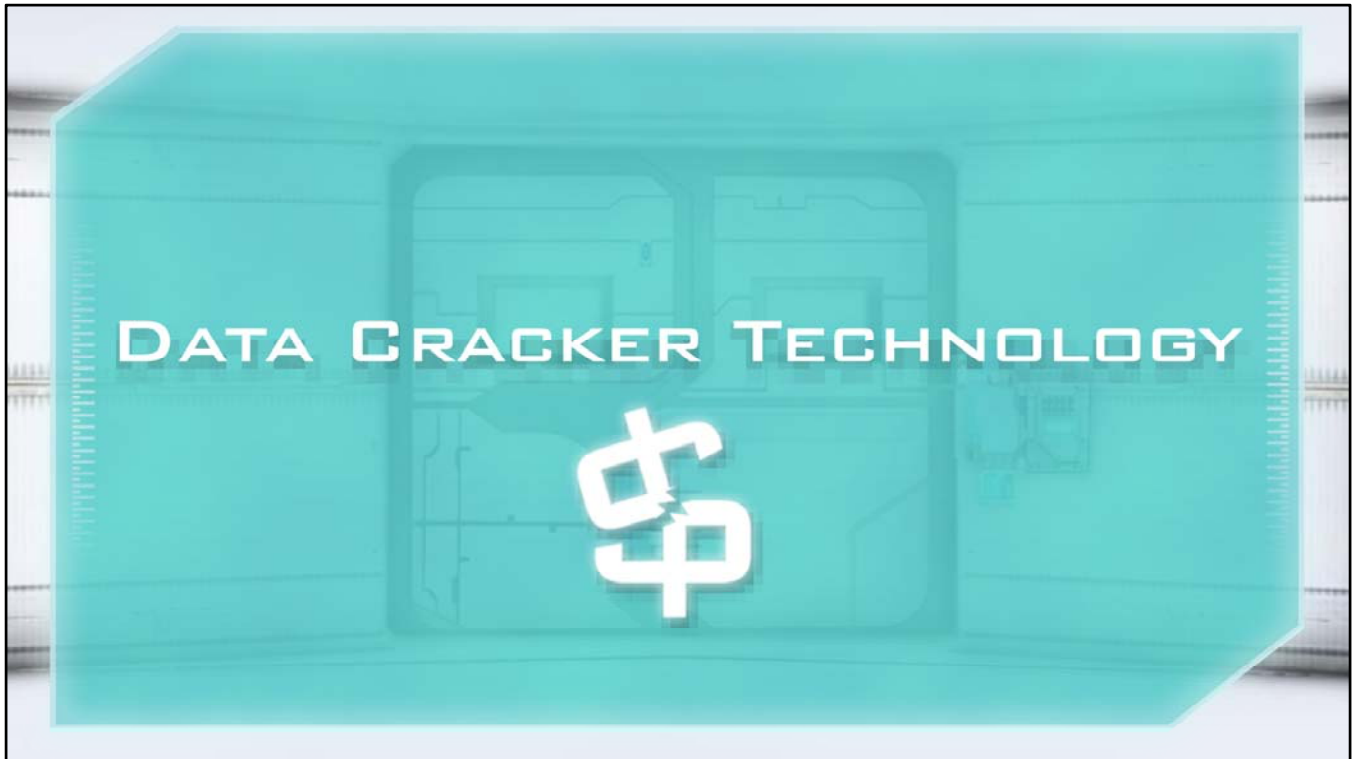
OVERVIEW

1. DATA CRACKER DEMO
2. ACHIEVING USEFUL & USED
3. SUMMARIZE KEY LESSONS

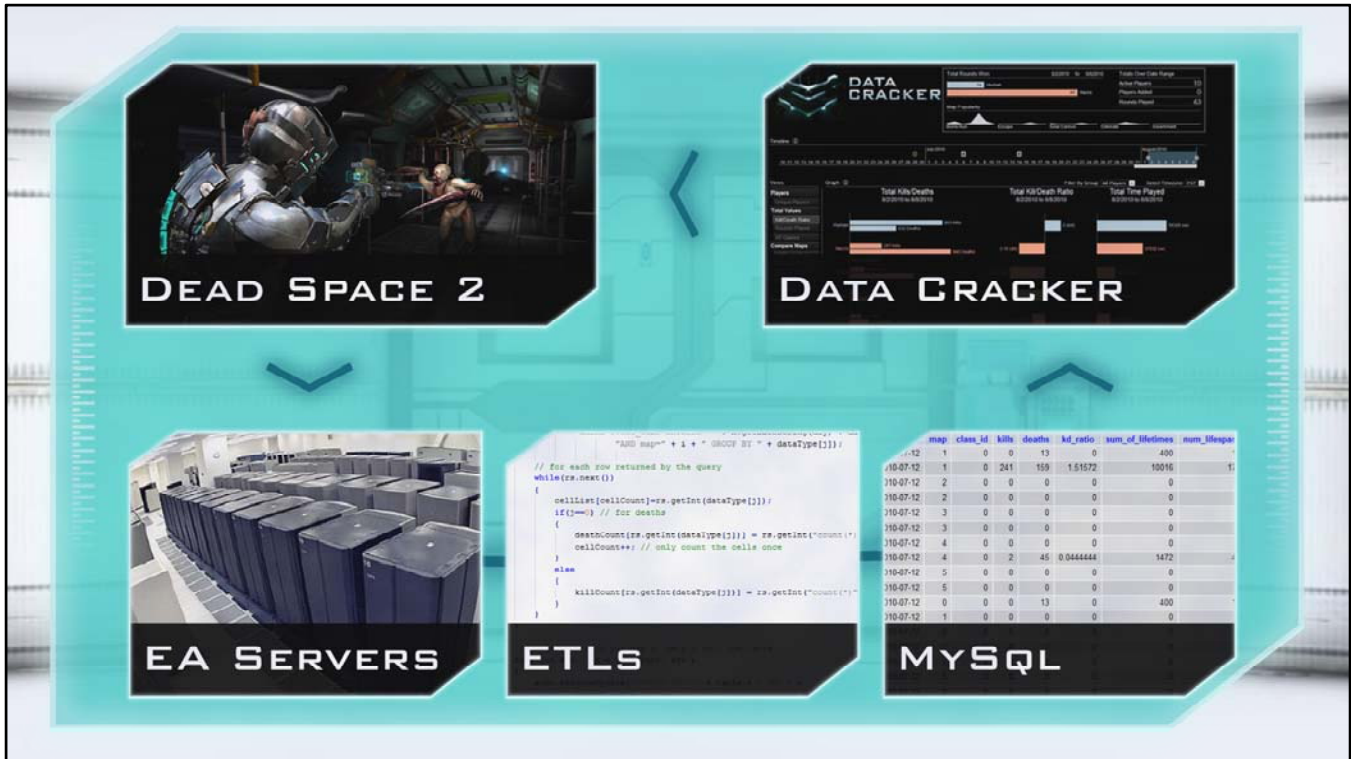
First, I'm going to demonstrate the Data Cracker tool give you a sample data analysis scenario.

After that, I'll step through how the two criteria of being useful and used were met.

And will close with key lessons learned from this experience that anyone can take forward into a Play Intelligence program.



The technology behind Data Cracker is simple, and almost absurdly cheap. In fact Jeff and myself were given the constraint to try to build the system with open source tools, and indeed Data Cracker is built with open source tools, and runs on a cheap Linux box.



To give you an outline, the system works by collecting telemetric data from Dead Space 2 by EA's online infrastructure; this metric data is parsed by the data cracker ETLs, which are the functions that extract, transform and load the metric data, and organize it into a mySQL database using tools built in Java.

The actual interface portion of Data Cracker is a web-based visualization tool that connects to the MySQL database and allows the Dead Space team to query the pre-organized data. Besides the online infrastructure, the system which handles the game to server communication, everything else uses open-source technology and was built from scratch.

But, deciding what to do with the data once it is collected and how to communicate it to the team is the hard part.

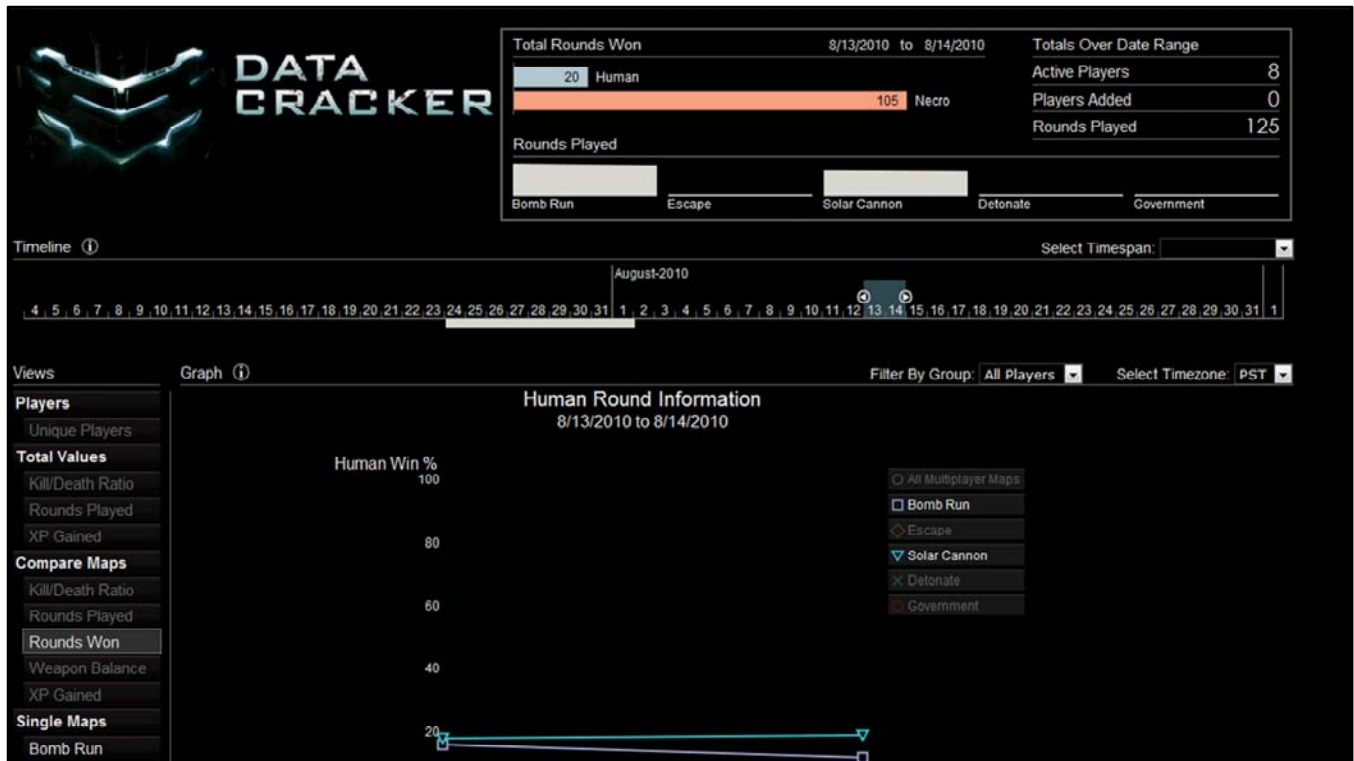


And that's where the data Cracker visualization tool comes in. I have a video which I will use to step you through a scenario of how someone from the Dead Space team can use the tool to analyzing gameplay. I should mention that this data is from the summer of last year, before dead Space was in alpha, and the player data we had at that time was mainly from EA staff testers .

So let's jump in.



When you first open Data Cracker you're immediately shown summary graphs at the top of the screen. These are just a few simple overview metrics that allows someone to quickly get a sense of what is happening in Dead space 2 multiplayer matches. Below that is the timeline which allows you to flip between different time frames of data. We are going to look at a specific two day period where we have data from two maps in Dead Space, bomb run and solar cannon, which were renamed titan mines and solar array for the release.



When we shift over to August 13th and 14th we notice at the top there are two bars labeled Human and Necro.



For those not familiar with dead space 2 multiplayer, the gameplay consist of placing two teams into an asymmetric battle. One team play as the humans who are heavily armored and attempting to complete objects before a timer runs out.



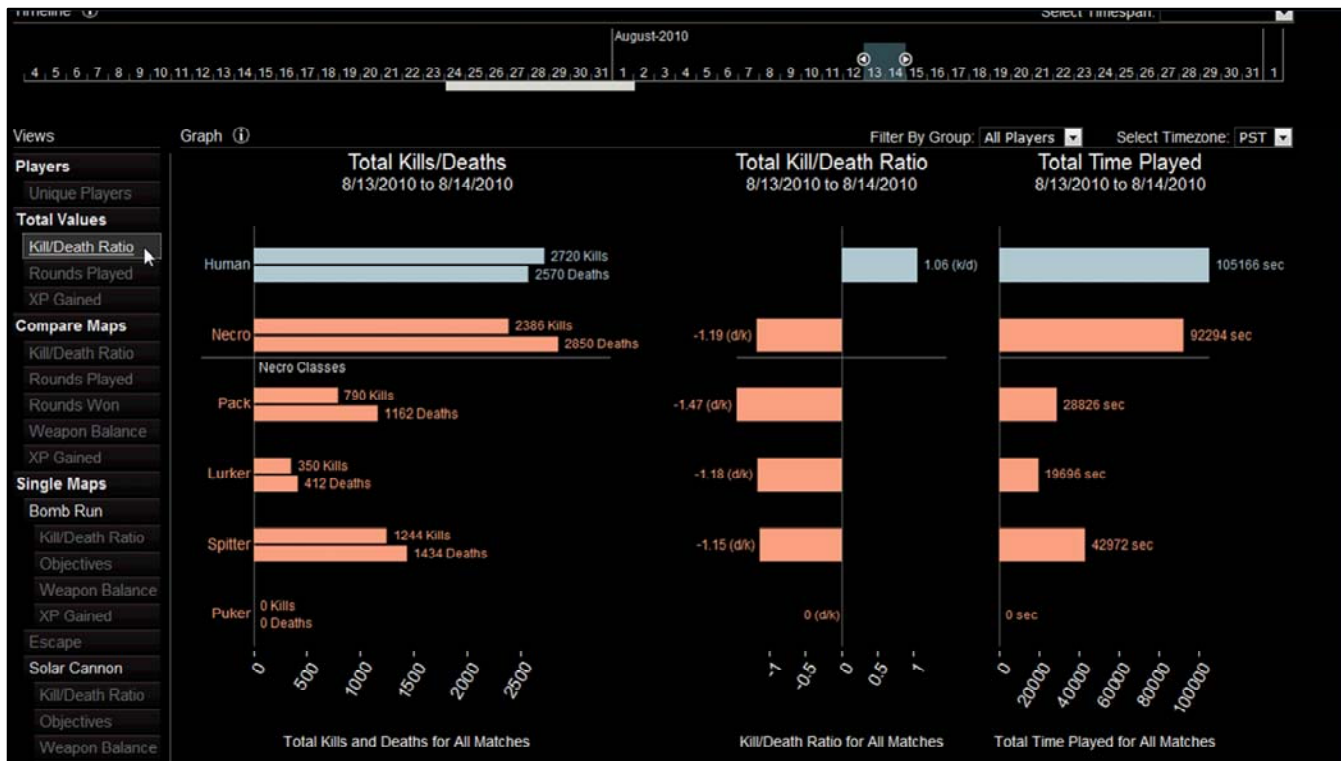
The second team are the necromorphs, or necros, who are weaker creatures and are trying to stop the humans from completing their objectives. So the main purpose of Data Cracker is to monitor how effective one team is versus the other and provide guidance on how to balance the game.



This top graph shows humans won 20 rounds versus the necros 105 wins. Doesn't really seem balanced. The humans should be winning at least a little bit more.



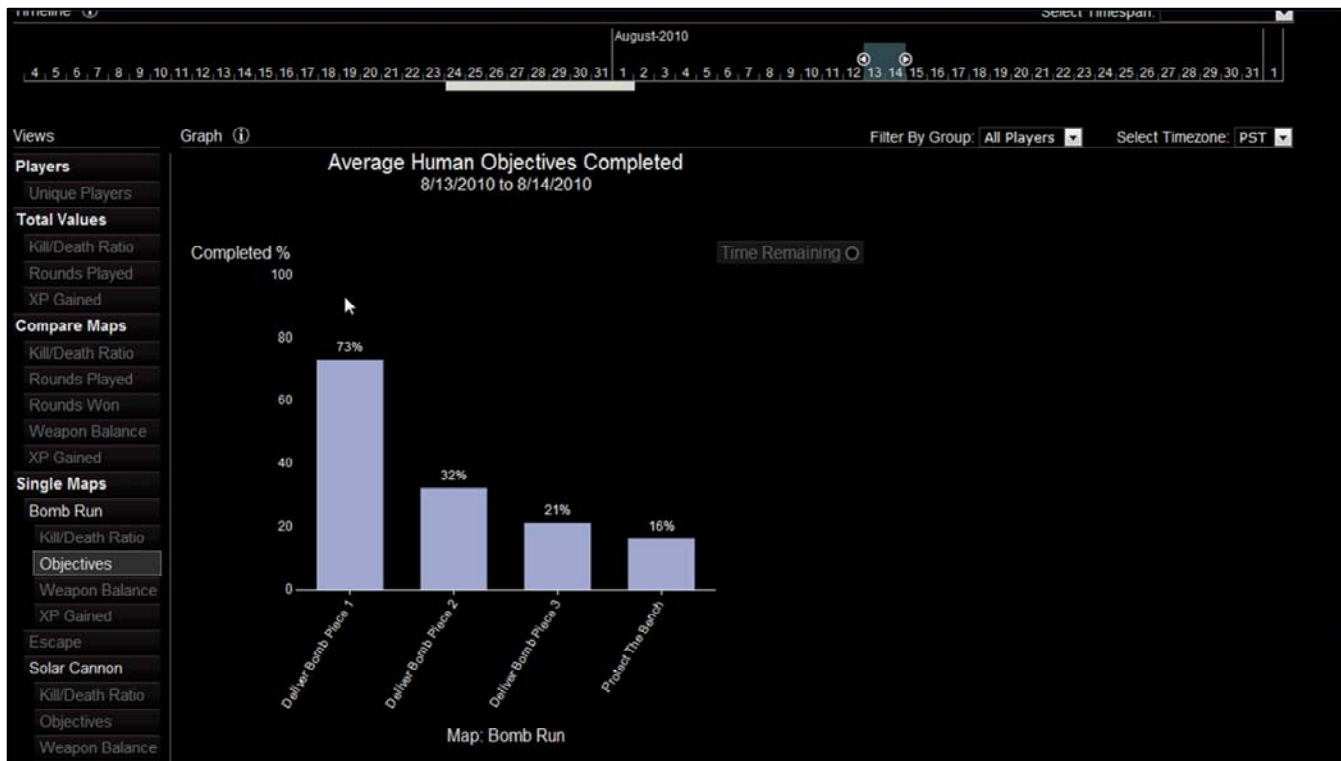
We can scroll down to the main graph area in order to investigate why the humans may be losing so often. The current graph shows the percentage of rounds won by the humans separated by map. Humans lost fairly evenly on both maps so we the problem doesn't seem to be map specific.



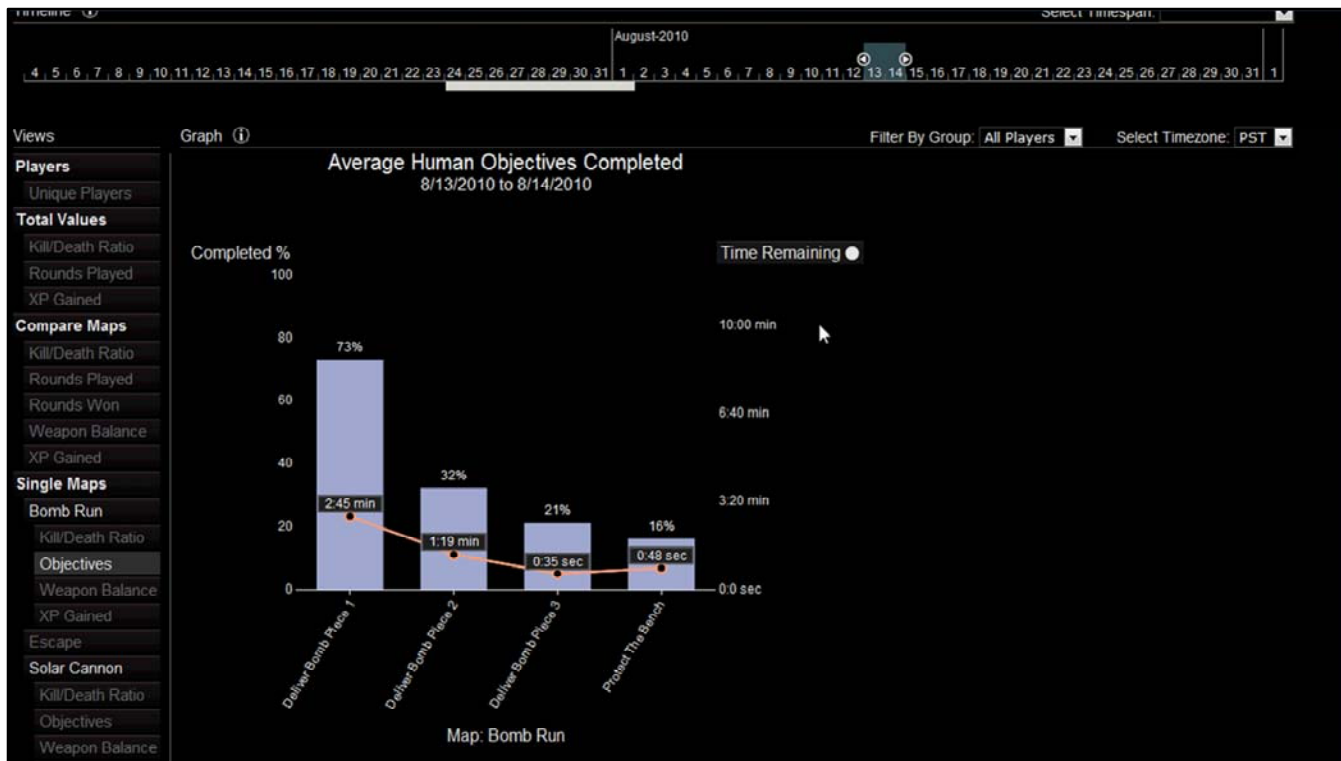
Let's look at total kill death ratios to see if anything jumps out. Here we can see how often humans and necros are earning kills and dying during multiplayer rounds. Humans and necros are pretty even, And although humans should be a little stronger than the necros nothing seems too abnormal.



We flip over to a different graph which shows the experience points earned for each team. It looks like humans are completing objectives and earning experience but the necros have huge number of paired attacks, which is a special ability necros have that locks a human player into melee fight and impedes their progress. So it looks like humans are getting slowed down a lot.



If humans are getting slowed down then that may be affecting their ability to finish objectives. We can move down to the graphs which focus on single maps to look at both bomb runs and solar cannon's objective completion rate. If we take a look at the bomb run objective graph we find something odd. 73% of all the teams that start bomb run finish the first objective but only 32% of the total teams finish the second objective. That's a pretty steep drop off. It may be because the second objective in bomb run forces the players to traverse more of the map.



If we turn on the time remaining chart we can see that teams are wasting a lot of time trying to complete the second objective, which makes completing the third and fourth objectives harder.

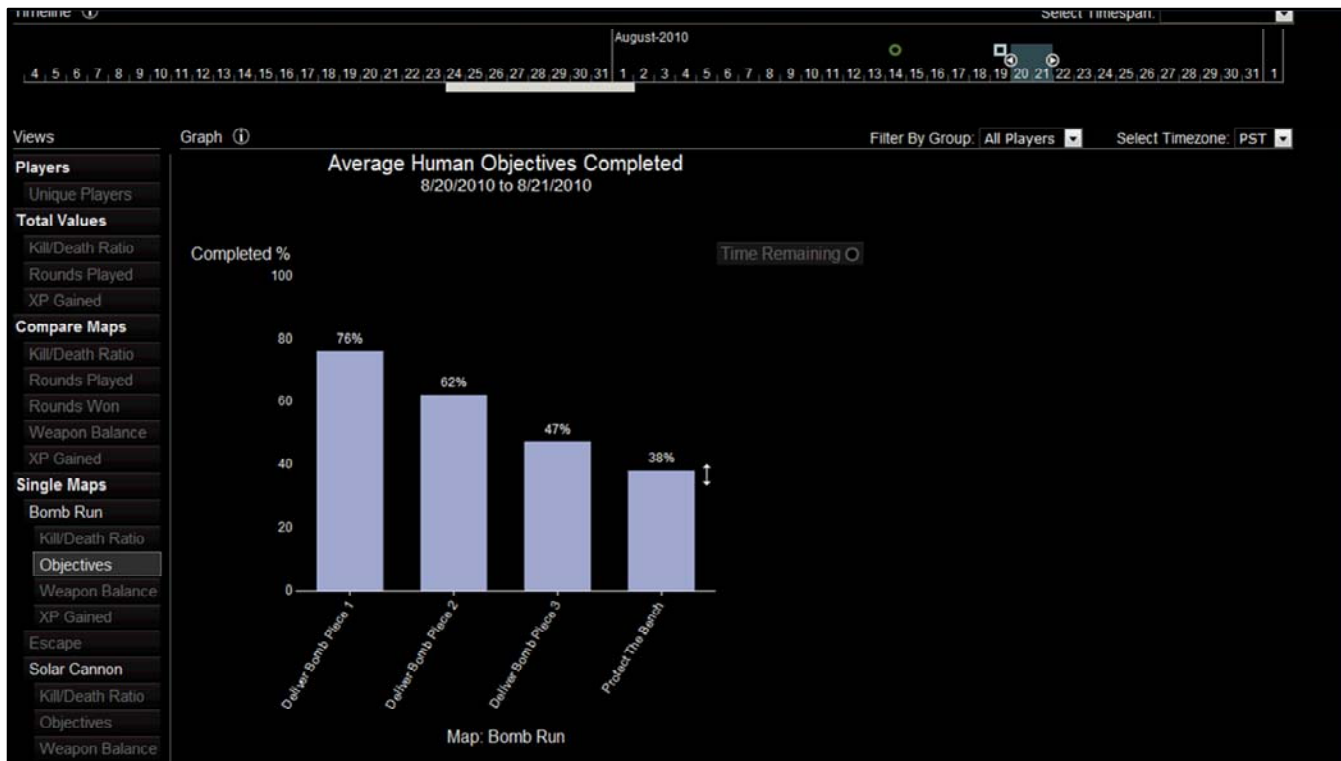


We can bring up the solar cannon objectives graph we can see that another steep drop off occurs at the fourth objective, which is an objective that forces the human team to activate two switches both taking time and leaves the player activating a switch vulnerable to attack.

A FEW DAYS LATER...



We can shift the timeline over to the 20th and 21st and notice at the top that humans are winning more than they were.



And checking the objective graphs there seems to be a gradual decline for the human teams completing objectives on both of the maps instead of sharp declines.



Hopefully when players are on the human team they now feel that they have a better chance of winning. Of course this analysis should be paired with other qualitative analysis like player testing.

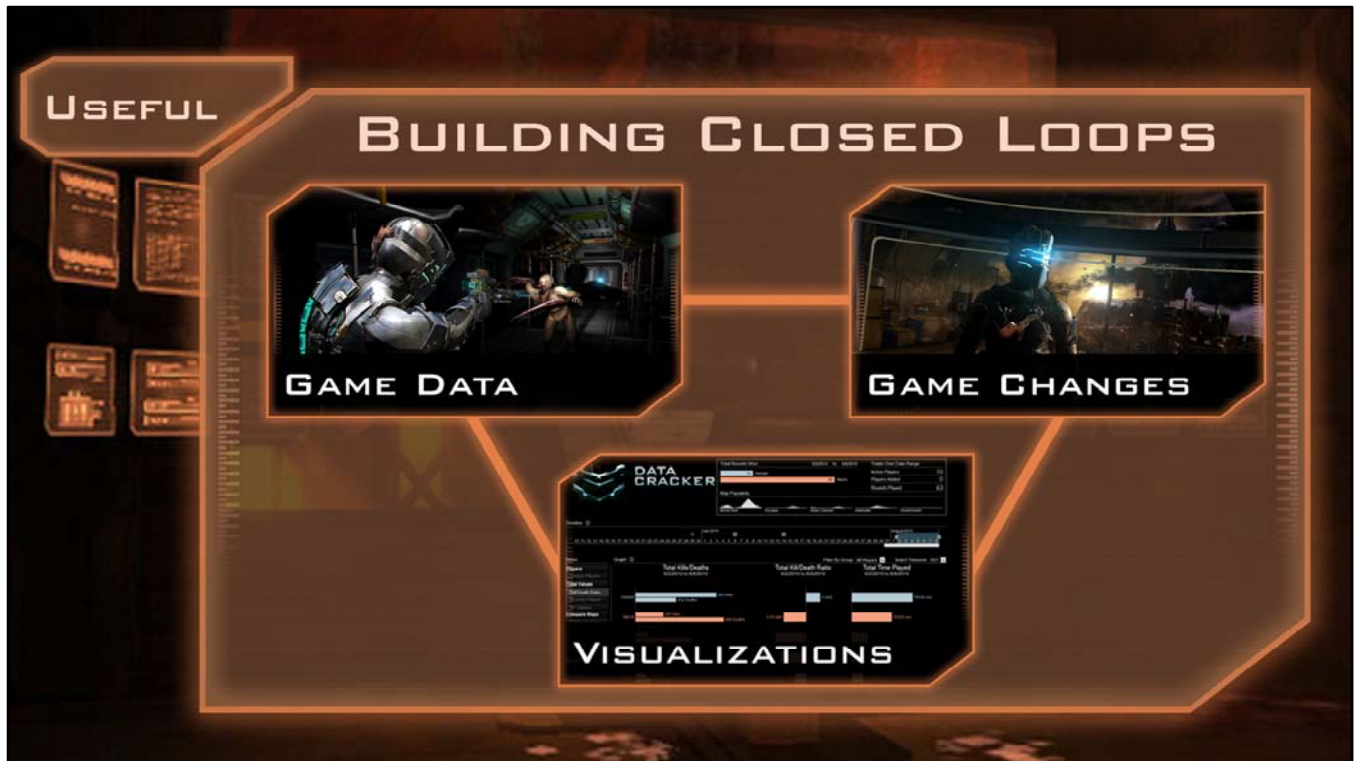


So that is a quick example of how Data Cracker is used to analyze gameplay. While the data itself is at a higher aggregated level it still provides the ability to analyzing many multiplayer matches at once. Data Cracker has scaled with the release of Dead Space and has since tracked hundreds of thousands multiplayer matches. It was also modified by the Dead Space 2 single player team to analyze players going through the campaign.



Now to echo my previous points... we wanted to make Data Cracker *useful* and *used*.

Beginning with useful, we let the Dead Space team define what that meant for us, We had a series of meetings where we played the game with the team, and had many conversations with their gameplay designers and programmers to determine what useful meant to them.



Working with the team, we used one specific rule: if the designers could not articulate a use for the data, describe what about the game would change based on the numbers, we chose not to focus on it. We called this process “building closed loops”.

They told us what data was important, how it would be used.
And we showed them how it would be visually represented for analysis.

And as you saw in the demo a number of metrics were agree upon and ultimately visualized.



The tool also underwent a number of iterations during the time we built it. One specific iteration that occurred the longer we worked with the tool, and the team used it, was how *time* was represented as a crucial dimension of analysis.

That's hopefully one of the big takeaways here. If you're building a tool like this of your own: TIME will almost always be a dimension that you want to visualize. This was one of the features that differentiate Data Cracker from other EA tools. It continually charts data over time and is quick to make comparisons between time-frames.



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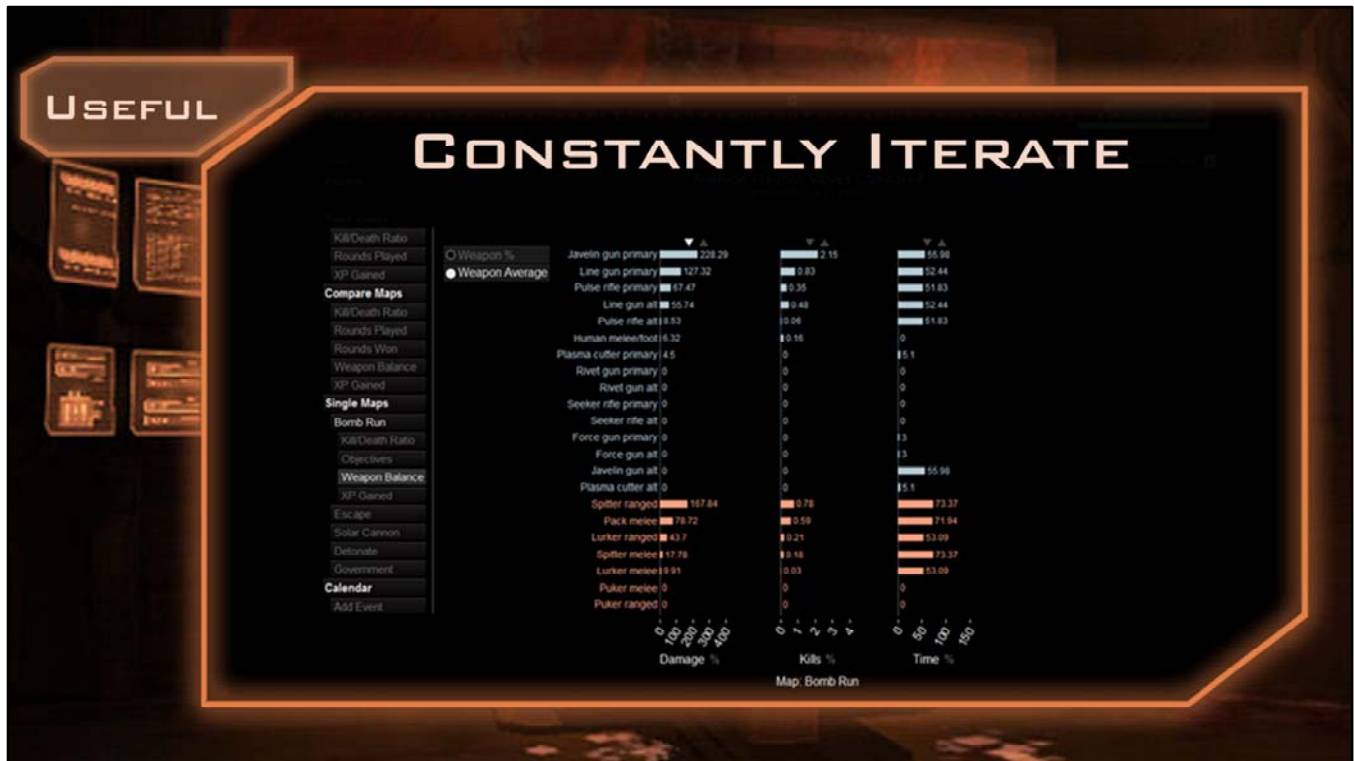
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Another takeaway is you must constantly iterate with the game team. For instance, when we were demonstrating an early version of the weapon visualizations to the designers they noted that they were curious not just how much a human fired a weapon, but how much time they had a given weapon equipped.



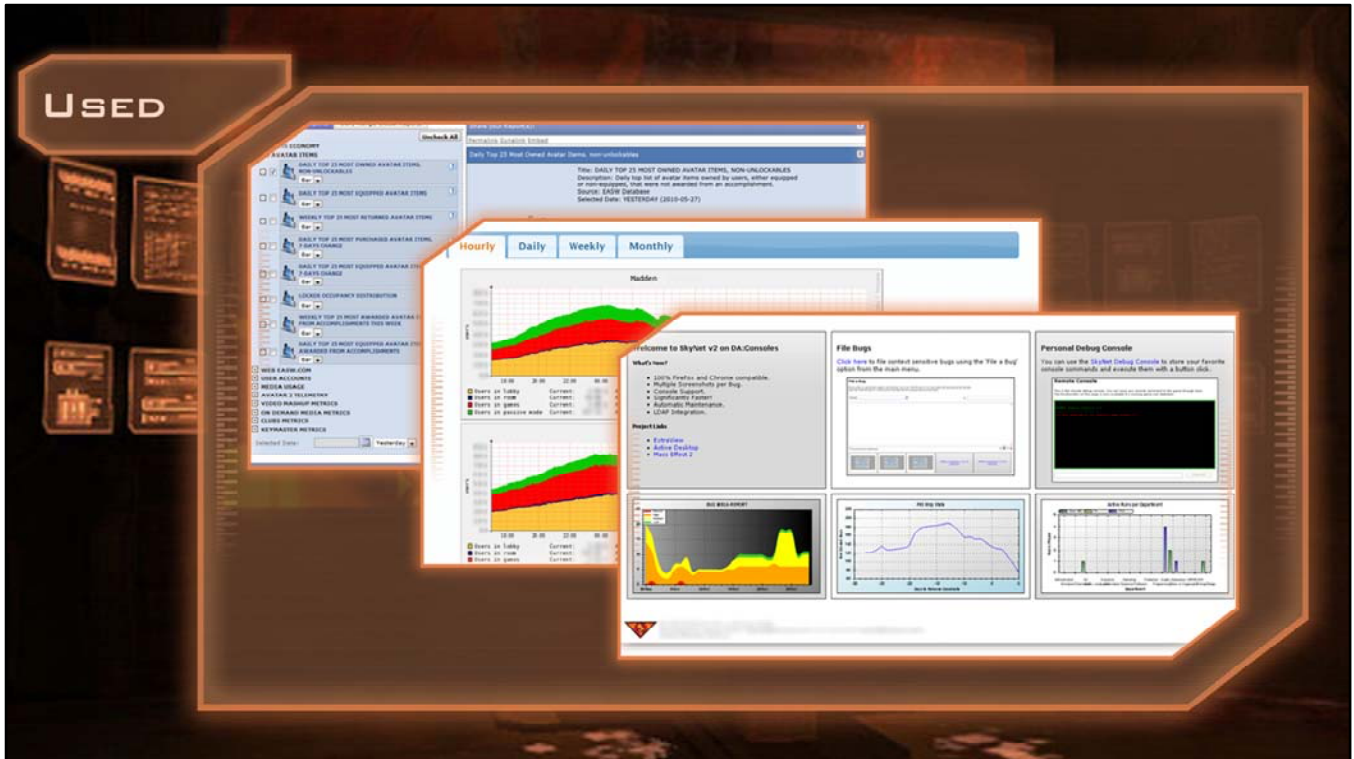
We added extra visualizations to accommodate their curiosity and we also had to work with our gameplay programmer to get the necessary data. The game initially didn't track how long a player held a weapon, just that they are holding a weapon. So iterating on data formats and game code happens, and you have to be ready to implement those changes and debug them.



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That's another takeaway: if you're going to build a Data Cracker, do it *early* in development. A simple rule of thumb is: the visualization tool should be complete and debugged before alpha.



The second big challenge was making sure the tool was *used*.

Considering EA's many developers and the many games they have produced, there has been a lot of interesting analytic systems created for those game, but we still faced a lot of resistance to using analytics at first.



We found that resistance to form around two issues: one is accessibility, do team members feel comfortable using a tool, and the second is usability, are team members capable of using a tool.

How did we approach these issues?



Well, for accessibility the first thing you notice about Data Cracker is that the tool looks like it belongs in Dead Space.

This too was a different approach compared with other analytic systems built at EA.

We used a color pallet that matched Dead Space's pallet and added in Dead Space artwork were appropriate.

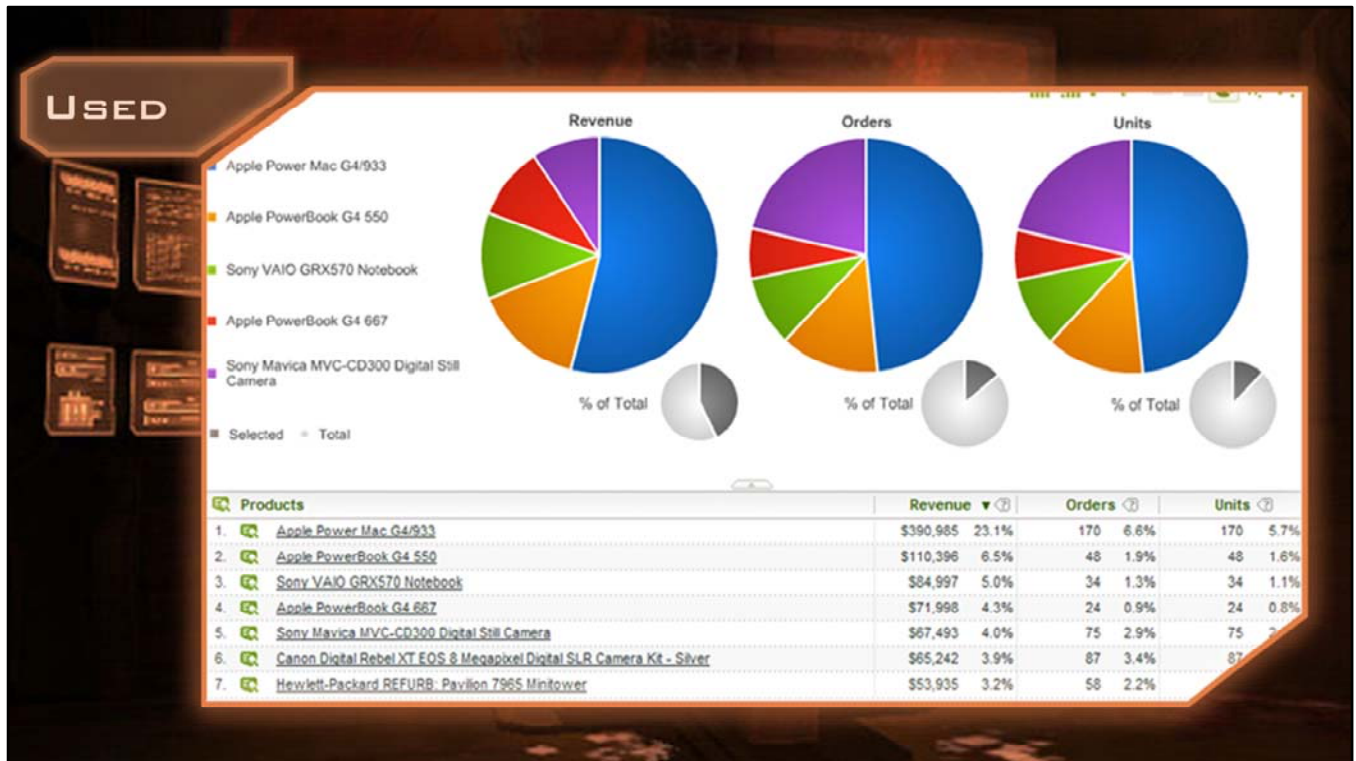


Even the name “Data Cracker” is a direct reference to the concept known as planet cracking in the Dead Space lore.

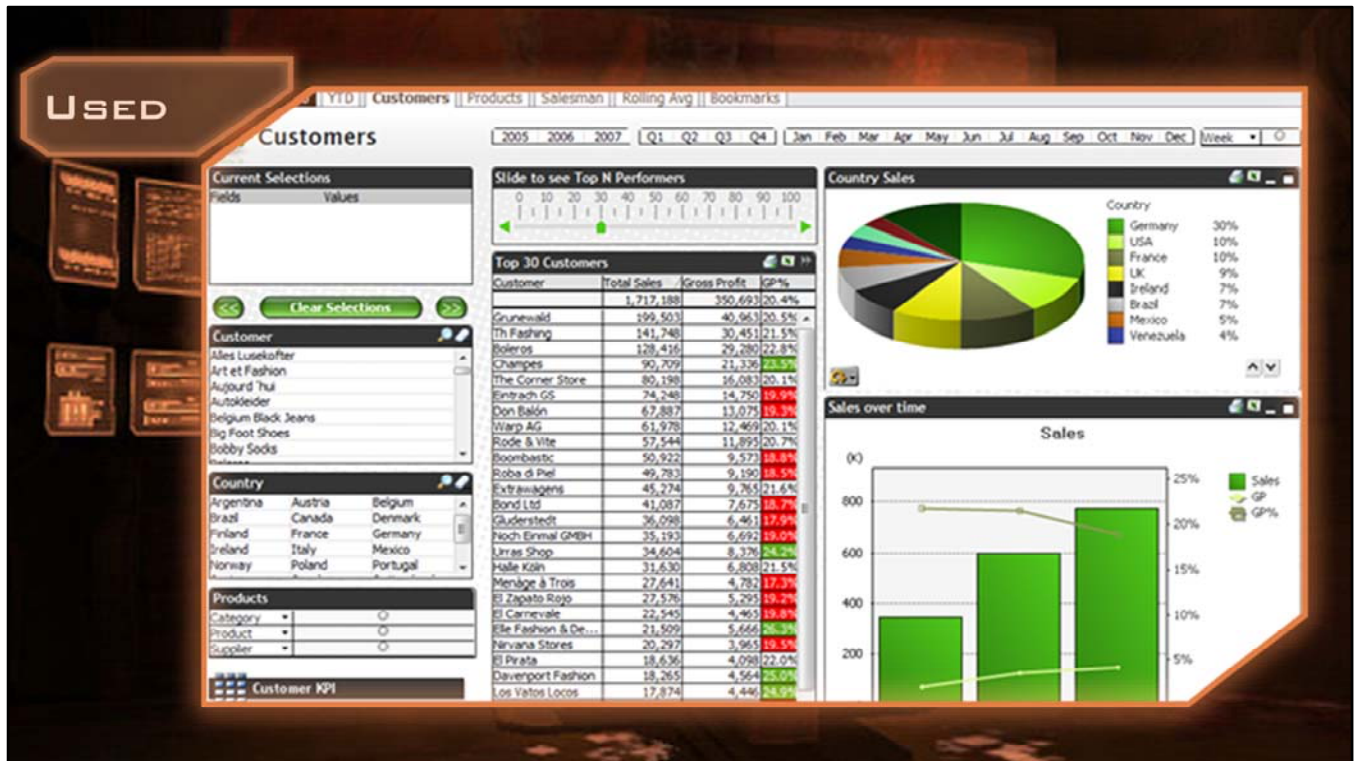


By making the tool feel like it belonged to the team, which it does, we found the team members get really excited when they saw it.

It's easy to think that this is trivial, but the difference is probably best shown in pictures.



When you look at generic analytic tools they are mundane, lack any personality.



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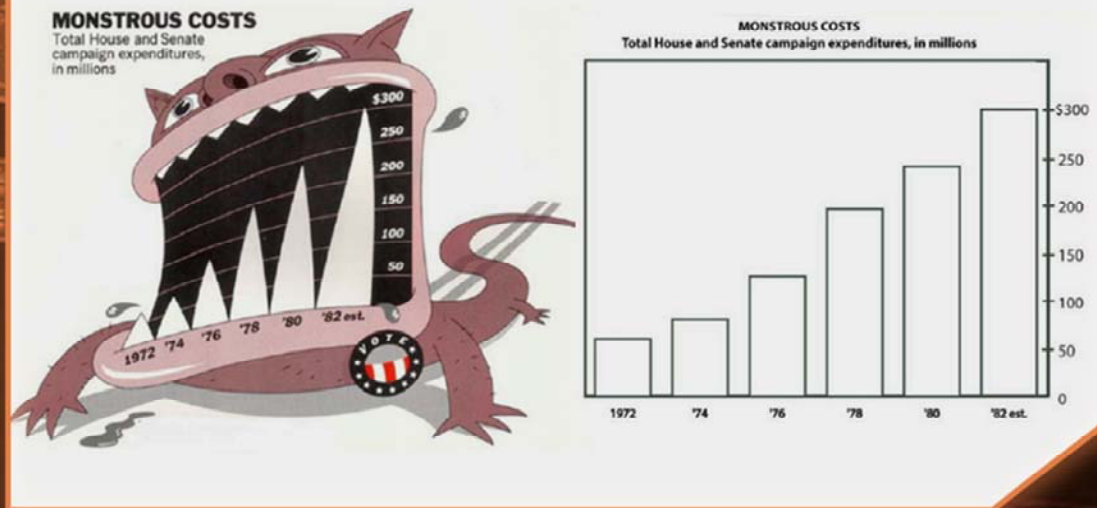


Game teams embark on large creative endeavors for months and years at a time.

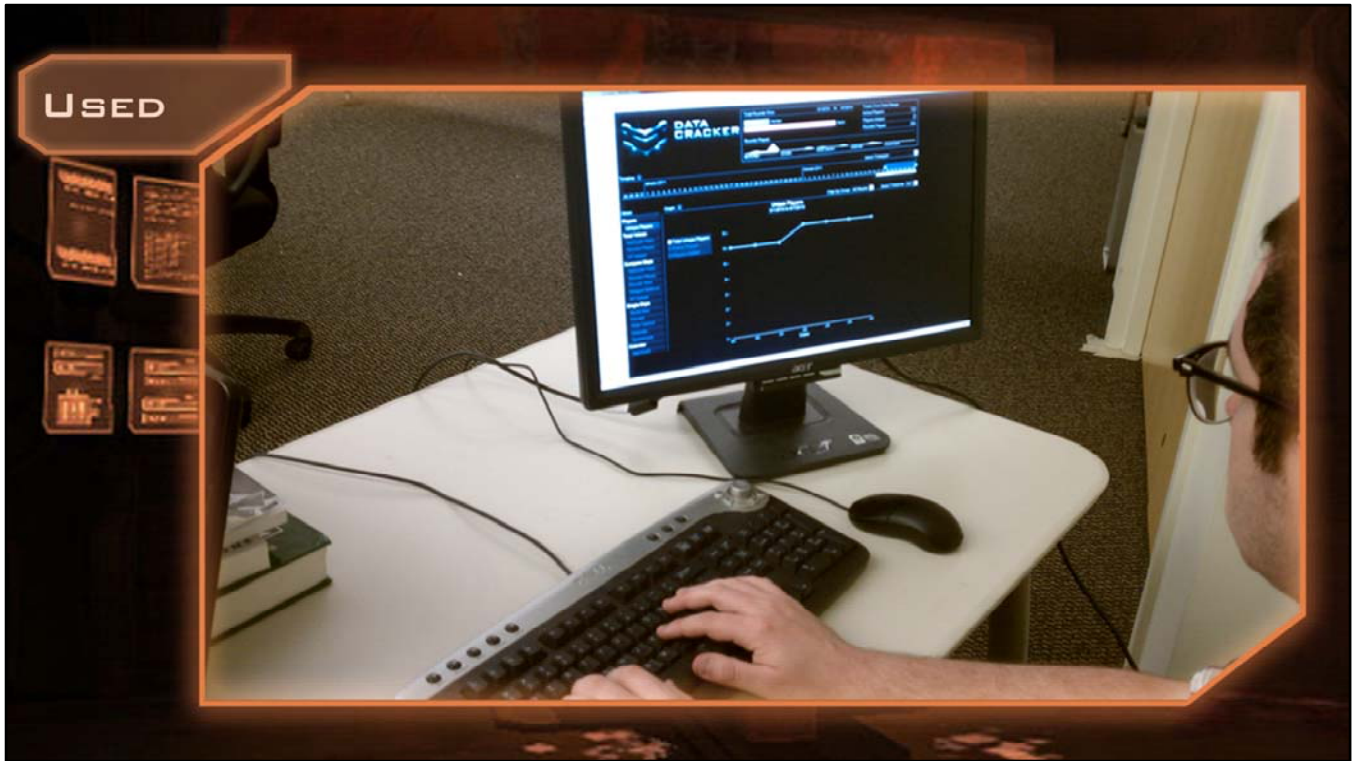


Wouldn't it be great if they had tools that reflected their creativity?

USED



There has also been recent research that shows personalizing or embellishing charts and graphs actually helps with information retention. If someone views a graph as being novel they will likely remember it. Personalizing Data Cracker to the Dead Space team was a great way of achieving that novelty and holding their interest.

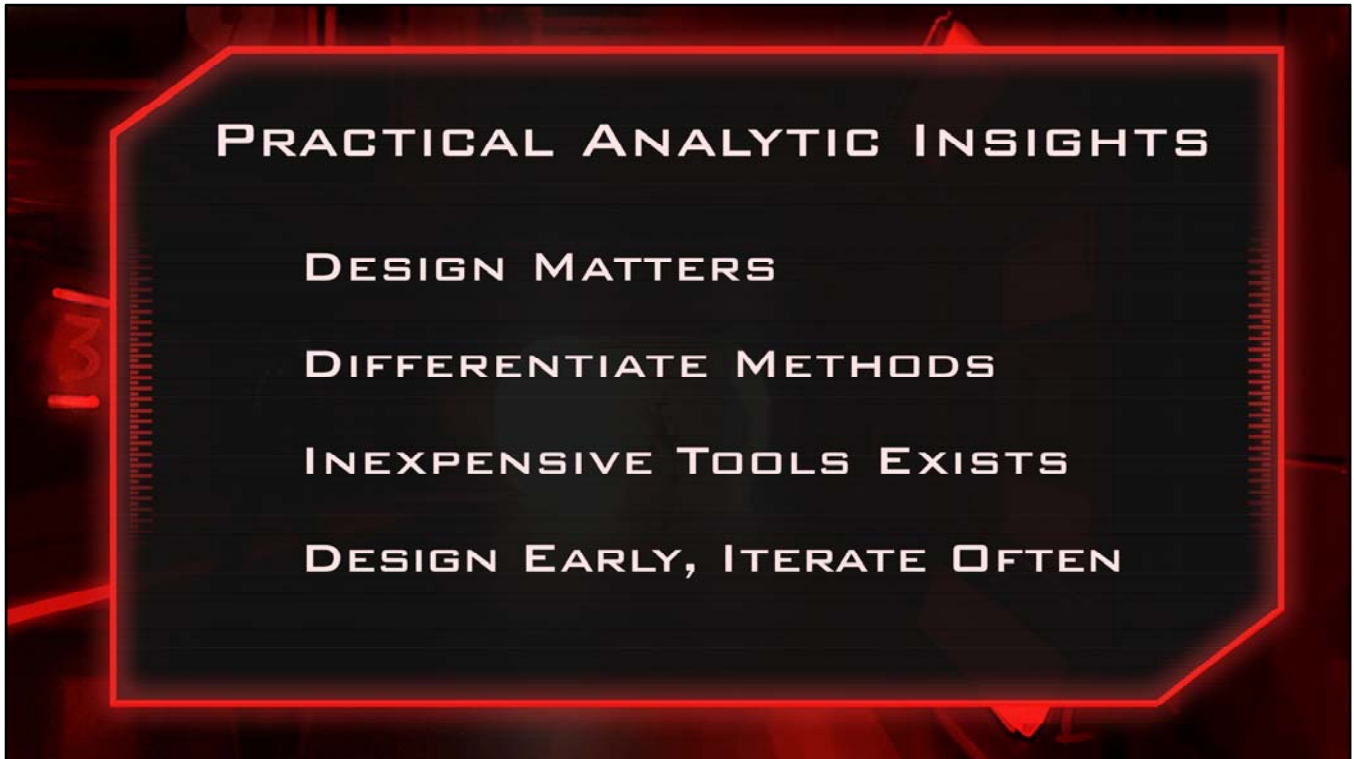


The second thing we did was to focus on usability of the Data Cracker. Once we had it working, we invited a number of people, both from the Deadspace team but also just friends from around the EA campus, to come and be play testers for the tool.



As with any usability testing we learned a huge amount from this process. In particular we made dramatic changes to the timeline functionality. It was obvious that people were interested in looking at various date ranges, and they were really struggling with our initial interface. We also split up graphs into different tiers of analysis, making it easier to step through data from a high level to a lower, detailed level. Finally, the best thing was after someone from outside the dead space team would play with the tool they would immediately ask “where’s my data cracker.” So we spun usability testing into a means of disseminating our work and getting other teams interested in what we were doing.

That’s how we made data cracker useful and used.



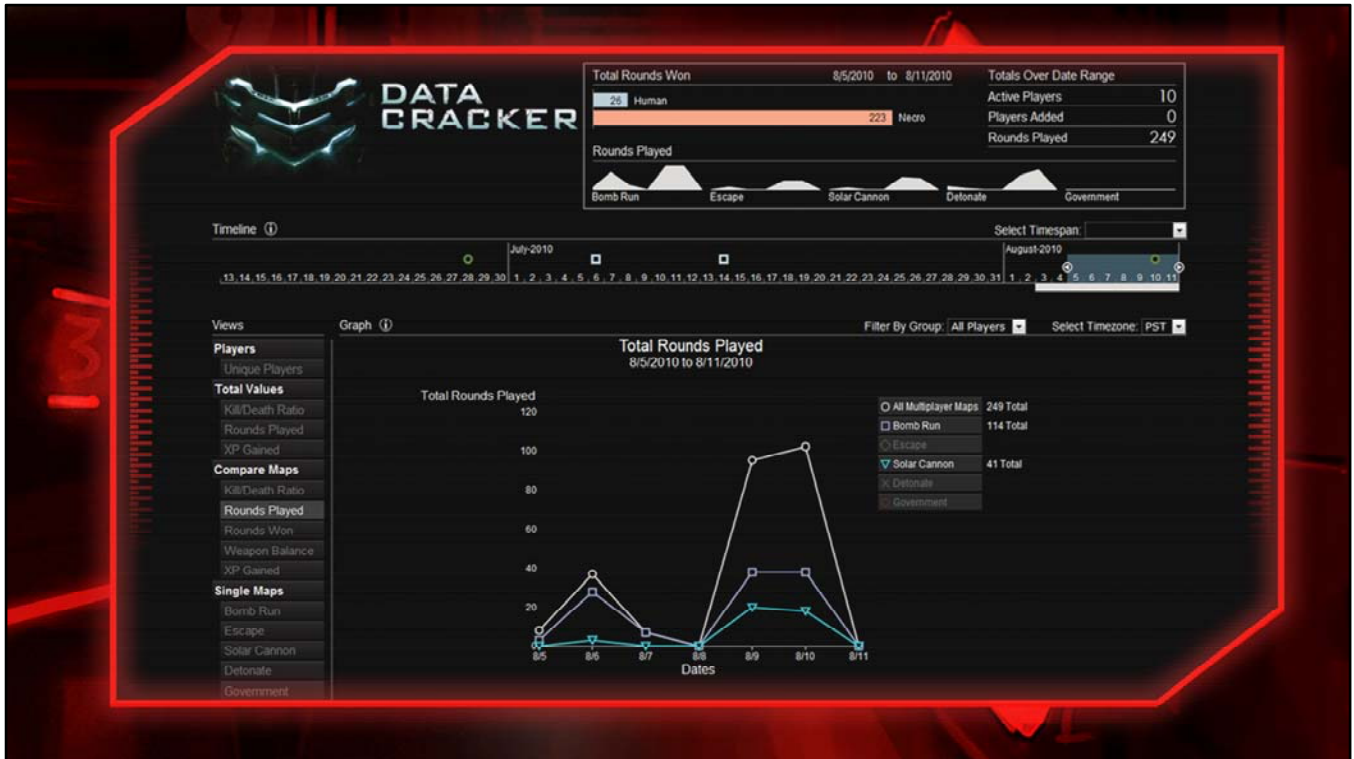
Wrapping up. Data Cracker is one of a number of analytic systems that have been used at EA, but it was a particular success for a number of reasons and they are reasons that are valid for anyone wishing to make their own tool:

First, Design matters. In terms of appearance, usability, and functionality. In other words, analytics is not an engineer's task.

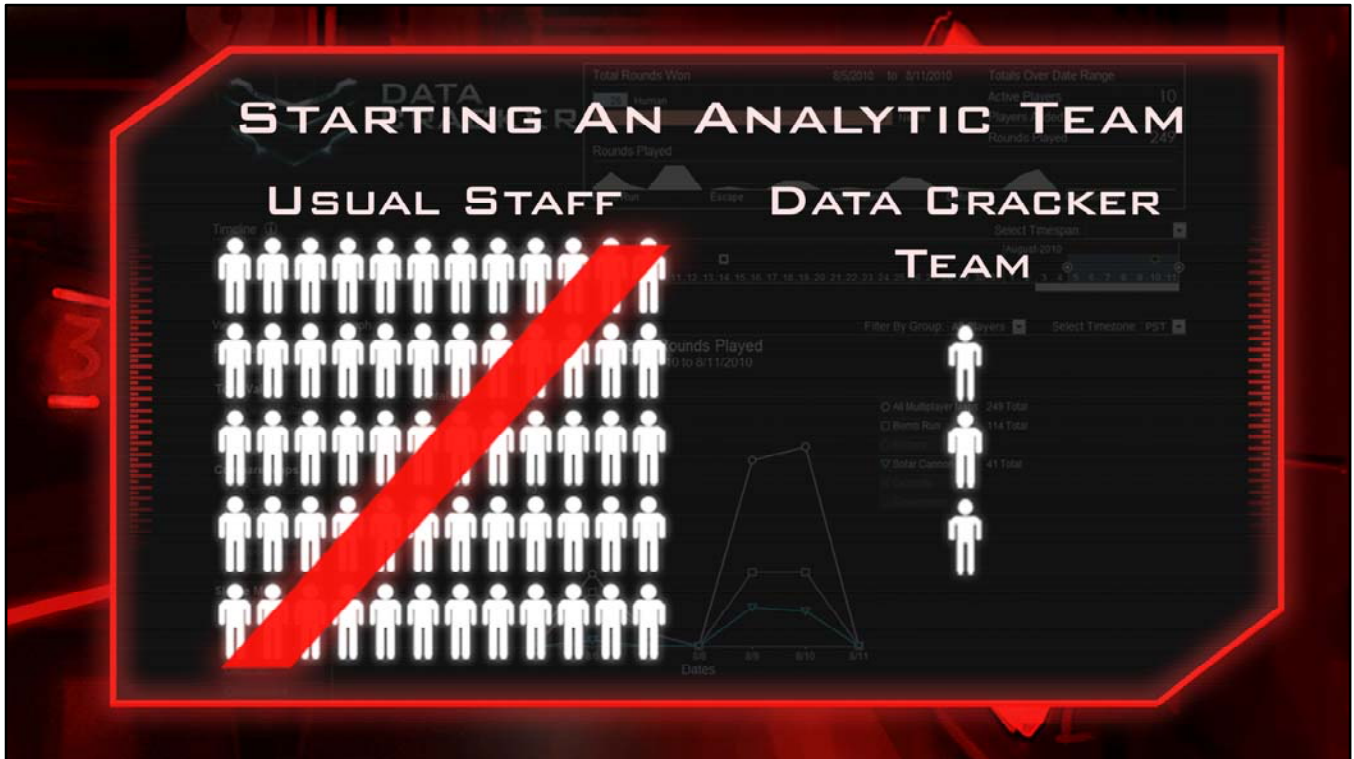
Second, Understand the difference between instrumentation and data mining methods. Data Cracker is an *instrument*, meaning that it collects data to compare against expected measurements over time. *Data mining*, which is designed to produce unexpected insight, is a whole different ball of wax and a whole different GDC talk.

Third, Use inexpensive tools. You should not be intimidated by the work involved, or the cost of tools. If you know what you're trying to achieve with analytics, it just isn't that hard.

Finally, Design early, iterate often. If you want the tool to be useful, make it part of your development plan, not your deployment plan. This shift is fundamental. Only by starting early can tools evolve *with* the game, and actually reflect the needs of the designers.



It's unfortunate that these types of projects tend to inspire fear and distrust among the usual suspects in game development – and I'm not just referring to EA.



As Michael John puts it “If you’re going to go big on something new, like analytics, the usual staff won’t get you there. But a cleave, focused graduate student ... that just might.”

Data Cracker was built by two students and a single manager, with little to no technology budget. It is now being used by both Dead Space single and multiplayer teams, and is slated to be modified by other EA teams. Bringing in a few outside people to work on analytics and integrating them into a game team can radically change how developers think and operate.



And don't believe all of the hype. Analytics will not steal your design soul. The sentiment I have felt around the conference this week is that design and analytics must work together ... which is excellent. What frightens designers is when they see analytics being used as a means to achieve gameplay where the primary goal to squeeze money out of the player.



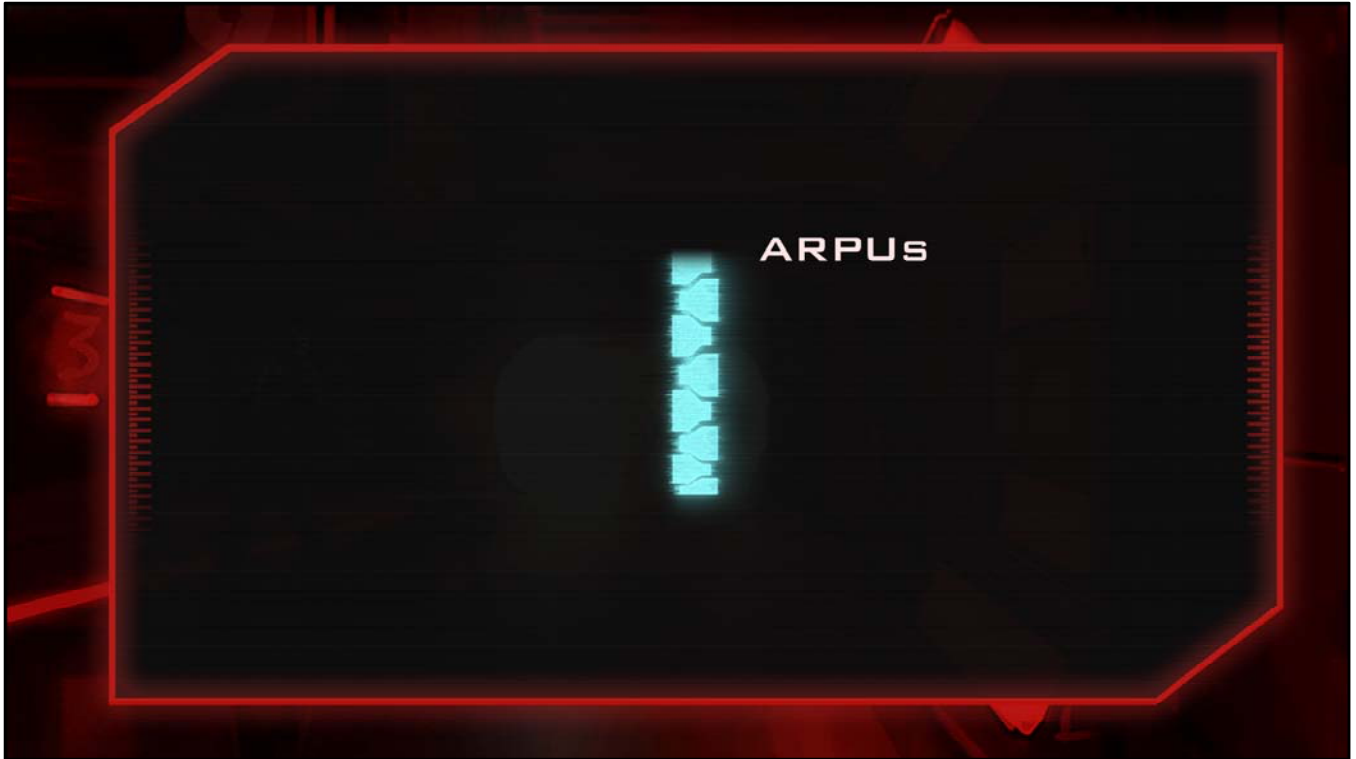
But if your primary goal is to create a deeper and more accurate connection with your population of players, going in with analytics can only help. Remember, it's "Play Intelligence". I'm not personally studying and developing analytic tools to increase my Average Revenue Per User. It's about gaining really cool insights into how people play and figuring out where to go from there.



This is a call to action for game designers : Don't fear this stuff – embrace it, make it your own, and use it to make your games better and more appealing to your players. Once you have an instrument like Data Cracker, it feels like flying blind not to have it.



And if you don't embrace it, if you don't make it part of what you're doing, right now, on your game, you can bet that those typical marketing acronyms, ...



the ARPUS...



DAUs...

ARPU_s

DAU_s

 SKU_s

SKUs...

those will be what your game is measured on, and judged on.

Thank you.



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