Welcome to The Brainstorm, a podcast and video series from Arc Invest.

Tune in every week as we react to the latest in innovation and reflect on how short-term news impacts our long-term views.

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Welcome to episode 15 of The Brainstorm, joined by Tasha Keeney and Nick Groose.

I'm Sam Kors.

Today, we've got some great topics.

We're talking about 3D printing, making its way into some of the biggest companies.

You've probably heard of them, Apple and Tesla.

We've also got Unity upsetting developers and what's going on there.

And then lastly, we're going to talk about EV charging and whether or not the grid can handle it.

Tasha, maybe we can dive right into it.

What is going on with 3D printing and Apple and Tesla here?

Yeah, well, you know, at Arc Invest, we've been looking at 3D printing for a long time, the past 10 years, since the company started.

And a quick recap, 3D printing is often used for prototyping.

So it's in the design to production phase.

To make its way into an end-use part, it's typically like a low volume part application,

super complex part applications.

They're kind of like specific and niche to the technology.

We do think that this is going to be a big area for 3D printing and this is what, you know, you could get like a above 40% growth rate on the industry as a whole, the end-use part category.

But what's so interesting is, okay, so this week, as Sam said, Apple and Tesla might be using 3D printing.

The reason this is such a big deal is because these are, you know, they're mass-market, high-volume consumer products.

And I think this is a 3D printing application that would surprise a lot of people.

Again, just on the sheer volume of these types of products.

And the 3D printing that we're talking about is binder jetting specifically.

So very exciting news that both Apple and Tesla are considering it.

What is binder jetting and what is Apple planning to do?

What's Tesla planning to do?

Yeah, binder jetting is basically you take a binding agent and you apply it to a metal powder to make or a sand, any type of powder, but usually metal and sand, to make the particles stick together.

And then once you are able to get them to stick together in the shape that you want, you bake the part.

That's the final step.

You bake it to kind of cement everything together to center it.

So in binder jetting, out of all the different types of 3D printing, so as opposed to what's more typical fused deposition modeling, which is like squeezing, you know, plastic out of a nozzle head, this type of 3D printing is better for higher volume applications.

So it's no surprise that, you know, when we're talking about high volume, we're hearing about binder jetting, but it is really exciting that these are like tangible consumer products that a lot of people know and love, both Tesla vehicles and potentially the watch case for Apple.

And so what are some of the companies here that are actually doing this?

Is this something that they can do in-house or are they going to be relying on some supplier here?

Yeah, so Tesla, we know, is using printers from what was formerly X1, a company that ARC actually used to own.

X1 was acquired by desktop metal and the application that Tesla is using again is sand, using sand 3D printing.

So basically it's what's called investment casting.

So you create a mold and then you build your product around it and then you actually destroy the mold.

So using sand has a lot of benefits to using metal in this case, which would be the alternative.

So the Reuters article, which published on this, mentioned that the sand molds would be like 97% cheaper than the metal alternatives.

Again, this could be used in every car produced, specifically the car platform that they're

talking about is a low price vehicle, the $25,000 car.

So you know, for our purposes, that could be the robot taxi, for instance.

And it's the vehicle subframe that they're looking to giga cast all in one piece.

And basically this, the sand mold would be in the center.

So that is again, X1 desktop metal.

For Apple, we're talking about metal binder jetting, so not sand, but metal.

And it's the watch case, as I mentioned, they're not saying who their suppliers are.

And again, it was just rumors that they could be potentially using this, but we've heard about Apple testing out 3D printing in the past.

Foxconn has been making investments in binder jetting to develop that technology.

You know, I mentioned desktop metal, another company, Markforged, also has binder jetting technology, HP also invested in binder jetting.

So those are sort of the Western counterparts, but again, there are other Asian companies that are working on that as well, which might make more sense for an Apple.

But the important thing is it's showing light on this technology and all the special things that it can do.

And how you can actually lower cost, shorten design to production, time frames in a lot of cases.

And maybe just to continue a little off topic, but in the spirit of the brainstorm, Tesla's continued innovation here on manufacturing.

You know, I feel like one of the key questions back in the day was, is Tesla going to ramp up and learn how to manufacture or are these traditional automakers going to switch over and be able to make electric vehicles?

And I think, you know, we saw with the single casting for the rear and front parts that they kind of took the lead there.

You saw Toyota say, you know, that was huge innovation.

What does this mean for their continued advancement here?

Is anyone else looking at this or do you think this is Tesla separating from the past?

Yeah, well, you know, Sam, and maybe you can touch on this.

We have heard of other automakers looking to, you know, cast these really large parts.

So Tesla was, it seems like Tesla was first to do it.

So but that doesn't mean that it's not, you know, an interesting technology that others might pick up on.

I think it does to your point, it highlights Tesla's verticalization advantage.

You know, Tesla's using these X1 machines, but it sounds like they're, you know, they're switching up like the chemistry of what they're putting together, the material types.

They're thinking about, you know, how this is going to interact with the amount of pressure that you need for this press to work and whether they can make adjustments there.

So they're using someone else's machine, but they are making internal adjustments to make this happen.

And this is certainly an innovative process, right?

I mean, we know other automakers are likely using types of 3D printing, probably in the prototyping phase.

But for this to be in like a high volume production process, that would probably be unique to Tesla and pretty amazing.

The only other cars that we see that get, that utilize 3D printing really heavily for more production parts are race cars, because they tend to be in lower volumes.

Amazing.

Tasha, thank you so much.

And we'll, we'll have you back on once we find out more.

Thanks for having me.

All right, Nick.

Why are so many game developers upset at Unity?

Yeah.

So last week we had a bit, we'll call it a bit of drama.

Maybe it's fair to say it was a little bit more than that in the game developer community.

And just to give some background, Unity is a game engine service.

It has different services it provides to developers.

But really you can think of this as a platform to create and grow video games.

It is the largest of its kind.

Another comparable and competitor would be Epic Games and their Unreal Engine.

But what happened last week was Unity announced that there would be a new run time fee implemented
in January of 2024 for developers.

And there were set tiers into which this would be implemented.

So if you had, I think at the base package.

So if you were using Unity for free, because they charge per seat, you would have to have
over the last 12 months, over $200,000 in revenue and over 200,000 installs.

This did not sit well with developers, especially on the smaller side.

The indie developer community really took issue with this implementation of this run time fee.

Particularly, I think what we saw happen was a miscommunication from Unity to the developer community.

I think if Unity had a chance to go back in time and redo this, they would have spent
some more time talking with developers, initiating communication before they released this run time fee.

Because I don't think, we don't believe that it was their aim to upset their developers.

This is their core customer base.

But they are looking to scale and monetize their business after just that charging for
the seat if you move up into their higher end package.

So they are looking to monetize this run time fee.

And ultimately what has happened, we've had a week of back and forth between Unity and
the developer community, Unity released a statement on X saying, we are going to re-look
at what we've put out, we've heard from you, we understand, we hear your concerns.

And now I think I just saw a memo, it was a recording of an internal all hands meeting.

And it looks like they are going to revert to potentially a pricing scheme that is more

in line with what Epic Games has, which is taking a percentage of revenue after a certain amount.

So over a million dollars, Unity will start to charge, I believe it's a 4% fee, but again, this is just hearsay at the moment.

Hopefully we get confirmation on this, which is actually more in line with what Epic Games is charging.

I believe theirs is also that million dollar cut off, but at 5%.

So some competitive pricing going on.

But this was big news in the gaming community because these two platforms, Unity, Unreal with Epic, these are the primary two game engines that developers are using today.

So this seems like it's a big hub up because of poor communication, but they are going to get their take rate once they figure it out.

Maybe more interesting, what's the difference between Epic and Unity?

Yes.

Why would a game developer choose one over the other?

Kind of what's their flavors?

Yeah, from what we know, again, it's going to come down to what the developer is looking for out of their game.

Typically what we've seen is Unreal has skewed to higher end games.

So when you're looking to create a very immersive landscape, you want something that feels more AAA in nature, you may tend to use Unreal.

That doesn't mean you'll always opt into Unreal, whereas Unity has really had a stranglehold and has done very well in mobile and VR.

And it does scale up into those more immersive games.

But if you look at where the share is today, Unity has dominated within mobile and Epic has dominated more in the higher end video games.

And where it does differ between the two companies as a whole, Epic has also used its Unreal engine to vertically integrate through Fortnite.

If you think about Fortnite, Fortnite is running on Unreal.

And typically when you look at AAA publishers, when you're looking at Activision, when you're looking at some of these Ubisoft, whatever AAA publishers out there, they're going to tend to have their own internal game engine that they're using.

Whereas indie developers, the smaller games that are being created, are choosing to opt into these open Unreal and Unity services because from a cost perspective, there's really nothing else out there.

The industry has largely standardized on this practice of using game engines as a service.

Any other insights here, or should we move on to the next topic?

Yeah, I think the larger point to make here, because again, it was news over the weekend and now we're here today recording on Monday, and it seems that they've come to an agreement or hopefully they've come to an agreement.

So it was news, and now it's not really news.

But I think what we can take away from this is if you are interested in the gaming space, looking at game engines as structurally important to the growth of the larger gaming ecosystem

I think is really important.

When we're looking at the space, we want to see platform opportunities, and we believe game engines and the services that you can layer on top of them.

Remember Unity is not just offering the ability to create a game, but also to grow a game and monetize that game after the fact.

Actually, if you look at their revenue, there's a large chunk of that that comes from advertising.

So you build a mobile game, and then you grow and monetize that game through Unity and their ad network.

So looking at these game engines as the way that this space as a whole gaming becomes democratized.

And this is a big trend that we've been watching in the gaming space, which is as it becomes easier and easier to create 3D assets and 3D worlds, you should see more and more creators step into this space.

We kind of believe we're in the third inning of content creation.

First it was with photo, now it's video with UGC, and I think the next wave is going to be in gaming, as you have the ability to create assets in real time with AI and the proliferation of that.

We think game engines, Unity, Unreal offer a very interesting opportunity from a growth perspective.

I like that third inning.

So we still got, what is it, six innings to go?

Yeah, third inning, maybe the wrong phrase.

I'm mixing up my phrases here.

The third stage, the third leg grows within content creation.

Nice.

So no seventh inning stretch.

No, we were probably, I mean, unless there's something after interactive, immersive video creation, I think this is probably what's going to take us into the next decade plus of content creation and consumption.

Nice.

Thank you for breaking it down, because that was one of those things.

It's like, I saw it, I saw everyone was mad, and I was like, all right, I don't really get it.

Yeah, and you have to understand both sides of this.

I think it is fair for, and again, what we've boiled this down to is a clear miscommunication on both parties.

I think the developers didn't understand where Unity was coming from, Unity didn't understand where the developers were coming from, and hopefully everyone can move past this because we believe it's in the best interest for Unity to not upset their developer base.

And developers, we think, have a great tool in what Unity builds for them.

Nice.

All right, let's take it to Eevee charging and the grid, and Nick, one thing I want to say here, oftentimes, maybe you've experienced this as well, one of the big mistakes with

forecasting is assuming that other things are not going to change.

I think Eevees are a clear example of this.

One of the biggest pushbacks, you know, oh, you're charging it on a dirty grid, ignoring the fact that the grid is rapidly changing, coal use is going down, particularly in the US.

Globally, as well, you see different dynamics happening fairly quickly with the addition of solar and wind.

And I think this is another example of that, people saying, you know, oh, the grid's not going to be able to handle all of the Eevee charging.

And so at the very highest level here, you know, I'm going to, for those listening, I'm going to draw a sign chart with my hand.

But electricity demand looks like this, right?

It goes down, no one's really using stuff overnight.

It normally comes up and it peaks in the evening slash afternoon whenever it gets home and turns on air conditioners, and then it comes back down.

And so we have the capacity to meet peak demand, but you have all of these other hours where we shut things down because there's not as much demand.

And so just a very crude back of the envelope math here is looking at the roughly, you know, I think it's like 285 million cars registered in the US, and they travel roughly 9 billion miles a day.

And if you were to say that Eevee's need four kilowatt hours per mile, so then you'd need 2.25 billion kilowatt hours a day in order to charge all of these.

And again, I'll draw this chart again, whoop.

If you take those troughs and you bring them up to that peak level, then you've got more than you would need to charge every single vehicle in the US if it were electric.

Of course, that's back of the envelope.

That's crude.

That's not really what happens.

It's going to take time for vehicles to switch over.

And I think this is another important point here, which is the vehicle fleet is huge, right?

I'm just going to double check, make sure I'm not totally off here.

It is 285 million vehicles registered in the US.

So even if you went to 100% Eevee sales tomorrow, it would take over a decade to fully transition out that fleet of vehicles.

And in that time, the grid is rapidly evolving.

And I think people say, oh, look at the blackouts that are happening now.

I think we're really just getting started with energy storage.

People hate it when I say that cryptocurrency, particularly Bitcoin mining, is great for incentivizing additional solar and battery.

But it's true.

We wrote a paper about it.

You can see why we believe that's the case.

I think the grid is going to become far more distributed and resilient over the course of time where electric vehicles are sold.

And so I don't think that this is an issue that people should be saying will limit electric vehicle adoption.

Any pushback there?

Well, I smirked when you mentioned the blackouts, not because I think that's funny or I'm trying to make light of it, but because I was going to give you that pushback, which was if the grid is so resilient and can handle this type of demand, why are we seeing these blackouts?

But I think you answered that.

I guess my one question is, aside from just potentially misforecasting how the grid will develop, why is there this misconception around EVs overloading the grid and there not being enough electricity to support this growing fleet of EVs?

I think because it's an understandably complicated topic.

And it's one of those things out of sight, out of mind.

Most people have no concept of how the grid functions, what's generating their electricity, and then layer in the rate of change at which those things are developing.

So another, another, I'll just throw this out as another example, you know, originally everyone just said, look, semi trucks, electric, not going to happen.

Batteries aren't good enough.

They weigh too much.

No way, you know, that's being proven false with the deliveries that Tesla's made to Pepsi and we're tracking the runs that they're doing now and clearly those exist.

And then people said, okay, but you'll never be able to charge them in the same area.

And this is where batteries really do come into play.

And at the local level, if you can put batteries in place, you can make it such that you don't need to wait on these big infrastructure upgrades at the grid level, you can put these batteries so that they can charge at slower paces and the power demand can be kind of abstracted away from older grid infrastructure.

And what do you think about residential battery packs?

I saw something on X about, you know, Tesla and I think Texas working together to redistribute residential battery pack energy back into the system when it was being overloaded.

And I think, you know, it has a new name and a terminology, this kind of digital infrastructure for energy.

I would love your thoughts on that because I assume this is something that you are thinking about when you say the grid will be more resilient over time.

Yep.

And so, Nick, just correct me if this isn't what you were thinking about.

Virtual power plants.

Yes, virtual power plants.

Yeah.

What did I say?

Digital infrastructure.

I don't know.

You gave the consulting report version of it.

So virtual power plants, I think they're definitely going to be a part of the future here.

Companies are running tests with them.

Tesla has been running one in Vermont, I believe, for a number of years.

And I think it's a smart way to go about it.

It's, again, to the point that I made it earlier, the future of the grid I think is decentralized to some extent and having these battery packs at people's houses where they can, if there is a blackout, keep using all of their, you know, their fridge, their washing machine, no interruption to them.

And then if it's not in their local area, they can help with other grid services to make sure that there isn't a blackout is extremely beneficial.

And it gets into, you know, Tesla has AutoBidder, which is another service where, you know, they intelligently turn on and off batteries.

And apparently it's made hundreds of millions of dollars by providing those grid services.

So I think that batteries are going to be deployed in a significant way to the grid.

And in various configurations, software is going to be layered on top of it.

And it's going to change the way that, you know, we think about the grid.

Very interesting.

I'm looking forward to having you be proved right here, because I don't want to get through anything like a prolonged period of blackout.

I need to watch TV and make sure you can stay up on speaking of TV, Nick, I think it's important we address.

Okay.

I knew this was coming.

I knew.

I'm over to.

Over to on predictions for sports, for sports, and for those, for those who didn't see last weeks, one, you should go watch great episode, episode, brainstorm episode 14 killer.

No, we made the forecast about Max for stop and winning every single race remaining in the season.

He lost in Singapore.

What what else we got going?

What other sports prediction can you make here?

I think I'm, I'm going to take a week off because this is now I'm over to, and it's, it's happening very fast.

I'm making these predictions and it feels like maybe we could have got one race and then maybe he loses the next one, but no, right, right away.

I'm a counter indicator for now, hoping to turn it around later in the year.

I'm going to take a break for now though, and hopefully my, you know, yeah, no blackouts in St. Petersburg need to be able to watch TV so I can get better at.

I'm making these predictions.

There you have it.

All right, we'll catch everyone next week for episode 16.

Yeah, thank you everyone.
That's our show.