

*Iain Roberts:*

Thank you for having us today. It's been a great day so far, really a varied ton of work that we've seen. And hopefully this is gonna be something a little bit different.

We in Chicago have a pretty strong digital, physical, kind of integrated user experience team, and so we're gonna try and tell a story literally of a project that we did back in 2007. So it's interesting that we've been talking today a lot about the iPad, and when we actually began this program, the iPhone didn't exist. And we were having lunch with Gary Braddock, who's one of our clients from Ford here today, and he was saying, "I remember you guys telling us about this mythical tablet-like handheld device that Apple's gonna produce." And lo and behold, six months later it came out.

There's actually a story of this of fairly resourceful project team. This is a slightly tongue-in-cheek starting slide. Imagine nine people stuck in a room for six months, working pretty much like 12- to 14-hour days, eight men, one woman: four interaction designers, one researcher, four mechanical engineers and industrial designers.

The Glade air freshener became jokingly referred to as the innovation spray, 'cause it smelled in there. It was bad. Every morning, Dario Buzzini, who's actually now our lead interaction designer in Munich, would come in and say, "I think we need some innovation this morning," but it would actually be lit up into space because we literally camped out and nobody saw us for many months.

So this is a program that Ford came to us back in the end of 2006 and said, "We think we need to do something in user experience, in car experiences." The first program that we did was called Ford HAL. It was actually focused on defining the principles of an in-car experience, and we knew at this point that we were gonna be fundamentally delivering a platform experience that would ultimately be trickled across everything that they produced from 2011 onwards.

This is actually what's called a property or a buck in the industry. This was actually the concept we delivered at the end of that first phase of work and was really just intended to inspire senior executives around what features and functions and experiences we could actually deliver to consumers in 2011.

So fast-forward, we're gonna talk to you actually about the build phase of this program, where we actually went and designed the experience, not just the concept and the research but where we designed the experience. Ford 5 saw us move from fundamentally defining what are the right things to do, what things should Ford go after, what experiences should they deliver. And Ford HAL, the second project, was really focused on making sure we go back out into the world, evaluate our findings and our principles with people, to ensure we're doing things right, that we deliver that right experience, that the concept – it's not just a concept. It's something that makes it to market in its full form.

This is the challenge – two major challenges, one and two, that we kinda came away with. If you look back, actually, to this buck, there were a lot of features and functions we put in here that were very, very different: a full LCD screen in the instrument panel, a very different-looking steering wheel, a completely different center stack, this idea of an enhanced content experience. Ford at this point were just getting into a partnership with Microsoft for SYNC, so we were really looking at an information layer on top of the car experience; it was very different.

As we moved forward with Ford HAL, we were focused on how do we actually present that experience to people in a safe manner, right? We're driving a car, for god's sake. Eyes on the road. We're not trying to overload people. Cognitive overload is an issue here.

But this was the state of the art when we began, right? People were bringing Garmins into their cars, this didn't exist, and they had iPods. People were bringing increasingly large amounts of their own stuff – we affectionately termed it their baggage – into the car with them, and it was affecting their driving experience. How can we deliver all of that in a safe manner that allows them to continue and focus on the driving experience but also deliver something that's quite remarkable and allows 'em to stay connected with their lives?

How do we take what was a standard in the industry referred to as a DIN radio – it's that way for a reason, because the after-market dictates that you have to have it a certain size so that you can swap a radio out. How do we put a touch screen in the center of the car to deliver the right content, but do it in a way that actually puts the right information in there, that actually allows consumers to get the right experience that they want out of their vehicle?

We started, as we always do, focusing on people we knew, which was kinda interesting for us. Ford had a ton of quantitative market data. We're doing a feature Ford and a fairly technology-advanced solution here, but the average car buyer's 57, and Ford were very, very worried about the fact that, fundamentally, people were gonna be very tech-averse.

We went out – we knew this was gonna come out in the CUV market, the Ford Edge; the refresh is happening this year. And we went and looked at drivers of CUVs that spanned the range of everything, of consumer ages and the core consumer as well. And really open their eyes a little bit to the fact that demographics and market data can be deceiving, as we've heard again today. And then when we actually dig underneath it and understand that there are some drivers who may be 57 and fit your core target customer but they're very advanced with regard to their understanding of technology, their use the technology, the fact that they're integrating it seamlessly in their lives.

This wasn't the interesting part of this early research study to me, though. This was actually more interesting. We affectionately refer to it as Mr. Potato Head. We took the buck from Phase 1 of the program and we drove home with a dashboard from Ford in the back of another car, and we assembled a research prop, for the sake of a better term, that was everything magnetic. And we would sit there and do research studies with people and allow the generative dynamic conversation to happen fluidly. So as they were talking about features and functions, they could move and they could change them, and they could design with us.

So it was kind of an interesting very early, super-simple prototype that allowed us to talk about what the right things are to do and allow them to have input, but the design cycle was minutes because we just simply added different things to the dashboard and we had different conversations.

I'm not gonna focus on the top here; I'm gonna focus on two elements for me that were most inspiring about our learnings here. The first is that we're adding this digital layer to the vehicle so that people actually – I actually read this idea that people wanted – that people clustered things in this kinda traditional areas. More that, actually, people wanted a sense of familiarity, right? There's a new experience that we're delivering on top of the vehicle platform. We still need to ensure that there's a familiar essence to getting inside that car. And you'll see some of those elements in the final prototype we share today.

The second being this pink Post-It note, which I think is genius. As SYNC was bringing a connected service into the vehicle, we were talking a lot about this idea of enhanced content. Again, Yelp was barely on the radar at this point. What if Ford could actually provide recommendations to you as you're driving as to what the best coffee shop is in your neighborhood? A lot of feedback from people. I trust Ford to get me from A to B; I don't trust them to make a recommendation. Right?

*[Audience laughter]*

So how could they partner with services? And actually, they've done a tremendous job internally – hats off to them – with their connected services group that's now going out and working with the likes of Pandora and bringing you the experiences you have on your smartphones, but bringing them to life in the dashboard of vehicles.

Great. You're not supposed to be able to read this, by the way. That wasn't the intent. As designers, we try to keep our head in the clouds and our feet on the ground. The first thing we did, knowing we had our first round of feedback from consumers, knowing really what we were trying to design, was "Okay, let's get the constraints out of the way." I often find, personally, constraints inspire me to do better work. Ignoring them, and we always fell foul of it towards the end of the program. Getting the constraints out first inspires us to really push and provoke in what we can do.

So we developed, with Gary and his team, a really comprehensive understanding of the information architecture. What were the features and functions that we need to be able to build into this thing? So these were always top of mind as we were going through the design process, even at a very early phase. Everything came back to having to be able to deliver all the features and functionalities that Ford advanced planning had asked for.

In typical IDEO style, prototyping was lo-fidelity early on. First thing we did, the team went into our shop, and I remember them building ten identical yellow foam steering wheels, and literally, prototyping was with anything that we had on hand. We're trying to, at this point, prototype the tangible interface. The tangible interface, the things I'm gonna touch, the things I'm gonna actually interact with on the steering wheel. Trying to talk about, fundamentally, are we gonna go the direction of a multifunction controller that allows me to be fluid in my interactions in the

content I'm consuming, or am I gonna go the direction of simply raising buttons to the higher level on the steering wheel?

What was interesting about this for me was the way in which the team worked together. As I said earlier, we were co-located in one space, and so the team worked in a more integrated manner than I've ever seen any team work before in my experience. Designers were talking about steering wheel designs, and literally talking about the interface at exactly the same time. And the interface would inspire and inform the steering wheel, and the steering wheel would inspire and inform the interface. And it literally went round in a reciprocal loop that was real-time, in a way that I haven't seen it before, and allowed design iterations to just move supremely quickly from one space to the other.

That's how the team worked probably the first six weeks of the program, is just making, literally in blue foam, yellow foam, and Post-It notes, to get to a point where we knew what the interface was gonna be, we knew what the functionality variations were that we wanted to test, because it was done super-quick, super-simple, and lo-fidelity early on.

At this point we knew, okay, we have a couple of design directions; we now need to go build them. And at that point, I'm gonna actually let Tasos explain a little bit more about actually how we went deep into building these experiences to get a better understanding of the cognitive load and the usability and the actual fundamental – whether or not these experiences were desirable for drivers.

*Tasos Karahalios:* So as Iain said, at this point we basically come to a point where we understand the overall architecture. We have our first thoughts about what might be the important features to have. But we're really just trying to get our hands involved and our minds – kind of what's the next step for us. And at IDEO, one of the most important steps for us really is prototyping.

So what you see here is basically the electrical engineers and the interaction designers on the team just decided "Well, let's start opening catalogs and just ordering one of everything." So they just started collecting electronic switches. And we knew that at some point the prototypes are gonna have to function; we knew that it was time for us to start interacting with things, 'cause that's the only way we can kinda put the sort of theoretical architecture that we're putting on paper in our hands and actually start believing in it. So this pile shows up on our desks, and then we just kinda use it

as a playpen to start interacting with and building quick things and seeing what works and what doesn't.

The outcome of this, actually, is some quick arduino prototypes. So I don't know how familiar everybody is with prototyping kits with electronics, but these are simple boards that you can put together and program that then you embed in the prototypes, which enable you to have fairly sophisticated interactions and then give some reality to any prototype so that you can put 'em in people's hands. And then you can reprogram them based on if we decide "Hey, we need a different type of functionality" or "We want the prototype to behave somewhat differently."

So the continuation of the prototyping effort was, as Iain was mentioning, now we had some electronics, we had some basic flows of what we thought we needed to do, and we were sort of now marrying the two with some forms. So you can see here, basically, we have the yellow foam steering wheels here that Iain was describing, and we're starting to layer on what are the types of interactions, what are the actual physical buttons gonna be like, how are we actually gonna push and kind of manipulate the steering wheel and kind of send information between the different elements of the car.

So we decided upon two very distinct directions. So for one approach, we wanted information architectures to be what we were referring to as sort of like the tasky approach. So by this – and it's kind of a difficult image to make out, so I'll kind of highlight the important parts, but these are the types of sketches that actually people sit around and get inspired by and go, "Wait a minute, I see it. I see it; it's in there somewhere."

And so on tasky, it was all about having top-level buttons. So if you look along here, these are representing three main categories of buttons. And it was music; it was navigation; it was telephony, which would put you into one category of information. And then with tasky, the goal was really to be able to kinda scroll through large lists of information. So this here is actually representing a scroll wheel, which is hard to see. But the goal was to have one sort of very list-heavy way of navigating information.

And then the second approach that we were keen on we referred to as browsy, which – difficult to tell, so I'll explain the sketch again. These are actually paddles that are on the sides of the steering wheels, which the goal here was to give you a different means altogether of actually interacting with the information. So by

pushing in and out of the paddle, you actually went into levels of information, and then you could push up and down when you were in those different levels to select different activities or features that you wanted.

So, again, the goal here is really, we were trying to show two very distinct ways of navigating the information that you needed to handle, and then put these in front of users to see what did they actually like and what elements of each one could we kinda pull in together.

*Iain Roberts:*

Yeah, it was – we kinda tried not to be right at this stage. We polarized on purpose, the effort being to try and make sure we learned as much as possible in our user testing, to really try and push almost sacrificial concepts to the point at which they broke, to really see what the moments were that worked for people and to learn as much as possible.

*Tasos Karahalios:*

And another fun part in the project, then, is we're always moving a little too quickly, so time is of the essence, so we decided, well, we need a prototype as fast as possible. What's available? And sure enough, you go to Target and you find arcade controllers, right? Start hacking these apart, and you find components that are readily available, and you'll see in another image, basically these are the guts of one of these. It's a four-way switch, but it embeds real nicely into our prototype of a steering wheel for a paddle, which is actually, if you can tell in the image, it's basically right here.

So now you can start seeing how it's all coming together. We have the artevino components here. We have the guts of whatever controllers we can find. And so these are our first pass at having paddle shifters on the actual steering wheel to enable you to have this type of interaction.

And so this was one of two steering wheels that we prototyped. The second one that I was describing before that was more scroll wheel-based, called tasky, started again in the shop with very basic prototyping techniques, right? This is literally two pieces of PVC tubing that somebody put on a dowel rod and said, "All right, I see something here. This is how it's gonna work." And so it starts the discussion about what the next type of prototype needs to look and behave like.

It starts becoming very realistic, or a lot more realistic, once you start embedding that little scroll wheel with some quick sketches that one of our industrial designers, our senior designer Jerry

O'Leary, was actually putting together. And then we just started putting it all together on a foam-core steering wheel, put this in people's hands, and you can start having a pretty in-depth conversation about how this is gonna behave. And, again, this is within days that you're getting lots of prototypes out so you can actually see and have intelligent discussions about what you think might be compromises you need to make for the design and the information architecture.

Again, this is just a quick picture, so the scroll wheel prototype – again, embedded controllers, plenty of button interaction. And our ability to kind of take this quickly into this state means that you can put it back out, 'cause our whole goal here was really to put these prototypes back into the hand of users and let 'em tell us what they like or they don't like about them.

Now, one thing to kind of make a clear point about. So we have the hardware, and we've discussed kind of the electronics and everything, but married with each of these directions, sort of the tasky and the browsy prototype that I was describing, is a really rich layer of information in terms of what are the screens really gonna look like and how are you gonna navigate through each screen and what are you actually gonna see. So for each of these distinct steering wheel designs and information architectures, we had the team working on basically developing all the screen interfaces that you see as you go, for example, through cruise control. When I click on this button, what's gonna pop up on screen? And when I go to this position, how's that gonna look like? So this was no small task to develop all these actual screens and then figure out how we're gonna embed 'em into a prototype.

So this is a close-in view of the prototype that I'll show you in a second, but as we're basically creating this interaction, we needed to define specific tasks. So this prototype was gonna enable you to do things like respond to somebody calling you. So you'd have to pick up the phone with the prototype. For example, there might be a need to navigate to mom's house. So there was very predefined tasks that we decided to put some depth into, and that would enable us to kind of give users the opportunity to sort of go through a series of interactions to sort of figure out how to do this. So it was basically a learning experience for the users.

And this was – well, all right, we have the steering wheels. We have the information architecture. We're trying to put all the pieces together. But we realized that it's really important to create an environment. So this was our makeshift – this was basically in

the basement of our office. We had to make a makeshift, basically, simulator.

And so the way this happened is we repurposed the previous buck that Iain had shown you before that was a Mr. Potato Head. And we said, "All right, what else can we do with this?" And we started laying in components, like an LCD screen, behind the cockpit in here. Might be hard to tell, but we actually wired up through the steering column. So essentially, this became a plug-and-play toy, where we could take the two steering wheels and any other versions that we came up with, plug 'em right in. We could have the visual screens that we were developing come on at the appropriate times within the cockpit, and we could also have another touch-screen display, which was here in the center console.

So as the other key point that I'll kinda emphasize later as well is, we needed to create an environment that felt realistic, and it's kind of funny to think of a PlayStation *Gran Turismo 3* game as making things realistic. But once we put the projector screen in front and we gave people tasks to do, one of the instructions we gave them is "Whatever we tell you to do, make sure you don't fall off the road, and you have to continue driving." And it made a significant difference in how actually people interacted with things and how they described sort of the effectiveness of certain types of techniques to navigate through tasks.

So the way to actually do that for us was hacking together a PlayStation 3 underneath here, which was a lot of fun. This is just a simple steering wheel controller that you would purchase, or maybe one of your kids or yourselves have at home, but basically we hacked it apart a little bit, tied the steering column into it, and at this point it became sort of a – basically a very fun, adult, large-scale game console. *[Laughter]*

*Iain Roberts:* I mean, yeah, it was force feedback as well, right?

*Tasos Karahalios:* Yeah.

*Iain Roberts:* It was fun.

*Tasos Karahalios:* And it was great 'cause it kept people late at night working, 'cause they wanted just play games on this anyway.

*[Audience laughter]*

So it's a good way to keep the team going around the clock.

Now, the testing environment, at this point we're bringing in users again. We had approximately eight people coming in, and as I was describing, we had one of our researchers standing right next to them, sitting basically in the passenger seat, and instructing them on certain tasks that they wanted them to perform. We also had random events, so as they were driving and trying to stay on the road and not fall off the cliff, they had to answer the phone; they had to figure out how to navigate to mom's house.

And the interesting thing was, initially, when we had 'em go through these tasks, everybody was just looking at the center console, which was in the larger top screen. You could perform certain tasks there very easily. And as soon as you said, "Don't fall off the road; pay attention," you could immediately tell which interactions needed to stay on the steering wheel, which ones were not distracting enough to enable them to go on the console. So it gave the sense of realism in a very sort of lo-fidelity simulator environment that we actually thought was instrumental in sort of defining the types of behaviors and the types of interactions we wanted from people.

*Iain Roberts:*

On the right here is – three floors above this, we actually had the entire team watching all these sessions, live video feed. And so, again, it allowed us, in the same way that the magnetic dashboard allowed us to make changes on the fly, this kinda feedback loop – one kind of opened the Ford teams' eyes to what was going on and to what was working and what wasn't working, into a completely new process.

I mean, these guys have multimillion-dollar vehicle simulators, right? But the waiting list to get in one of those is months. Right? You have to have a – we would've been laughed off the property if we turned up with a *Gran Turismo* game and this heap of whatever, right? To go in their driving simulators.

We had to create one, and we had to open their eyes to actually this way of rapid prototyping and rapid working that allowed us to effect change really quickly as well. Even in the testing protocol that we were using, we could see things that weren't working, and the feedback was immediate to go down for the next test participant.

*Tasos Karahalios:*

And so the outcome of that work was actually understanding what are the kinda key elements that people liked of the two different information architectures. And then we pulled all that information

back together into a final version now. It doesn't look that much different, because this was a stage of refinement. But at this stage, we were basically saying, well, there were certain types of interactions and behaviors that worked well from tasky, as I was describing before, and certain types of interactions and behaviors that were working well from browsy, which was the other type of interaction. And we decided to kind of figure out what's the best way to create a hybrid, and what are the elements that make sense to sort of take from each type of interaction and pull 'em into one final direction.

So this was a final round of testing where, again, we had users sit down with functional buck, go through all sorts of screen layouts, go through all sorts of interactions, and describe to us as a final pass what was working and what wasn't. And so this buck that started off as Mr. Potato Head got used at least three or four times with – by the end of the day, it was probably 30 user interviews and countless that we as a team performed on our own to kind of understand what we needed to change.

*Iain Roberts:* I think in a 20-week program, we actually went through four major research iterations, from the Mr. Potato Head to the fully immersive experience to a refined experience to a final experience. And that kind of speed of process was actually just critical to actually getting this done in time.

*Tasos Karahalios:* Yeah. And the end result is – one glimpse of it is here – was doing a refined buck that had all the levels of interaction that we thought were appropriate. And, again, what was key here was to preserve sort of what are the key elements from an interaction point of view, so of course we weren't able to program every level of detail in, but we selected out a few specific tasks and said, "All right, what does cruise control look like when you interact with cruise control? What does navigating through my music library look like?" And so by putting those elements into a refined buck, we were able to give Ford and talk with Ford about what are the key elements that then you would kind of take on to any other interactions that might evolve from that point on.

*Iain Roberts:* Yeah. Right.

*Tasos Karahalios:* So yup.

*Iain Roberts:* So I mean, if you – we can walk through some of the details of this, but this final prototype – a lot of the questions we get is, "Well, why didn't the final product have, like, the production

solution?" Because we didn't design the production solution. This is almost the information architecture design principles embedded in a physical thing that we can show to executives to get them excited about the fact they're gonna go away and make this. This is a real thing that's gonna require multiple millions of dollars' worth of investment. And, again, this is a platform, a platform that is gonna go – starts with the 2011 Ford Edge this year, and then will go across every single vehicle that Ford makes. I think it was about 80 percent of their fleet from here on in will have this interface in it. Big investment, requires us to create something that's gonna generate buzz.

If you look at the details, they're really simple things, right? Right-hand side of the steering wheel is my stuff. Right-hand side of the steering wheel refers to my telephone, my navigation, my media, my communication, with some very high-level buttons that allow me to control master switches such as volume, but super-simple and multifunctional controller that ultimately has gone from a paddle to a four-way controller. Left-hand side of the vehicle – steering wheel – is my car stuff. Right? Cruise control, vehicle information, trip odometer, things like that.

This spatial mapping allows people to do one thing really, really effectively. This maps to the information on the interim panel above it, and it allows people with some very simple and nuanced color coding in the final implementation to fundamentally keep their eyes on the road and see what they're doing using peripheral vision.

We actually tested the final prototype in New York earlier this year, which was an interesting situation, 'cause exactly what we saw in that test that Tasos outlined, people using the center console because it looks rich and glossy and iPad-esque. And then as soon as they're asked to drive, they have to use this, and their eyes go to this. And this thing is a godsend in terms of having this really simple information architecture that allows me to answer the phone, that allows me to play whatever song I want on my iPod or on my central – on the server on the car, that allows me to set cruise control in a way that's simple and understandable. And, again, similar to the center console.

Interestingly, here we were recommending – and, again, we kinda dialed up the contrast here, no pun intended, but old-school switches, right? This is harking back, us trying to make the point that people are looking for some level of tangibility in the final thing. You could, because you have a screen in the car, put all of

the functionality into it, but you need to leave some things out that make it familiar and understandable when they get into the vehicle. We didn't anticipate that Ford would create rotary dials or use rotary dials, which they haven't, but they have kind of leveled off and made sure that there's tangibility in the vehicle, and they kinda balance that tangible and digital experience really well.

So as I said, this was a prototype. It was almost a delivery mechanism for our principles, and on top of that, we've clearly delivered a 400-page guidelines documentation, as we were intending to do, and design principles to keep 'em true and honest, which now populate design studios within Ford. But, again, really, that 400-page book isn't gonna light anybody up. It tells you what to do once you're doing the project; the prototype is there to really allow them to get behind the idea.

So this was the final thing that we delivered. Pretty simplified on presentation. It was an amazing experience. It was one of the experiences I will probably remember from my career at IDEO is this – the purposefulness and the resourcefulness that this team used to pull this together in such a period of time.

And then this is the final implementation. As you can see, looks different, but fundamentally the underlying information architecture is the same. The way in which the switches are being used on the steering wheel is the same; the color coding is the same. There are a lot of the principles that are here and resident in it, and we did an interview this morning and were demonstrating the system in the parking lot. It works great. Right?

And so this will be available on the Ford Edge 2011 at the end of this year, and on the Lincoln MKX. It's going to production. Thank you.

*[End of Audio]*