

The future of personal mobility:
the internet of things and the rise of the autonomous car
or ...

why everyone needs to adopt a design mentality
or ...

how to succeed in the experience economy

Hasso Plattner Institute of Design at Stanford (the d.school)
Revs Program (CARS — Center for Automotive Research at Stanford)

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Stanford University, California



mshanks.com

because there's no clean slate in design — you can never start from scratch
archaeology — the material life of the past in the present looking to a sustainable future
with 200k years of insight into human experience — the big picture!
and seen from outside the box

why archaeology?



(yes — I do also dig up the past — currently a Roman town in the UK)

design research — the past, present, and future of the automobile
(so much more than a story of those powered boxes on wheels)

Revs at Stanford





Bentley DNA



1913 Peugeot voiturette —
a different kind of innovation story

2007 DARPA Urban Challenge



Latest News

Summer 2009 — Take a [video tour](#) of Stanley's exhibit at the Smithsonian with lead engineer Mike Montemerlo.

Nov. 5, 2007 — Junior, which drove nearly flawlessly during the DARPA Urban Challenge on Saturday, was awarded second place, and a \$1 million prize, in a DARPA ceremony Sunday morning.

Download Videos: [NQE Test A](#), [Test B](#), and [Test C](#). These and other videos can be found on [Video page](#).



Joining the team to support our efforts are:



2nd Prize to Stanford
for Junior the autonomous car



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a story of the near future

I'm not often traveling to the studio on this project. The fiber optic link at home lets me run a wall-sized wormhole at high resolution so I can see everyone as if I were just there, chatting, passing materials around as if I was with them.

I am planning the day with a member of the team out in rural France when the House tells me that Ben is off to school. It has remembered to charge his electric bicycle overnight.

My conversation follows me room to room across the screens and sound system running through the house and out to the car which has pulled round to the front from the garage.

It's a Gordon Murray Special. The super lightweight composite frame allows complete customization and I've got the latest self-driving system installed, developed by a small specialist company in Zurich.

My conversation carries seamlessly into the car and I'm gently interrupted by its greeting. I tell Jimmy I'll talk later.

"I see that you're a little stressed this morning Michael." The sensors in my jacket pass on all my vital signs to the House and Car. The House had suggested I had more for breakfast to help with my blood sugar. Now the Car suggests that I relax and let it do the driving.

"Your driving is upsetting the insurance company Michael. They'll raise your premium."

I refuse. I really like exploring the performance simulation modes. Having the Car behave as if it were a tourer in the 1960s, or whatever, gets my head out of things.

"Perhaps Eddie Hall's Bentley this morning?" Great! I've been wanting to try this all week, and the morning weather today is perfect. The Car lowers the roof and loads the specs for the 1936 4.25 liter motor that Eddie had fitted for the Tourist Trophy race of that year (he came second). The simulation of the Borg and Beck clutch felt spot on as I nudged the stick shift, admittedly from a late 60s Lotus Elan. I slip into first and pull away. The engine note comes through beautifully on the Car's environmental sound system. The dashboard displays adjust to show the worn dials of the old Bentley.

But the commuter traffic on 101 is bad.

The Car suggests it take over. Perhaps I'd like to edit the video of the weekend family road trip. The Car has compiled all sorts of clips, interior shots of us all joking along, looking out of the windows, clips shared from roadside cameras, and from the kid's cameras in the other Car. The dashboard displays adjust again.

"There's a problem ahead Michael, and I can't quite reconcile the data coming from the road sensors and other cars."

"Let me know if you need any help."

"I will Michael."

The lanes reserved for self-driving cars allow high speeds, and it's only a few miles and moments before the Car interrupts.

"There's really something not quite right Michael. The distances are not computing. Road and vehicle-to-vehicle sensors are incompatible. I think it might be something to do with the roadworks."

"OK, let me see."

I look up and don't recognize the road at all. The car has taken us a different route this morning.

Everything then speeds up. I see there's something coming up fast. It looks like an overturned bus, a school bus, and cars are swerving too fast around it.

"Michael, there are 14 school children in the road ahead and I can't see a way through. What should I do?"

I hesitate.

The car applies emergency braking and deliberately veers to the left to avoid the children.

Surveillance cameras and in-road monitors record the speed of impact with the concrete overpass as 58.3 mph.



Google™

self-driving car

home | bodywork | health | memory | interoperability | custom performance | interface |
materials | fuels | clouds | screens and windows | surveillance | soundscapes |
interconnection | infrastructures | time | awareness | management | decision-making |
anticipatory algorithms | hybrids | horror

a story of the near future

matters of (inter)personal mobilities

automotive futures



Ferry Building
Architect: A. Pope Brown
Designed: March 1906
Style: Classical Revival

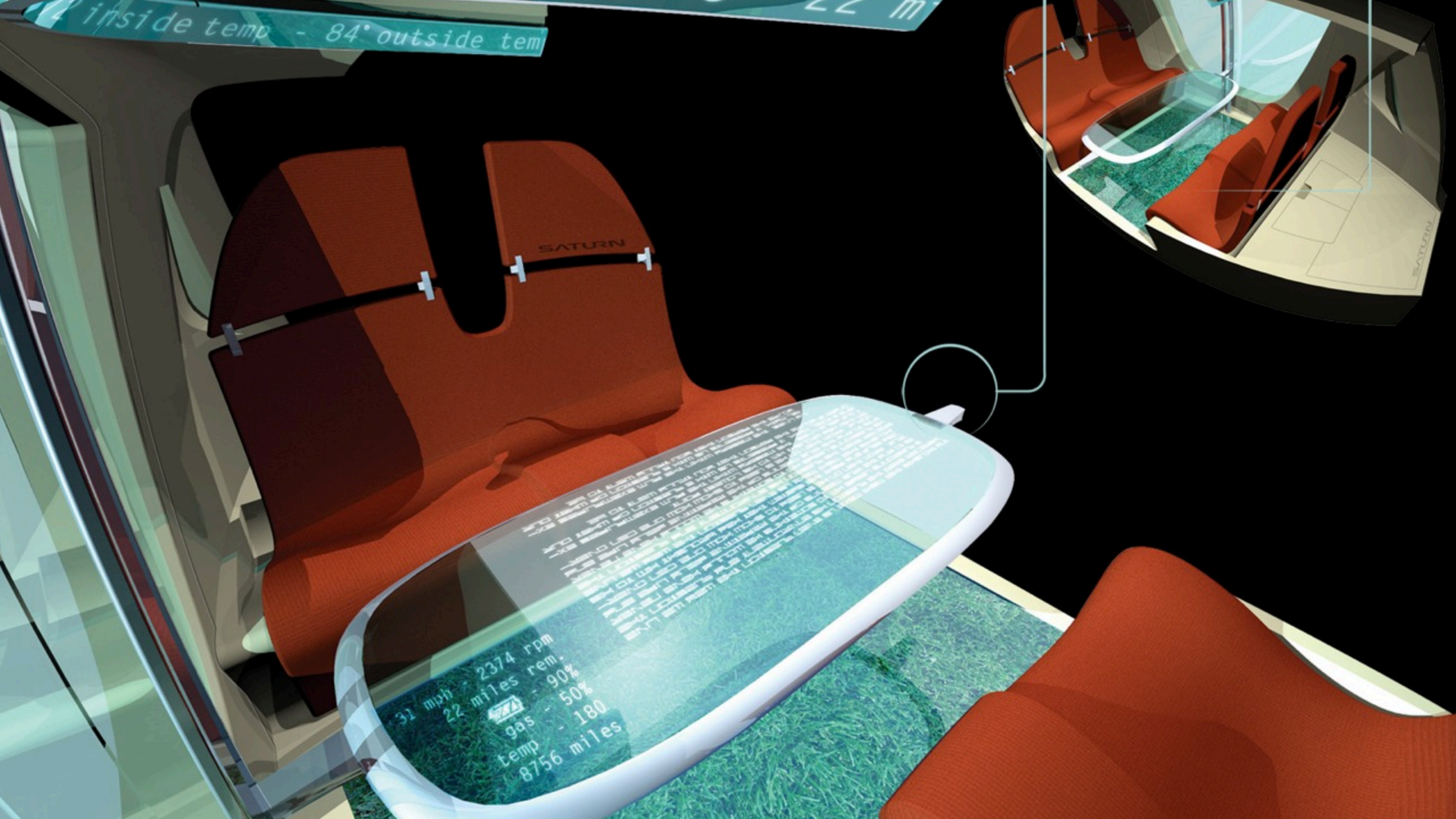
LA
24
San Francisco
San Jose
San Diego
Los Angeles

What will driving look like when you have the choice to hand over to an autonomous driving car?

With DICE we created a vision of an interactive, intuitive and simultaneously safe operating experience in future automobiles. The intelligent auto (robot) communicates not only with the driver, but also with other road users and its entire environment, functioning as a medium between inside (user/interieur) and outside (environment).



inside temp - 84° outside temp



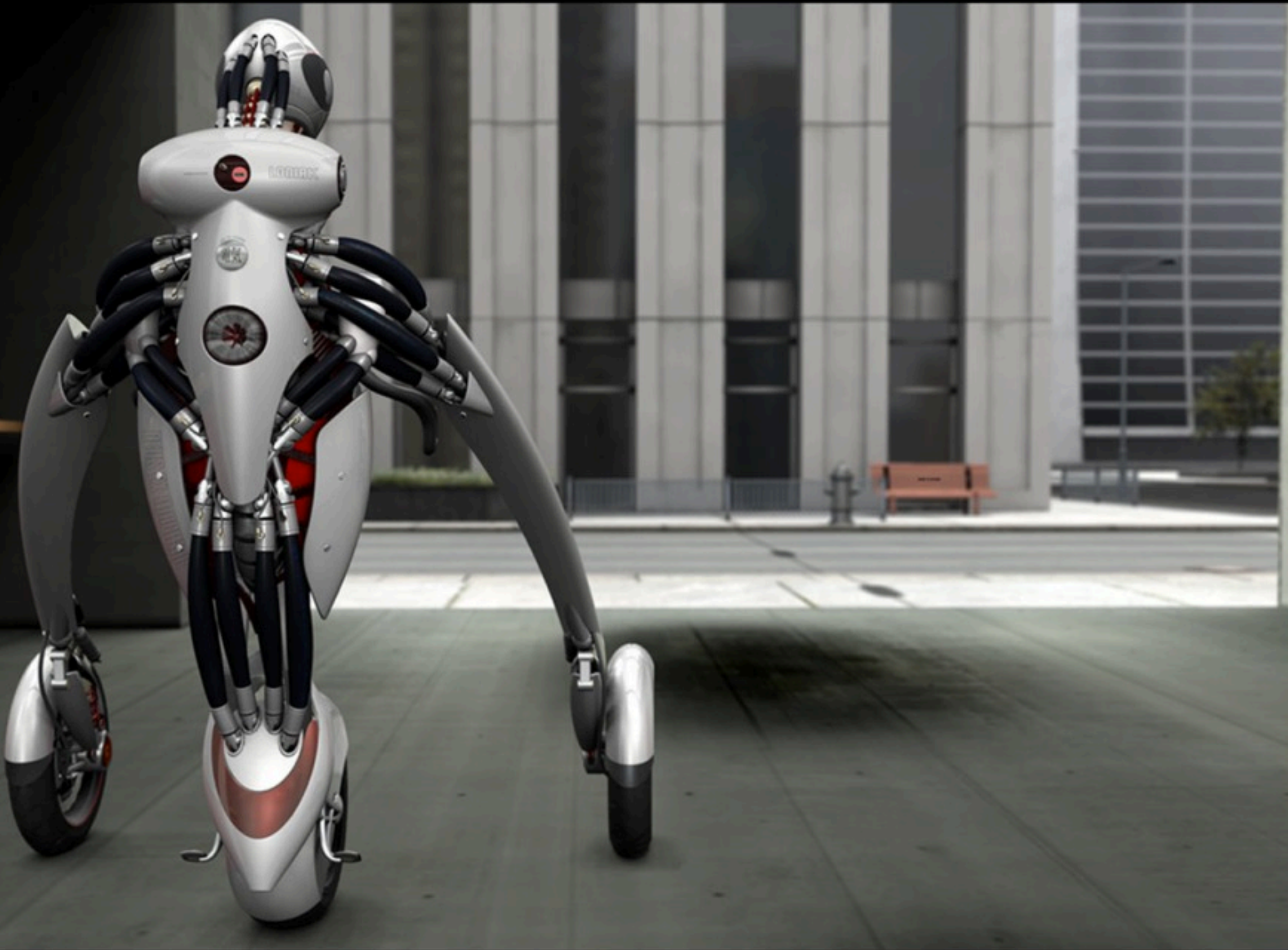
31 mph - 2374 rpm
22 miles rem.
gas - 50%
temp - 180
8756 miles

SATURN



Jake Loniak © 2008

bodywork



Functional Objective

Develop a wearable power-suit able to offer a rider's position that adjusts to velocity, giving exceedingly low center of g to maximize performance.



In Wheel
Electric Motor



Doped
NanoPhosphate Cells



Capacitors

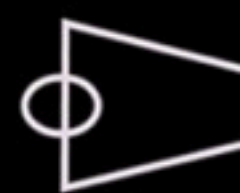
Possible themes
ExoSkeleton
Exposed power source
and drivetrain
Body steering



Slow speed and p



High speed



Direction of



RAC
FUTURE CAR CHALLENGE
BRIGHTON TO LONDON 05.11.11

The World's Leading Low-Energy Driving Challenge
futurecarchallenge.com

A Royal Automobile Club Event

Title sponsor
RAC
the driving people

Official partners
GOODYEAR
Safety together
The Daily Telegraph
WHATCAR?
GFEI
EVOL

Supported by
Imperial College London
Brighton & Hove City Council
London
City of Westminster
MOTORSPORT



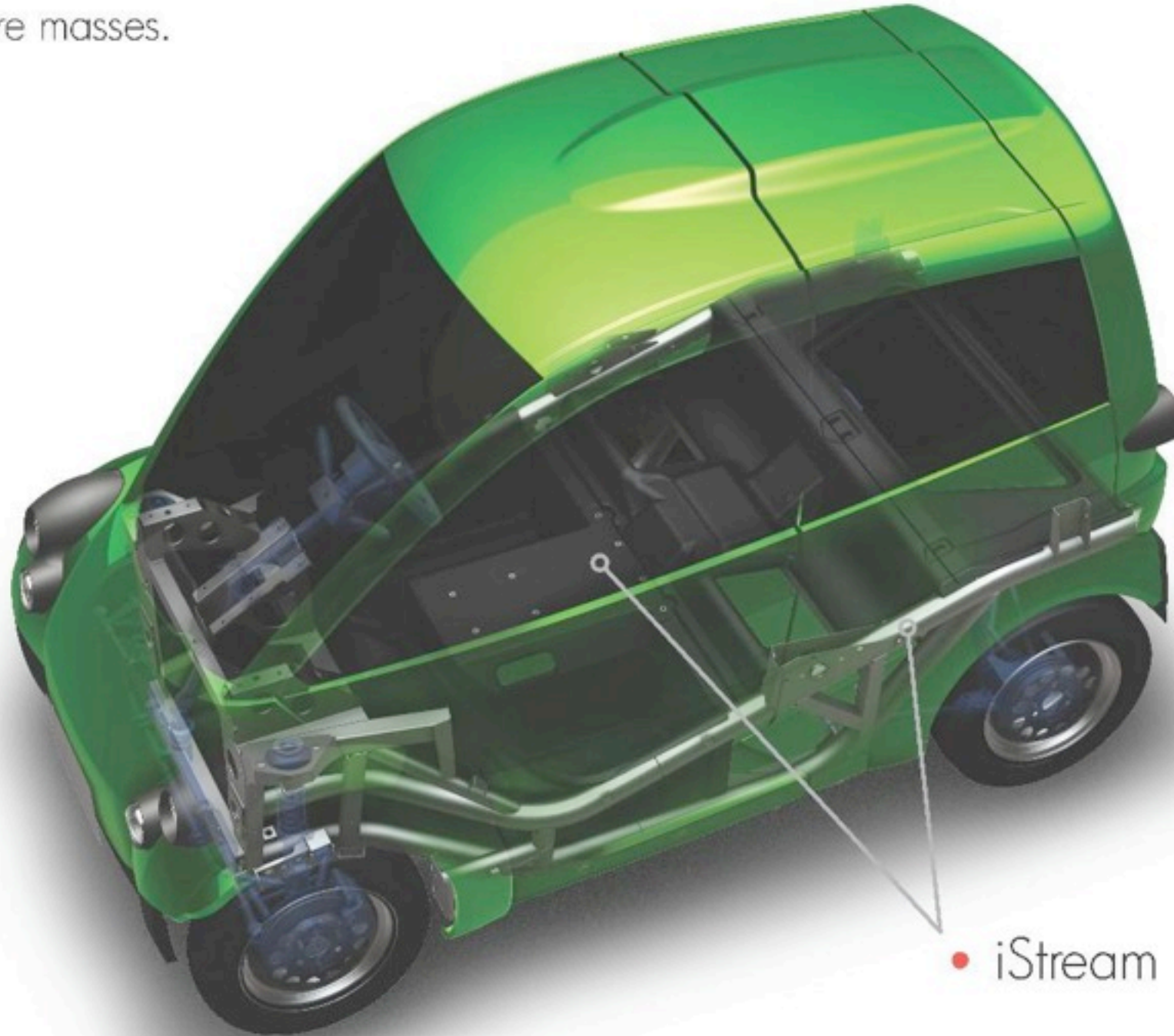
Gordon Murray

MEMBERSHIP





- iStream® - a separate body and chassis structure concept, using simple steel tubular sections and low cost composite panels for the primary vehicle structure, configured to satisfy the main load paths and support all the major hardware masses.



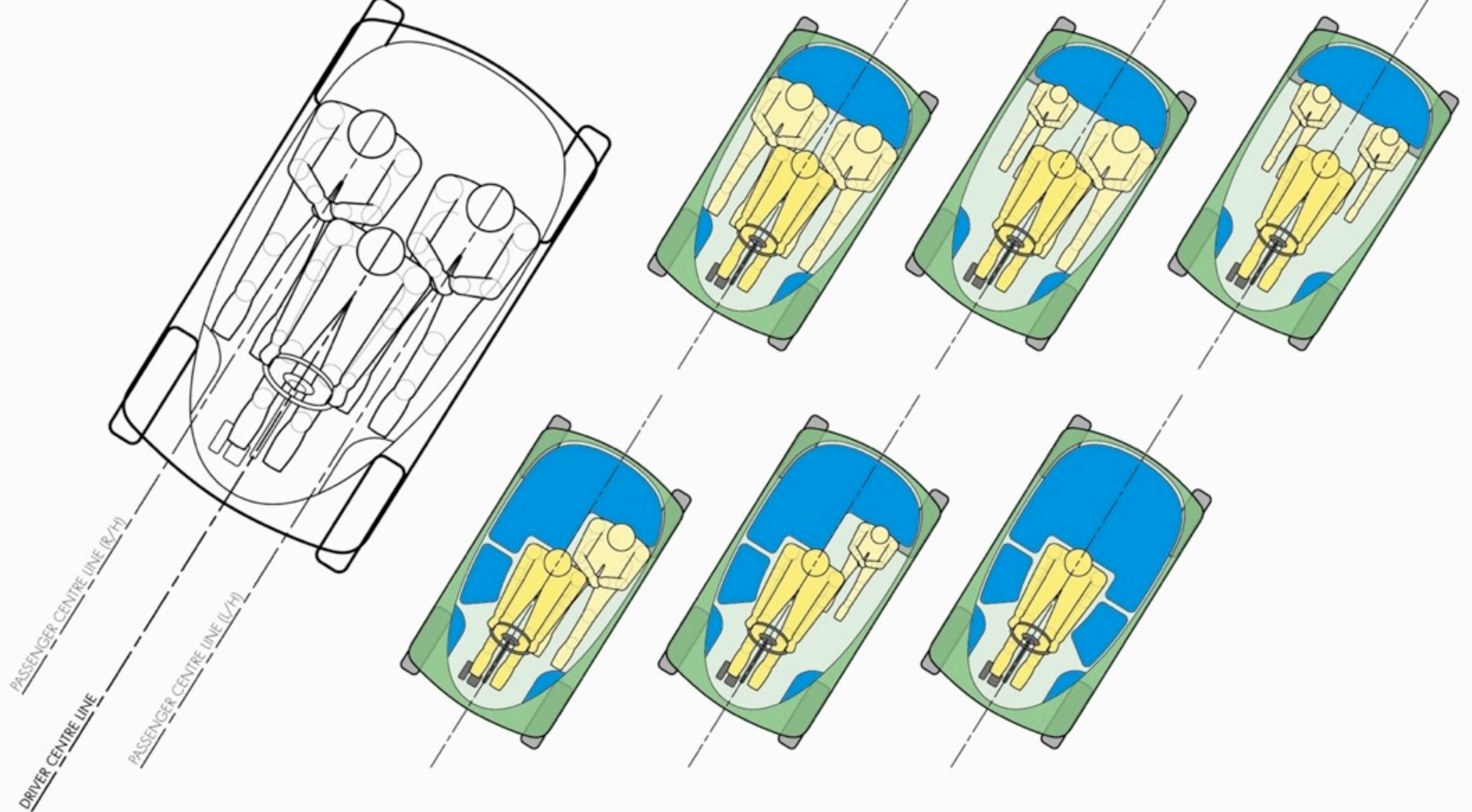
• iStream

radical (disruptive) needs-centered design



*Automobiles Are The First True
Open-Source Platform*

extreme customization



iCentre®

7 5 0 L I T R E S

6 SHOPPING TROLLEYS



Why Chinese Buyers Are Obsessed With Buick

ALEX DAVIES APR. 23, 2013, 12:22 PM 6,527 3

Recommend 30 Share 5 Tweet 24 +1 0 EMAIL + MORE

The heyday of Buick on American roads is long gone, but the brand is far from dead. In fact, business is booming — just not in the U.S.

The brand is hugely popular in China — the world's largest auto market — where having a large, foreign car is a status symbol.

Buick is the country's [hottest luxury brand](#), according to the [New York Times](#).

Sales numbers support those claims. The Buick Excelle was the [number one passenger car](#) in China in 2011, when 254,000 units rolled out of dealerships. The next year, Buick's sales in the country jumped 8%.

J.D. Power & Associates predicts total Buick sales in China could hit 1 million by 2016, [according to](#)



© General Motors

Buick's GL8 Luxury MPV is a favorite of Chinese executives.

new markets and old issues

bodyworks

Figure 5. Continuous Wearable Sensor Patches for Blood Chemistry and Vital Signs (mc10) and Cardiac Rhythm (iRhythm’s Zio Patch).

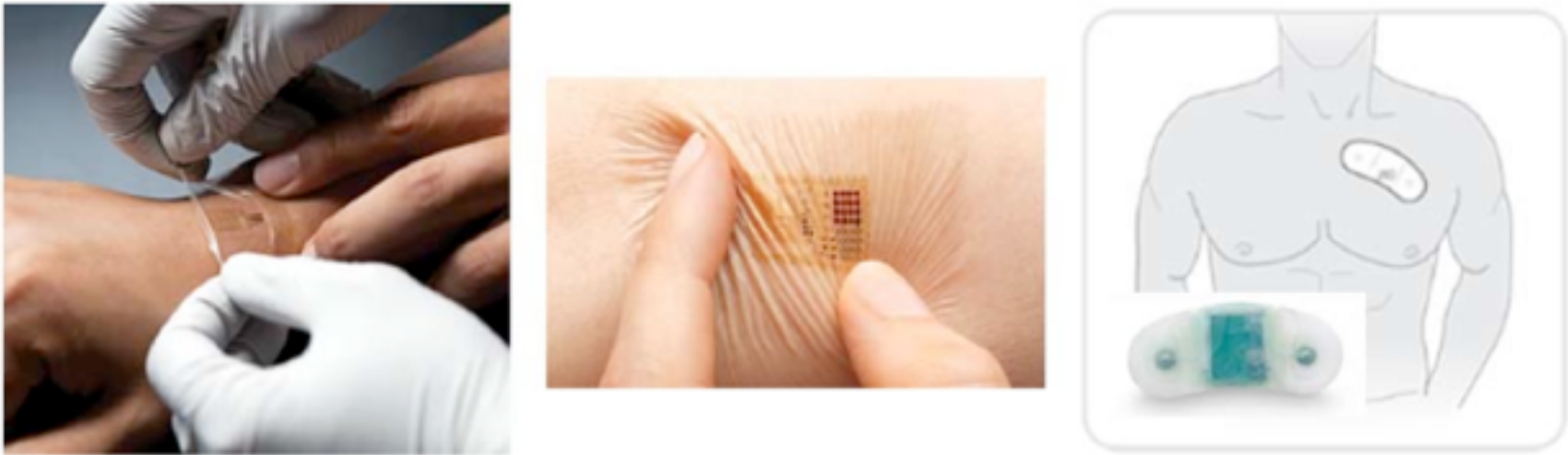
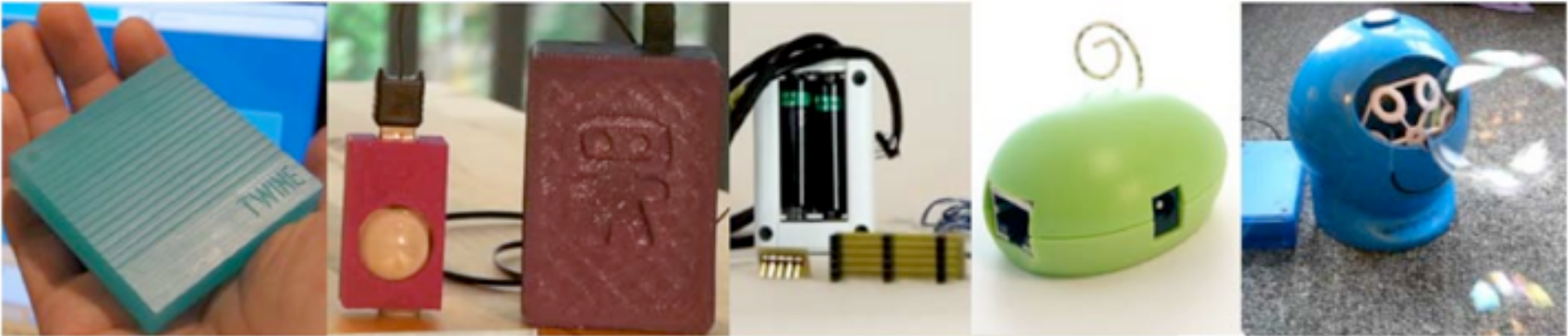


Figure 7. First- and Second-Generation Consumer EEGs: Emotiv, NeuroSky, and myZeo, and InteraXon and Axio.



Figure 11. Consumer-ready IOT Sensor Platforms and Gadgets: Twine, Ninja Blocks (an early prototype), knut, Green Goose, and Bubblino.





Convenience Meets Stealth



Extreme Wearability



Revolutionary Design



post PC

internet of things — ubiquitous interconnectivity

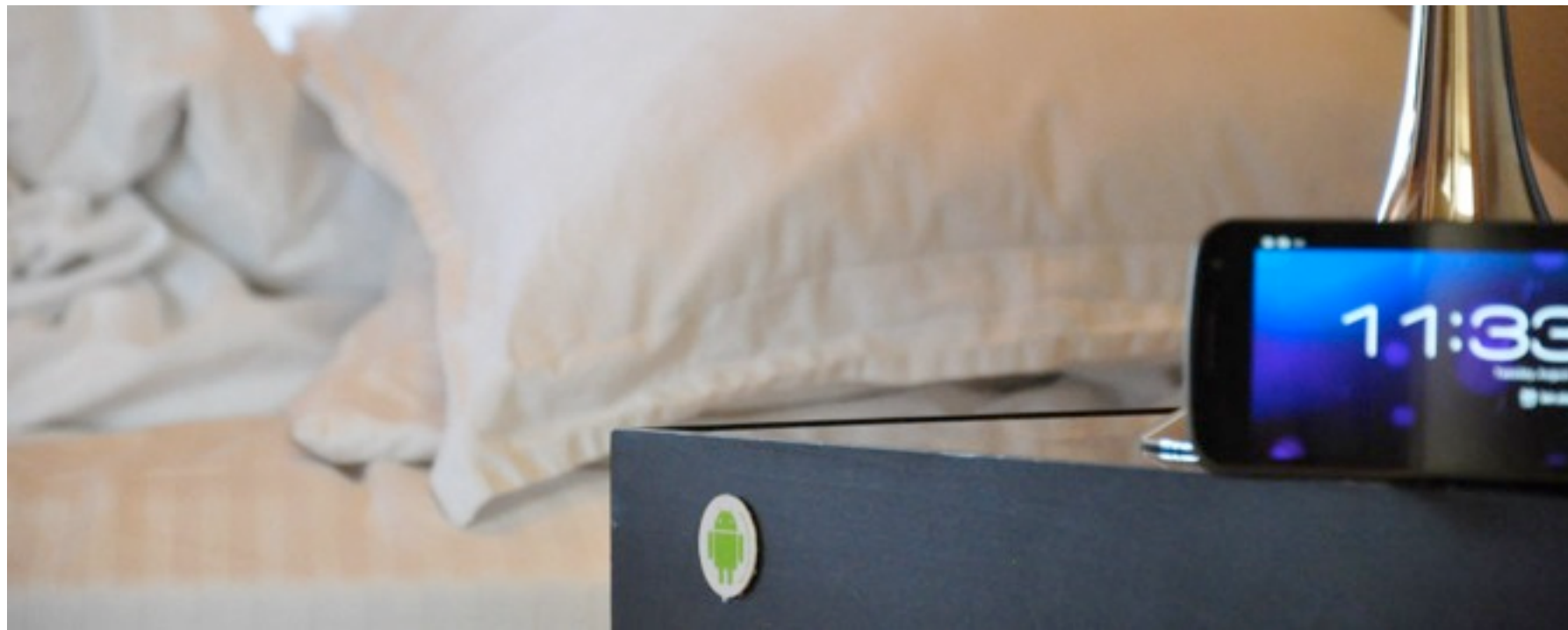
M2M World of Connected Services

The Internet of Things

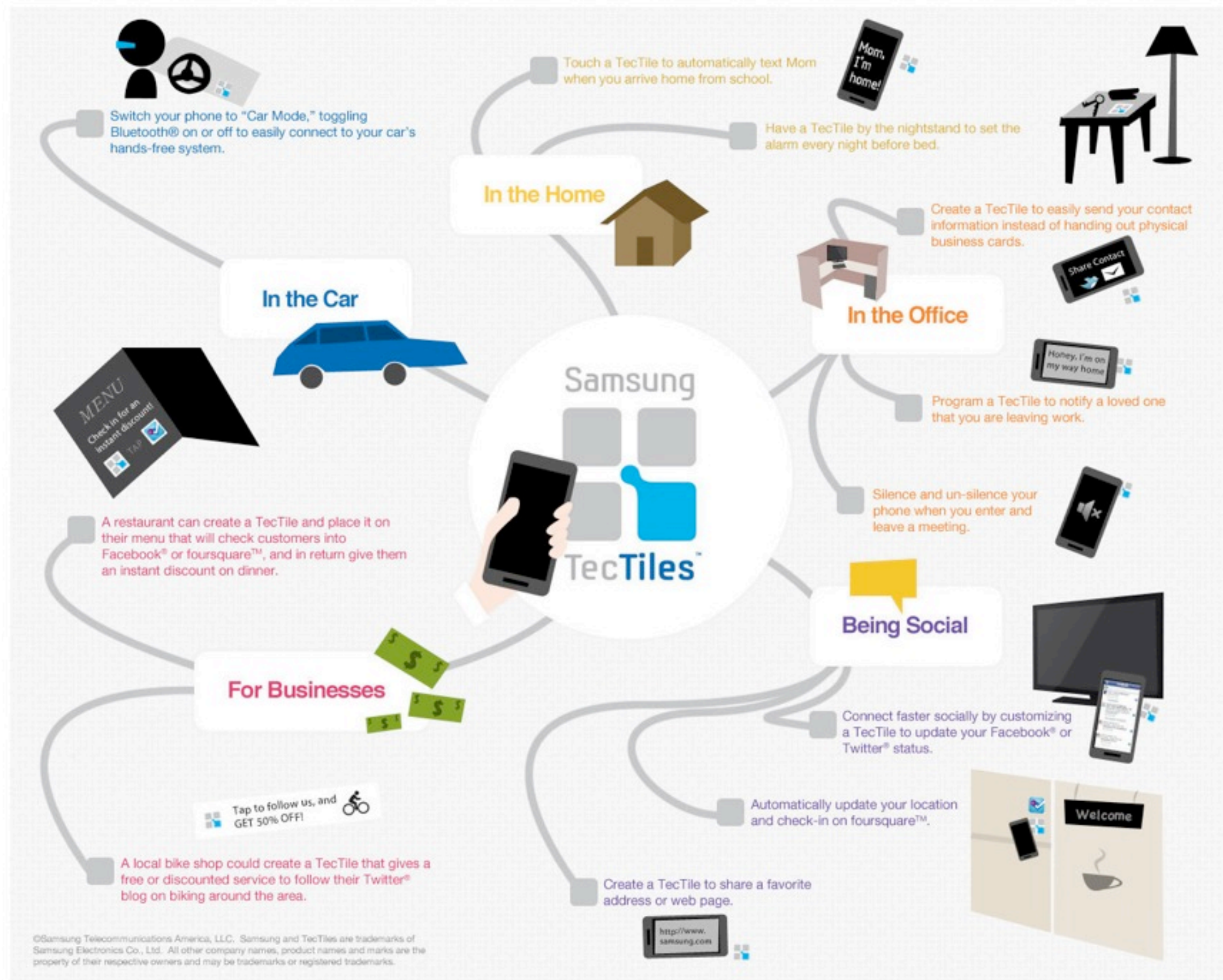


interconnection — a short example

NFC — near field communication





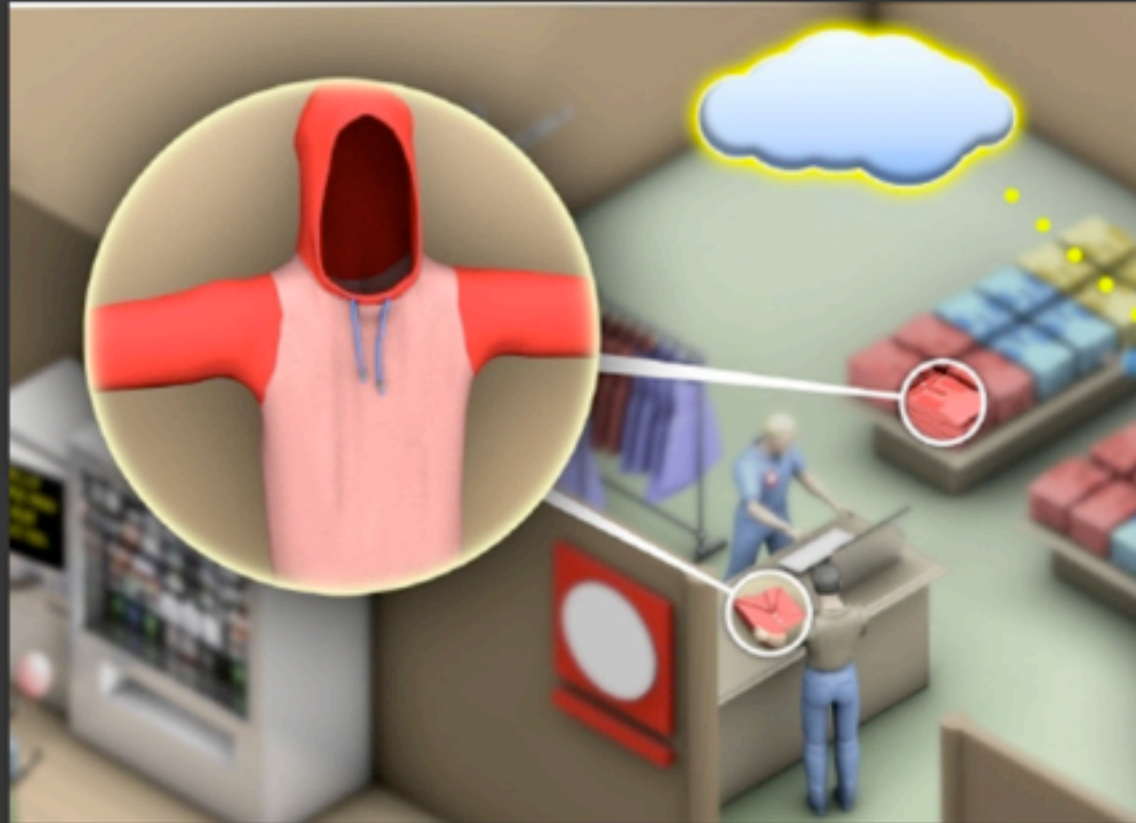


Learn

See

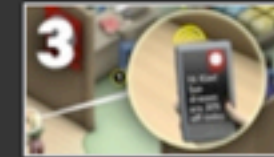
Explore

Customize



IoE at Work: Retail

See how the Internet of Everything will help retailers and other businesses deliver relevant information and offers to customers at just the right time and place.



internet of everything

Review

Sensor Mania! The Internet of Things, Wearable Computing, Objective Metrics, and the Quantified Self 2.0

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my car looks after me
with anticipatory algorithms

big data and the era of frictionless surveillance

- 1 A special camera connected to a special software is installed inside the mannequin's head.
- 2 This software analyzes the facial features of people passing through the front and provides statistical and contextual information useful to the development of targeted marketing strategies.
- 3 The embedded software can also provide other data such as the number of people passing in front of a window at certain times of the day.



Eye See

don't assume you know

so — just what is a car?



mobility, reach, copresence, bodywork, the sublime, sharing, anticipation,
tacit motor skills, platform, communication, risk,
status symbol, identity prop, technology, performance ...

assemblage and entanglement

there's no blueprint, specification, plan

we are always already *in medias res*

mobility, reach, presence, sharing, the real and the imaginary,
delegation, entanglement, nomadic itineraries, (dis)(inter)mediation

the car and the media device

convergent meta experiences

this is the experience economy

so what? — how do we deal with all this?

become a designer

design thinking

styling, branding, aesthetics, graphics, interface

design is so much more ...

an attitude, a pragmatics, a bundle of methods, strategies, tactics, focused on
needs finding and problem solving

design is a process

entanglement

— humans, non-humans, other species, things, environments, events, memories, remains

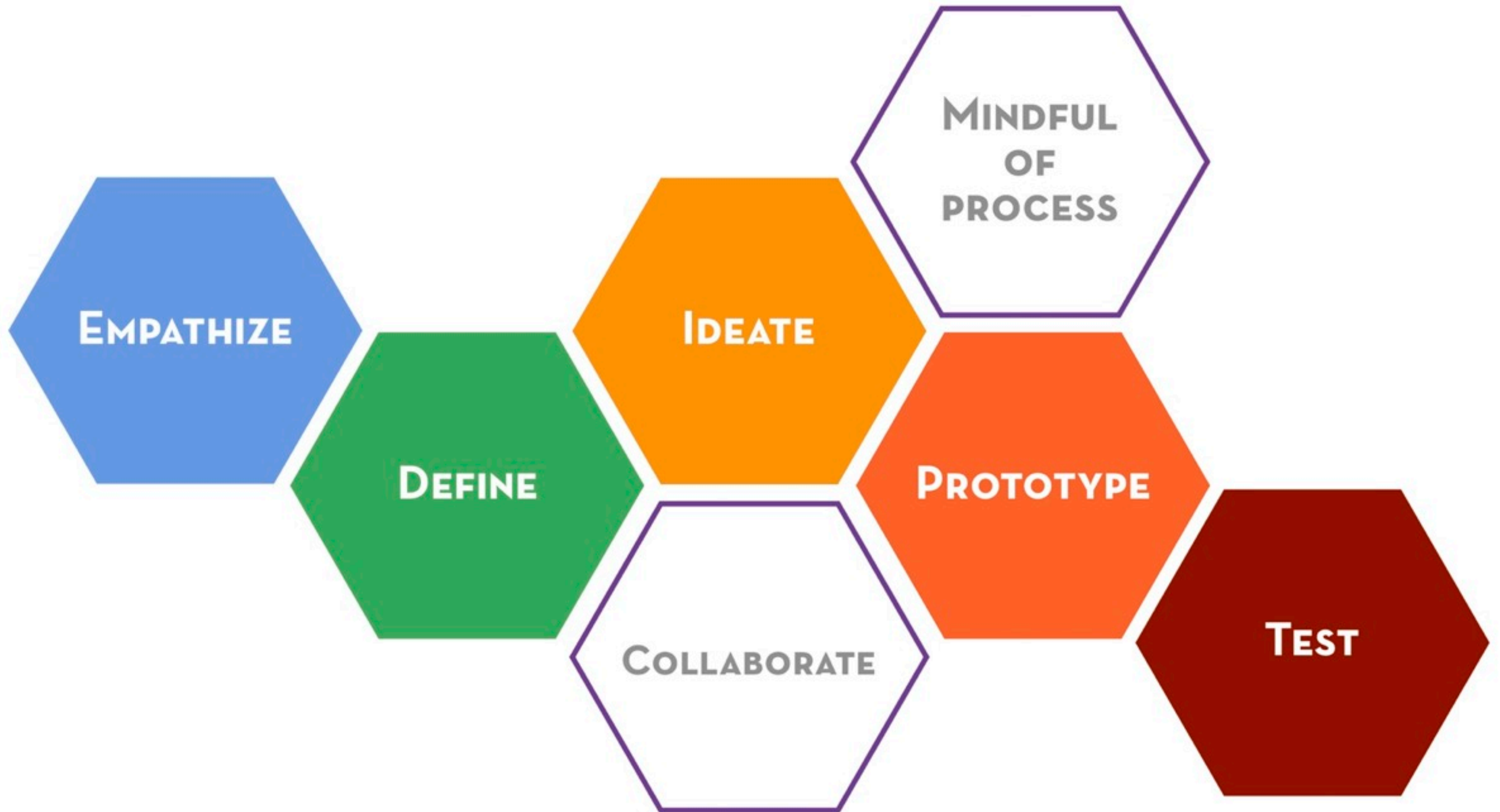
(ask — just what is it to be human?)

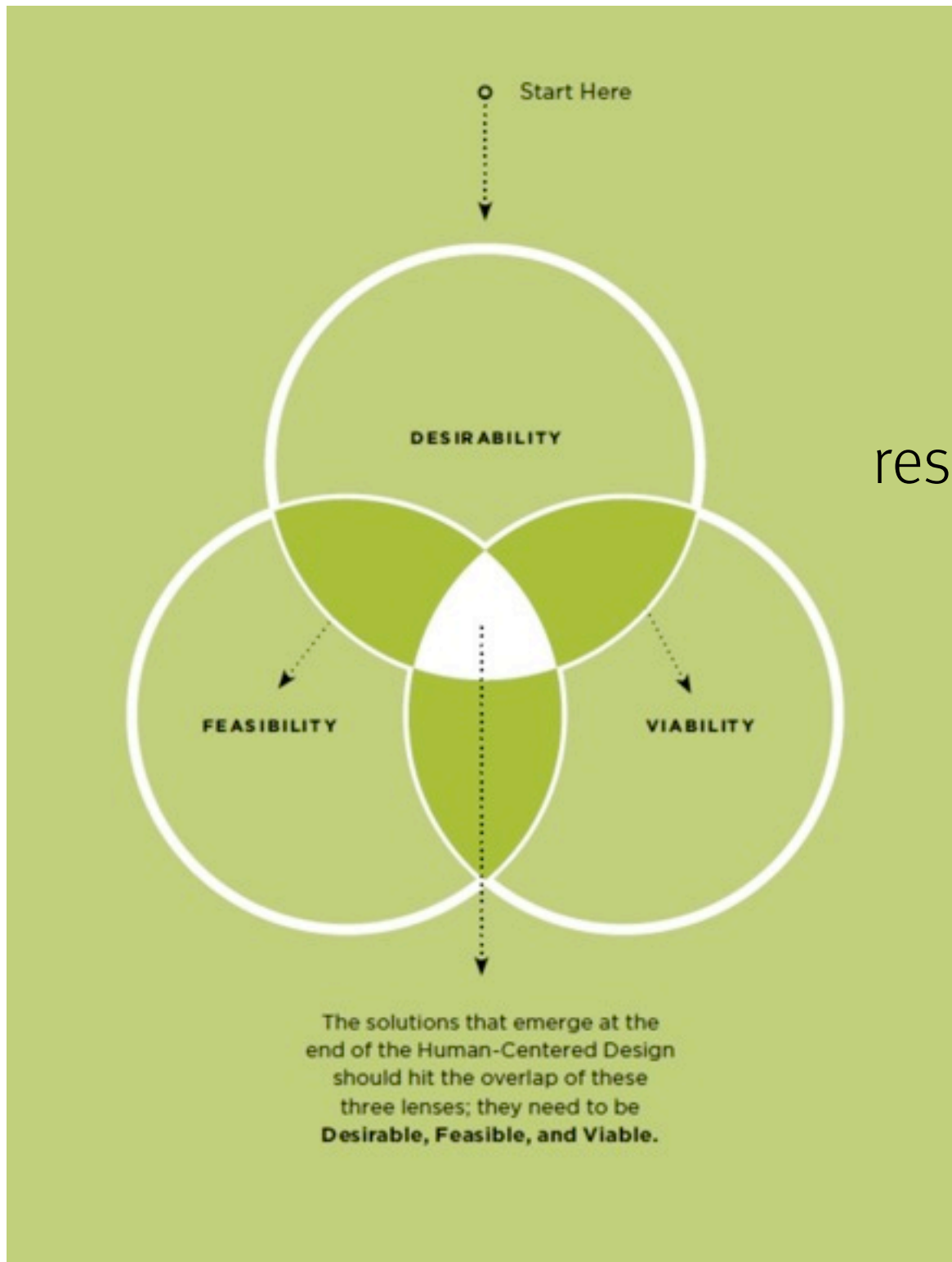
(NB — I am not talking about people and products, but hybrid assemblages where each can be both)

human-centered design

a skill set
not a mystery

design thinking





research, empathize, collaborate, prototype, test, fail quickly
clarity and mindfulness
desirability, feasibility (technics), viability (business)
elide product and process, company and community

design process

METHOD STORYTELLING



WHY storytelling over other forms of communication?

It seems stories are hard wired into our psyche. People have been passing information along via storytelling for as long as humans have had a rich language to draw from. Stories are great at connecting with ideas at a human level. A well-told story focused on sharing pertinent details that express surprising meaning and underlying emotions affects the emotions and the intellect simultaneously.

HOW to design a story.

What's the point? Know what you intend to convey both narratively and emotionally. You should be able to describe the essence of the transformation of your character in one sentence & the tone of the story in a couple of words. Be able to articulate the emotional tone in a couple of words.

Be Authentic: Stories are more powerful when they include a little bit of you. Honest expression is stronger and more resonant than cliché.

Character-Driven: Characters are a great vehicle through which to express deep human needs and generate empathy & interest from your audience. Focus on character.

Dramatic Action: Your story should have 3 components. - Action : Conflict : Transformation.
Action: What is the character trying to do? What actions are they taking to achieve it?
Conflict: What is in her way? What questions linger beneath the surface?
Transformation: What is the big insight? How do the action & conflict resolve.

Details: "Behind all behavior lies emotion." What details can you share about your character and their situation that will suggest the emotions that lie beneath?

Design Process is a Built in Story: Use what you've learned during the design process.
Empathy maps well to Character. Needs map to Conflict, insights + solutions to Transformation.

METHOD PROTOTYPE FOR EMPATHY



WHY prototype for empathy

It is common practice to test prototypes with users to evaluate solutions, but you can also gain empathy through prototyping, exposing different information than simple interviewing and observation might. Of course, whenever you test with a user you should consider both what you can learn about your solution and what you can learn about the person - you can always use more empathetic understanding.

But you can also develop prototypes or create situations specifically designed to gain empathy, without testing a solution at all (or even having a solution in mind). This is sometimes called "active empathy" because you are not an outside observer, you are creating conditions to bring out new information. In the same way a solution prototype helps you gain understanding about your concept, an empathy prototype helps you gain understanding about the design space and people's mindsets about certain issues.

HOW to prototype for empathy

These empathy prototypes are often best used when you have done some work to understand the design space, and want to dig deeper into a certain area or probe an insight you are developing. Think about what aspect of the challenge you want to learn more about. Then discuss or brainstorm ways you might investigate that subject. You can create prototypes for empathy to test with users or with your design team.

Some ideas:

- Have your user draw something (for example, draw how you think about spending money, or draw how you get to work) and then talk about it afterward.
- Create a game that probes issues you want to explore (for example, you could make a simple card game which forces users to make choices related to your design challenge).
- Simulate an aspect of what users are going through to better understand it yourself (for example, if your users plant seeds while carrying a baby, get a sling and carry ten pounds while planting seeds).

design thinking actually works, because it has been around for millennia

nearly one third of start-ups in Silicon Valley in the last three years have adopted a
design outlook

a design solution to innovation



make life richer

(don't let the machines murder us!)

design — you can do it too



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Bill Moggridge, Bernie Roth, David Kelley, Tim Brown, Rich Green, Sebastian Thrun, Meghann Dryer, Cliff Nass,
Chris Gerdes, Sven Beiker, Reilly Brennan, Jon Summers, Fred Turner, Joe Pine, Miles Collier, Murray Smith

(they don't realize how much they've damaged a perfectly good academic career!)

thanks