HUMAN-CENTERED: From Data to Future Mobility Experiences
Lextant HQ, Columbus, Ohio
11,000 Sq Ft
Full Service Automotive Research Facility

- Global Reach & Recruiting
- Static & Dynamic Testing
- Audio/Video Streaming
- Eye Tracking
- Affinity Partners: VTTI, OSU, SPARC
Acura

“The industry’s most intuitive information control system.” Honda Acura RDX
Ideal SmartRide Experience

UX concepts illustrate how the experience may come to life digitally through a SmartRide app.
“Research shows that 30,000 new products are launched every year and 95% of them fail.”

Harvard Business School Press

In a recent survey of 639 companies, executives cited lack of customer relevance (failure to meet needs) as the top driver of innovation failure.

Accenture Innovation Survey 2009
THE DESIGN THINKING PROCESS

STANFORD D SCHOOL

- EMPATHIZE
- DEFINE
- IDEATE
- PROTOTYPE
- TEST
Autonomous cars promise...

$5.6 trillion in worldwide safety, fuel conservation, and productivity savings.

Morgan Stanley
Pedestrians are killed in pedestrian-vehicle accidents every year.

Pedestrians suffer injuries every year when hit by a car or truck.
The trust test...

40% of drivers reported their ADAS equipped vehicles acted in ways that startled them.

University of Iowa Study
84% percent of drivers trust their own driving skills more than the technology.

AAA 2016 Vehicle Technology Survey
Realizing the promise of self-driving cars...

it’s not about technology—
it’s about psychology.
## Levels of Automation

<table>
<thead>
<tr>
<th>Level</th>
<th>Steering and acceleration/deceleration</th>
<th>Monitoring of driving environment</th>
<th>Fallback when automation fails</th>
<th>Automated system is in control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>1 DRIVER ASSISTANCE</td>
<td>N/A</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
<td>SOME DRIVING MODES</td>
</tr>
<tr>
<td>2 PARTIAL AUTOMATION</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
</tr>
<tr>
<td>3 CONDITIONAL AUTOMATION</td>
<td>SOME DRIVING MODES</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
<td>SOME DRIVING MODES</td>
</tr>
<tr>
<td>4 HIGH AUTOMATION</td>
<td>SOME DRIVING MODES</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
<td>SOME DRIVING MODES</td>
</tr>
<tr>
<td>5 FULL AUTOMATION</td>
<td>SOME DRIVING MODES</td>
<td>N/A</td>
<td>SOME DRIVING MODES</td>
<td>SOME DRIVING MODES</td>
</tr>
</tbody>
</table>

*Courtesy of SAE International*
ATTENTIONAL WORKLOAD FOR AUTONOMOUS SYSTEMS

- Assisted
- Semi-Autonomous
- Fully-Autonomous

EASE OF USE

TRUST

ENGAGEMENT

Direct Control  Vigilance  Boredom

0  1  2  3  4  5

Distraction Potential
Cognitive Fall Off
UNLOCKING TRUST
FOR AUTONOMOUS SYSTEMS

FAMILIAR
Easy to use
Friendly in voice and manner
Known display and control formats
Limited new terminology

IT IS...
COLLABORATIVE
Facilitates transitions
Predicts need to take over
Communicates drive state
Doesn’t fight against the driver

IN CONTROL
Of when used
Of how much is used
Of how to take over when needed

PROTECTIVE
Always effective
Anticipates & fails safe
Communicates limitations

AWARE
Of the capability
Of the expected behaviors
Of the status of the automation
Of the headway scene

I AM...
FAMILIAR
TRUSTED
COLLABORATIVE
IN CONTROL
PROTECTIVE
AWARE

MY IDEAL AUTONOMOUS SYSTEM IS TRUSTED
CREATING ENGAGEMENT
FOR AUTONOMOUS SYSTEMS

I WANT TO...

/ CONNECT
Experience mobility journeys
Relate to each other
Discover the world around us
Increase knowledge / awareness

/ COLLABORATE
Effectively use time
Coordinate and create
Accomplish the to-do list
Communicate and coordinate

/ COLLECT
Reclaim time
Immerse in luxury
Relax and rejuvenate
My ideal experience with smart technology

It... I am...

I feel... relaxed

and able to enjoy my experience

It... I am...

ENGAGED

IN CONTROL

PRODUCTIVE

SAFE

is a unified system

knows me

keeps me informed

is always accessible

knows what to do

ENGAGED

SAFE

PRODUCTIVE

is a unified system

knows me

keeps me informed

is always accessible

knows what to do

Smart Objects:

Understanding desired smart and connected experiences.
Intentional Alignment

Multi-agent negotiation and collaboration by reading and reacting to signals and body language.
eHMI - Pedestrian tracking

Building trust and confidence through continuous acknowledgment.

photo: Mercedes-Benz
eHMI - Smart infrastructure

V2X smart infrastructure as a third party agent to facilitate advice and rule following.
To humanize innovation you have to solve the right problem.
Our research process is structured, rigorous and repeatable to ensure that BIG IDEAS inspire meaningful innovation.

1. **Determine project scope**
   - Start with the questions that will fuel innovation.

2. **CONNECT**
   - Immerse people in their current behaviors and attitudes to understand barriers, pain points, and wish fors.

3. **DREAM**
   - The future is not here yet but desires for the future already exist. Projective techniques allow people to imagine an ideal future and how they would like to experience it.

4. **CREATE**
   - People can tell you what they want. Multi-stimulus tool kits allow customers to build a solution that will enable their ideal experience.

5. **IDENTIFY THEMES**
   - Use a framework to organize insights. Great research can be summarized into a few big ideas and presented on a single page. Experience ‘models’ simplify, structure, and make memorable key findings.

6. **INNOVATE WITH CONFIDENCE**
   - Match the capabilities of the organization with customer desires. Opportunity Workshops immerse the team in the ideal experience, explore ways to deliver an ideal experience, prioritize opportunities, and the pipeline.

7. **Bring the future to life**
   - Generate momentum. Tell the story of the future.

8. **Identify the big ideas**
   - Team alignment comes from separating the important from the merely interesting. Use analytical tools like frequency and co-occurrence to identify patterns in the data.

9. **Activate knowledge**
   - Use a framework to organize insights. Great research can be summarized into a few big ideas and presented on a single page. Experience ‘models’ simplify, structure, and make memorable key findings.
Our research process is structured, rigorous and repeatable to ensure that BIG IDEAS inspire meaningful innovation.
the human experience firm
Desired customer experience (DCE) frameworks

- **Easy**
  - Everything I need is available to me—I can see, reach, and use it.

- **Comfortable**
  - I feel physically at ease in my cockpit.

- **Accommodating**
  - I can bring whatever I want into the car with me.

- **Connected**
  - I can use my personal devices and access the internet.

- **Alerting**
  - I receive notifications and guidance for important needs.

- **Automation**
  - It reacts to potential problems without my stress.

- **Customized**
  - Interior and features sit perfectly for me.

I am...

- **Safe**
  - I am focused on the road and aware of my surroundings.

- **Relaxed**
  - I am stress-free, peaceful, and isolated from the outside world.

- **Informed**
  - I have immediate access to any information I want.

- **Productive**
  - I can be efficient with work while on the road.

I enjoy my driving experience.
THE DESIGN THINKING PROCESS

STANFORD D SCHOOL

DEFINE VALUE

FOCUS CREATIVITY

DRIVE ALIGNMENT

PROTOTYPE

MEASURE VALUE
Thank you.