9 Topics of Special Interest to Ford Motor Company

Though these 9 topics are our main focus areas, this list is not comprehensive and Ford welcomes any collaborative research project idea that can benefit the Company.

**Mobility 2025+:** The growing global number of mega-cities will require us to re-think personal transportation as congestion and parking issues increase. No one company or industry will be able to solve the mobility challenge alone. Therefore, collaboration and communication with other institutions and entities will be required. A key challenge is to determine how Ford will be relevant in these mega-cities as personal vehicles are banned or become impractical. Development of new business models, new vehicle concepts, and technologies required to deliver the vision are desired.

**Automated driving technology:** Ford Motor Company is heavily engaged in the evolving passenger vehicles from those in which the driver performs all functions to vehicles that increasingly employ driver assistance technology to maximize safety. The main future thrust of safety technology will be toward zero accidents/zero fatalities utilizing "active safety," to avoid accidents altogether through sensors, communications, vehicle connectivity, and situational awareness to advise and assist the driver. There will be significant incremental steps through new features working toward the ultimate goal of full autonomy. Both incremental and revolutionary ideas are desired.

**Vehicle connectivity:** Vehicles are rapidly becoming network nodes and will receive safety and entertainment related information from personal devices, the Internet, infrastructure, and other vehicles. Connectivity can also play an important role in the mobility and automated driving efforts described above. Enhancing any type of useful connectivity is desired.

**Cybersecurity:** Vehicles are becoming increasingly connected via the “Internet of Things,” making cybersecurity crucial. Ford is interested in both relevant technologies and policy work so that data can be handled with maximum “trust” for the customer.

**Business analytics/enterprise modeling:** Applying “big data” techniques to the increasing amount of IT information generated by vehicles will create a myriad of new business opportunities. Applying mathematical modeling and operations research techniques to improve business processes can generate great benefit to the company in the areas of supply chain, logistics, order fulfillment, product portfolio planning, option content bundling, and electronic markets among others. High-impact proposals in big data, analytics, and enterprise modeling are desired.

**Vehicle light-weighting:** Currently legislated fuel economy standards can no longer be met effectively solely through employing more efficient engine and transmission technologies. Substantial material substitution throughout the vehicle will be necessary to create sufficiently lightweight structures. Advances in cost-effective lightweight materials and/or structures suitable for high volume production are desired.
**Vehicle electrification**: The electrification of vehicle propulsion systems will constitute a growing segment of the market including hybrids, plug-in hybrids, full battery electric, and fuel cell vehicles. Improvements in the efficiency of electric drivetrains including fuel cells, batteries, motors, controls, etc., are desired.

**Powertrain fuel efficiency technologies**: The internal combustion engine has proven to be the most cost-effective powertrain solution over the last century and will remain the mainstay propulsion system for decades. There are substantial additional efficiencies that can yet be captured utilizing emerging technologies. Modest increases in IC engine efficiency applied in high volume can actually result in more fuel savings and fewer emissions than "dark green" low-volume solutions. Further improvements to IC engine and transmission efficiency are desired.

**In-vehicle health and wellness**: There has been a substantial increase in overall interest in health and wellness, and this trend is expected to accelerate strongly as the baby boom demographic ages (though the trend is not limited to that demographic cohort). Consumer perceptions of driving have also changed as people spend more unpleasant time on congested roads. The ability to improve the well-being, stress state, and satisfaction of the driver and passengers during the in-vehicle experience is desired.