

# Howard – Chrysler Projects: “High Level Functional Descriptions”

on

Adaptive Cruise Control (ACC)  
Lane Departure Warning (LDW)  
Automated Map Follower (AMF)

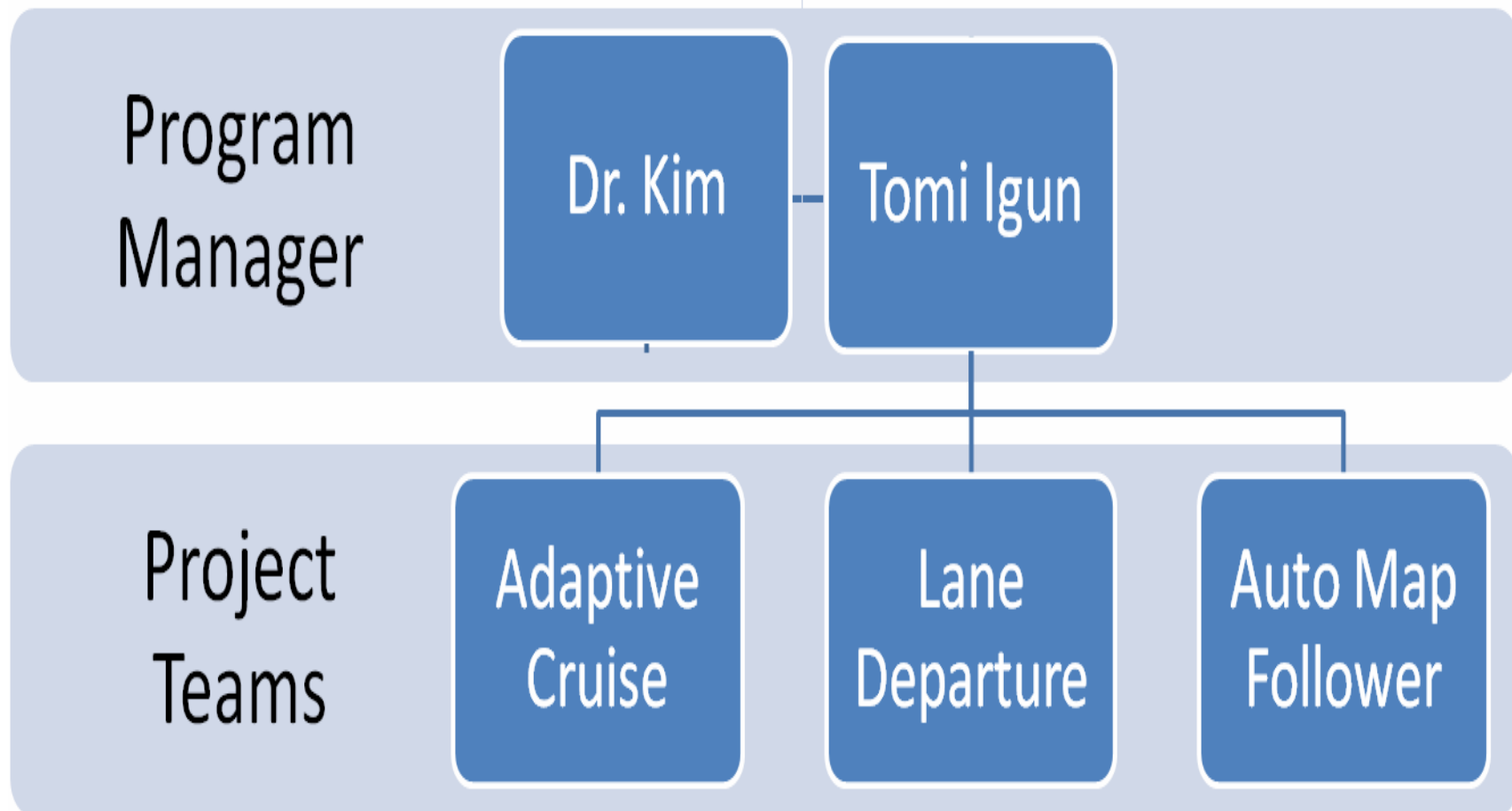
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# Operational Hierarchy



# Intelligent Vehicle System

## Purpose

- Develop a miniature-scale 'xxx' robotic vehicle
- Provide reasonably realistic functionality that is marketable

## Scope

- Perform within reasonable expectations of a miniature-scale system, not automobile
- Driver input is provided remotely

## Audience

- Anyone should be able to fully operate system based on submitted report
- Potential customers that need to see benefit

# The Intelligent Vehicle

## Adaptive Cruise Control (ACC)

Follow lead vehicle/object at maximum allowable speed

Avoid colliding with lead vehicle

Be able to move at maximum rated speed if no lead vehicle present

## Lane Departure Warning (LDW)

Warn when drifting between lanes

Allow lane change when turn-signal is activated

Center vehicle between lanes

## Automated Map Follower (AMF)

Automatically drive given route

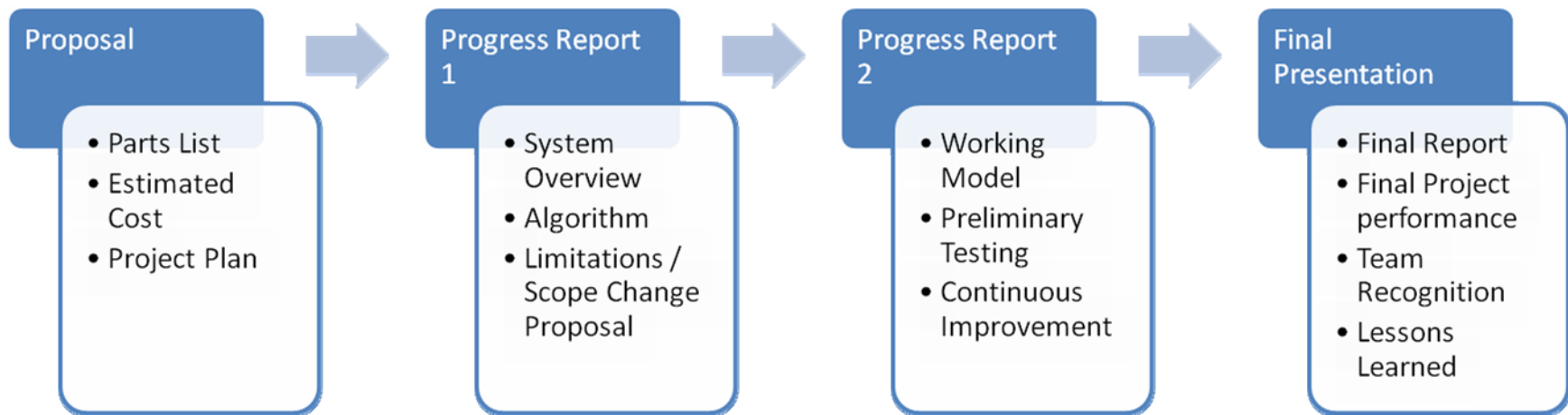
Stop at destination

Avoid collisions along the way

Inter-vehicular communication (for Intersections)

# Timeline

- Continuous communication is key to keep all parties on the same page
- Honesty and Integrity during Progress Reports are integral to project success



# System Definitions & Acronyms

- NCC (Normal Cruise Control) – will not acknowledge targets ahead
- Driver Input – Remote Control Operational Key Input
- Driver (or User) – Person/Entity handling Remote Control

# ACC System Overview

- When there is no lead vehicle, ACC behaves like traditional Cruise Control (maintains constant speed)
- When speed varies going up or down hill, it is adjusted by accelerating or braking
- Forward looking sensor(s) provide(s) recognition of ACC environment
- If ACC approaches slower lead vehicle, ACC reduces speed and follows at preset minimum distance
- If lead vehicle is no longer present, ACC gradually increases speed to preset maximum speed

# ACC Functional Objectives

- Accuracy of Speed Control
- Longitudinal Acceleration Limits
- Distance Setting
- Braking Strategy
- ACC Proximity Warning (when driver intervention is required)
- ACC response to 'Driver Input'



# ACC Additional Requirements

- Detect reduced sensor performance as in case of covered sensor e.g. snow
- Provide audible or visual response to 'Driver'
- Possess NCC functionality through ACC on/off option
- Driver emergency-stop override option
- Maintain relative speed on incline/decline
- Fail-safe strategy

# ACC Optional Requirements

- Driver speed and distance change capabilities within limits
- Driver acceleration / braking override option

# LDW System Overview

- LDW system alerts drivers of an unintended movement of the vehicle out of a designated traffic lane
- LDW system is temporarily disabled by driver activation of the vehicle's turn signals, which informs the system's control unit of intended lane changes
- Allows the driver to turn the system off when desired

# LDW Functional Objectives

- LDW should detect lane boundary (e.g. solid painted lines with specific width)
- LDW should not issue warnings for lane departure in acceptable situations (e.g. when turn signal is ON for user lane change)
- Prioritize vehicle centering within lane
- LDW should adjust warning level according to distance relative to lane boundary threshold
- Should function accurate within specified lane dimensions

# LDW Additional Requirements

- LDW should have robust strategy to determine 'ghost' demarcations (e.g. objects on road)
- LDW should estimate lane boundary where there are no demarcations
- LDW system should function properly along curved roads

# LDW Optional Requirements

- Notify user when LDW system is OFF
- Indicate which direction the lane departure violation is taking place
- LDW system should be able to function under various types of visible lane boundaries (e.g. decipher broken lane demarcations)

# AMF System Overview

- The Automated Map Follower system provide navigational direction and maneuvering for a given map based on destination
- Upon arrival at the destination, it alerts the user and requests to shut down or process another destination

# AMF Functional Objectives

- Automatically drive given route
- Stop at destination without user input
- Alert user upon arrival at destination
- Allow user to abort on-going destination navigation



# AMF Additional Requirements

- Allow user to change destination during on-going navigation

# AMF Optional Requirements

- Allow for stop-over along a given navigational route
- Allow for automatic return to departure location (i.e. reverse directions)