

ASTM Committee F45 Driverless Automatic Guided Industrial Vehicles



Adam Norton

Chairman, ASTM F45.03

University of Massachusetts Lowell

NERVE Center

Roger Bostelman

Chairman, ASTM F45

NIST/Smart HLPR, LLC



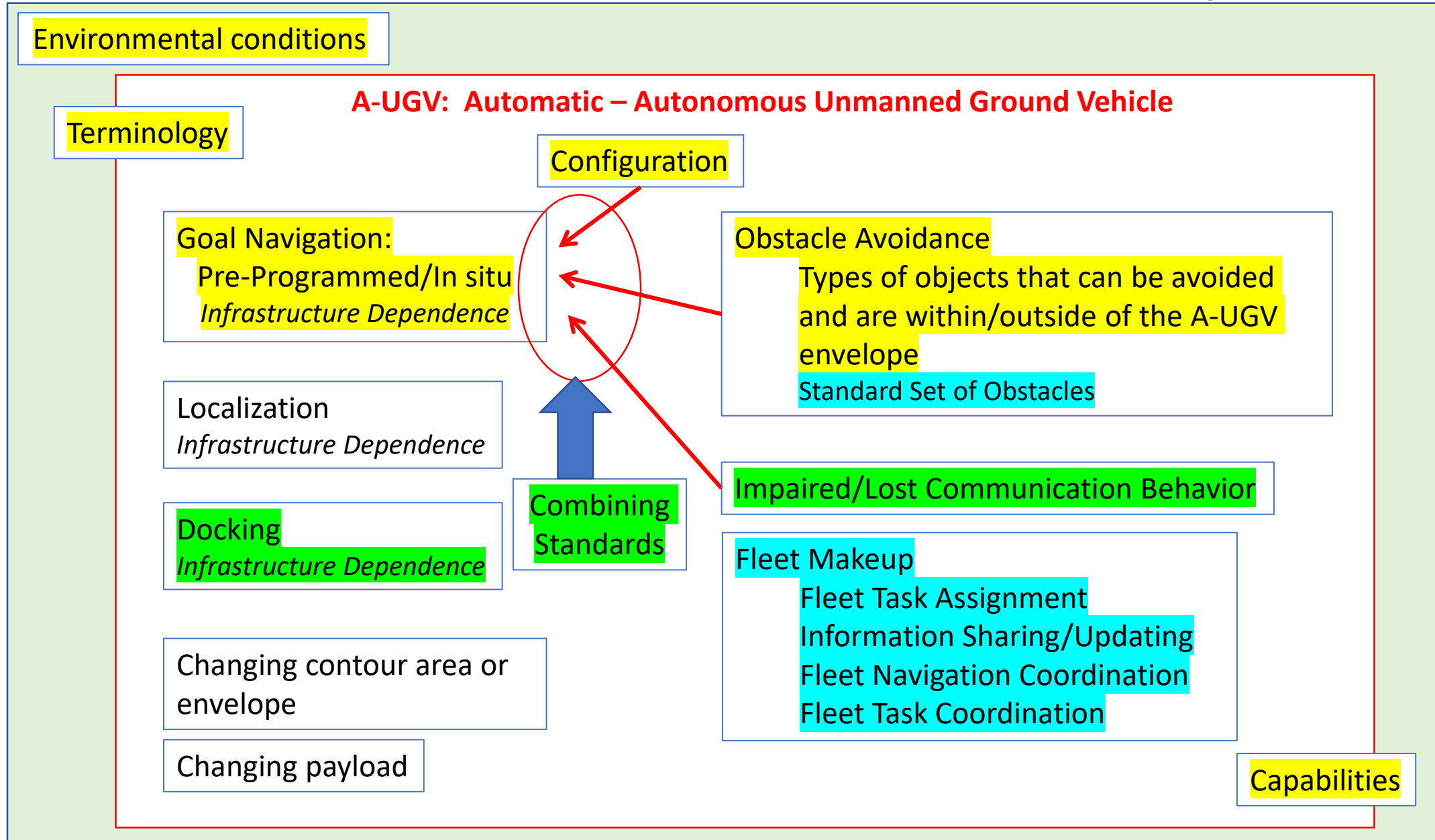
October 8, 2020

ASTM Committee F45

- Brief Scope
 - Performance standards committee for automatic- through-autonomous unmanned ground vehicles (A-UGVs) used in industry
- Committee F45 Subcommittees
 - F45.01 Environmental Effects
 - F45.02 Navigation and Docking
 - F45.03 Obstacle Detection and Protection
 - F45.04 Communication and Integration
 - F45.91 Terminology
 - F45.90 Executive
- Approximately 60 members from 12 countries
- Held 11 bi-annual face-to-face meetings, 12th planned for Oct 2020 (*virtual*)
- Hold over 40 e-meetings per year to develop standards.

ASTM Committee F45 Roadmap

published standard / work item / beginning development



ASTM F45 Committee Accomplishments

- **Published standards**

1. F3200-18 Standard Terminology for Driverless Automatic Guided Industrial Vehicles (continuously updated)
2. F3218-19 Standard Practice for Documenting Environmental Conditions for Utilization with A-UGV Test Methods
3. F3244-17 Standard Test Method for Navigation: Defined Area
4. F3265-17 Standard Test Method for Grid-Video Obstacle Measurement
5. F3327-18 Standard Practice for Recording the A-UGV Test Configuration
6. F3381-19 Standard Practice for Describing Stationary Obstacles Utilized within A-UGV Test Methods
7. F45.91 - WK65139 Standard Guide for A-UGV Capabilities

- **Work Items**

1. F45.02 - WK57000 Standard Test Method for Docking Driverless Automatic Guided Industrial Vehicles
2. F45.02 - WK65141 Standard Guide for Combining A-UGV Standards
3. F45.03 - WK54662 Standard Practice for Capturing A-UGV Positions using Grid-Video Techniques
4. F45.03 - WK68031 Standard Practice for Describing Moving Obstacles Utilized within A-UGV Test Methods
5. F45.04 - WK54431 Standard Practice for Implementing Communications Impairments on A-UGV Systems
6. F45.02 – WKxxxxx Fleets
7. F45.03 – WKxxxxx Standard Set of Obstacles

ASTM F45 Committee Accomplishments

Eleven (11) Bi-Annual Face-to-Face Meetings

- Next meeting 10/21 – 10/22, <https://www.astm.org/COMMITTEE/F45.htm>
- And at least once per year, these meetings have held demonstrations of standards being developed.

Over 40 E-Meetings per year

- Develop work items ~ monthly in each of the five sub-committees.

Two Workshops

- First Workshop – at IEEE ICRA 2015
 - Ten (10) papers were presented and discussions followed
 - Published ASTM book - STP1594 “Autonomous Industrial Vehicles: From the Laboratory to the Factory Floor”
- Second Workshop – with July 2018 meeting
 - Developed new work items:
 - A-UGV Capabilities (and a *roadmap to future standards development*)
 - Combining A-UGV Standards (e.g., navigation, docking, obstacles, communication impairments, etc.)