DARPA Robotics Challenge:

Jim Pippine - Golden Knight Technologies

DRC - Chief of Operations

Overview

- *Will not discuss Autonomy*
- There will be no equations used in this talk
- We were not trying to determine the "best" robot
- I am not a DARPA Employee*

DARPA Robotics Challenge

- International competition to develop robot systems for disaster response
- Why a challenge?
  - Historical examples – Napoleon' Food Challenge - 1800's
  - DARPA
    - Grand Challenge 1 – 2004
    - Grand Challenge 2 – 2005
    - Urban Challenge - 2007

Focus: Human Compatibility

1. **Environments**, even degraded, has been engineered for humans

Public Internet Images

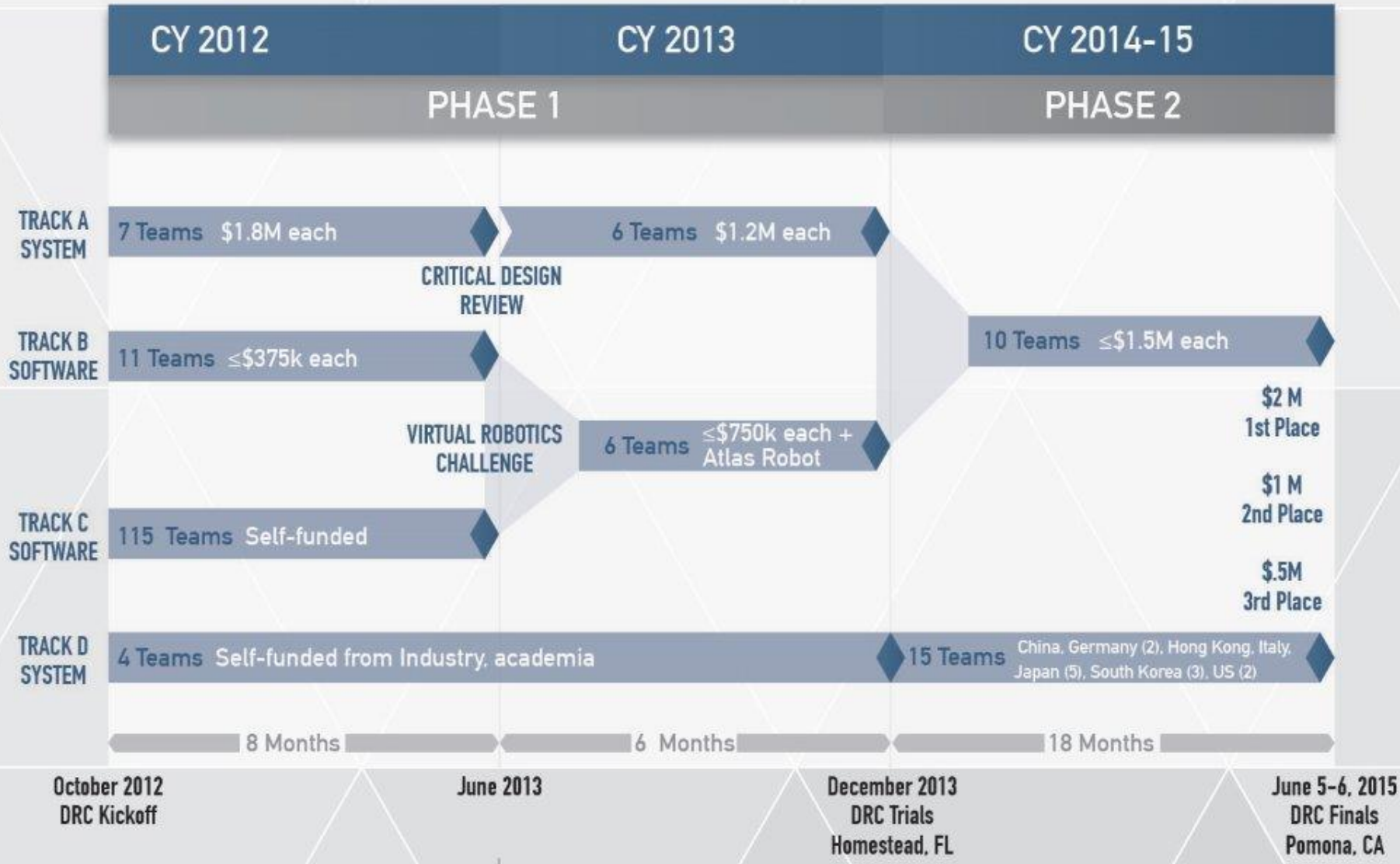
2. No shortage of human **tools**

Public Internet Images

3. No **training**: Human-like robot capabilities are easier for domain experts to use without requiring training.

Public Internet Image

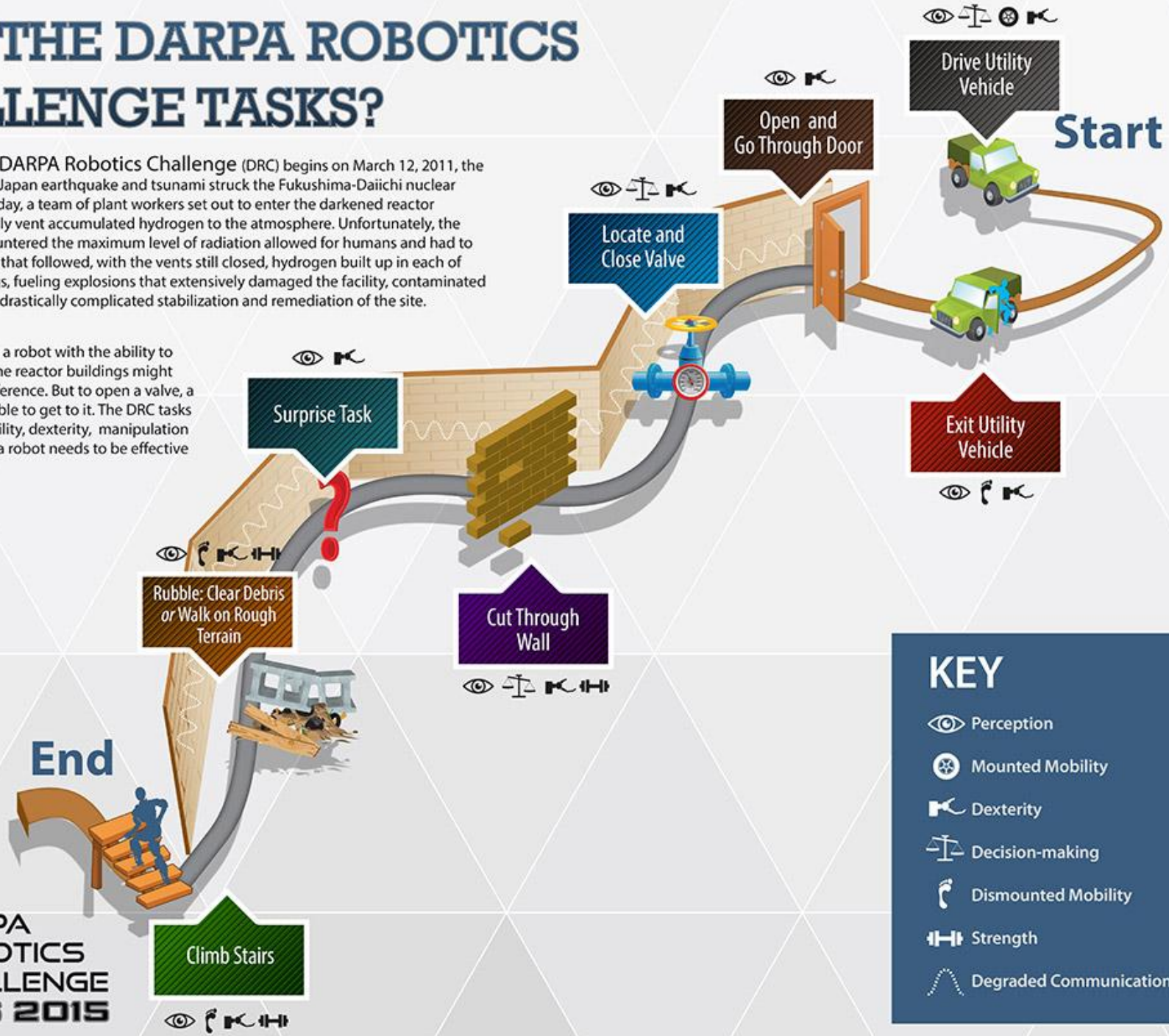
DRC PROGRAM STRUCTURE + FUNDING



WHY THE DARPA ROBOTICS CHALLENGE TASKS?

The story of the DARPA Robotics Challenge (DRC) begins on March 12, 2011, the day after the Tohoku, Japan earthquake and tsunami struck the Fukushima-Daiichi nuclear power plant. On that day, a team of plant workers set out to enter the darkened reactor buildings and manually vent accumulated hydrogen to the atmosphere. Unfortunately, the vent team soon encountered the maximum level of radiation allowed for humans and had to turn back. In the days that followed, with the vents still closed, hydrogen built up in each of three reactor buildings, fueling explosions that extensively damaged the facility, contaminated the environment and drastically complicated stabilization and remediation of the site.

At Fukushima, having a robot with the ability to open valves to vent the reactor buildings might have made all the difference. But to open a valve, a robot first has to be able to get to it. The DRC tasks test some of the mobility, dexterity, manipulation and perception skills a robot needs to be effective in disaster response.



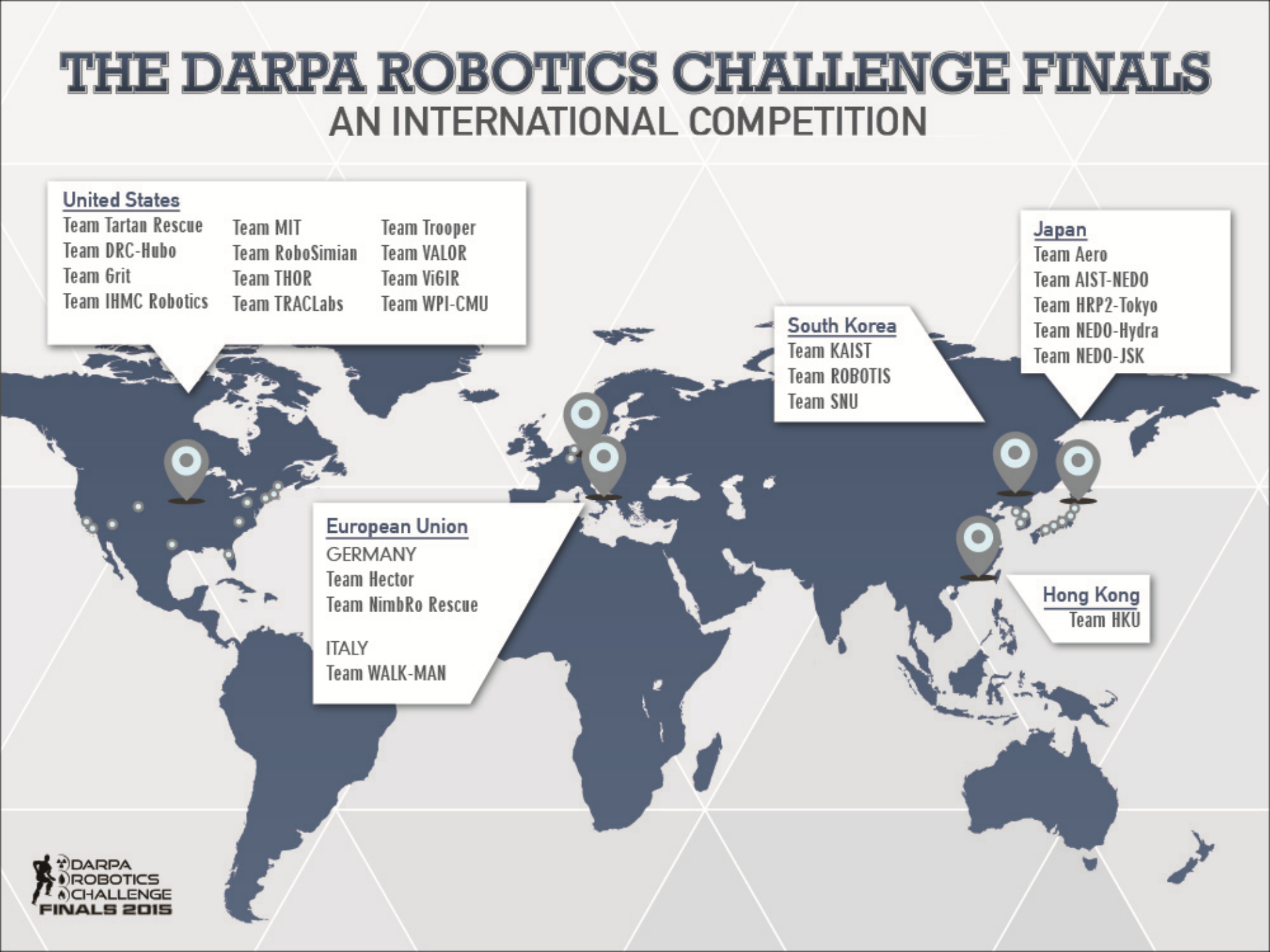
DARPA ROBOTICS CHALLENGE FINALS 2015

KEY

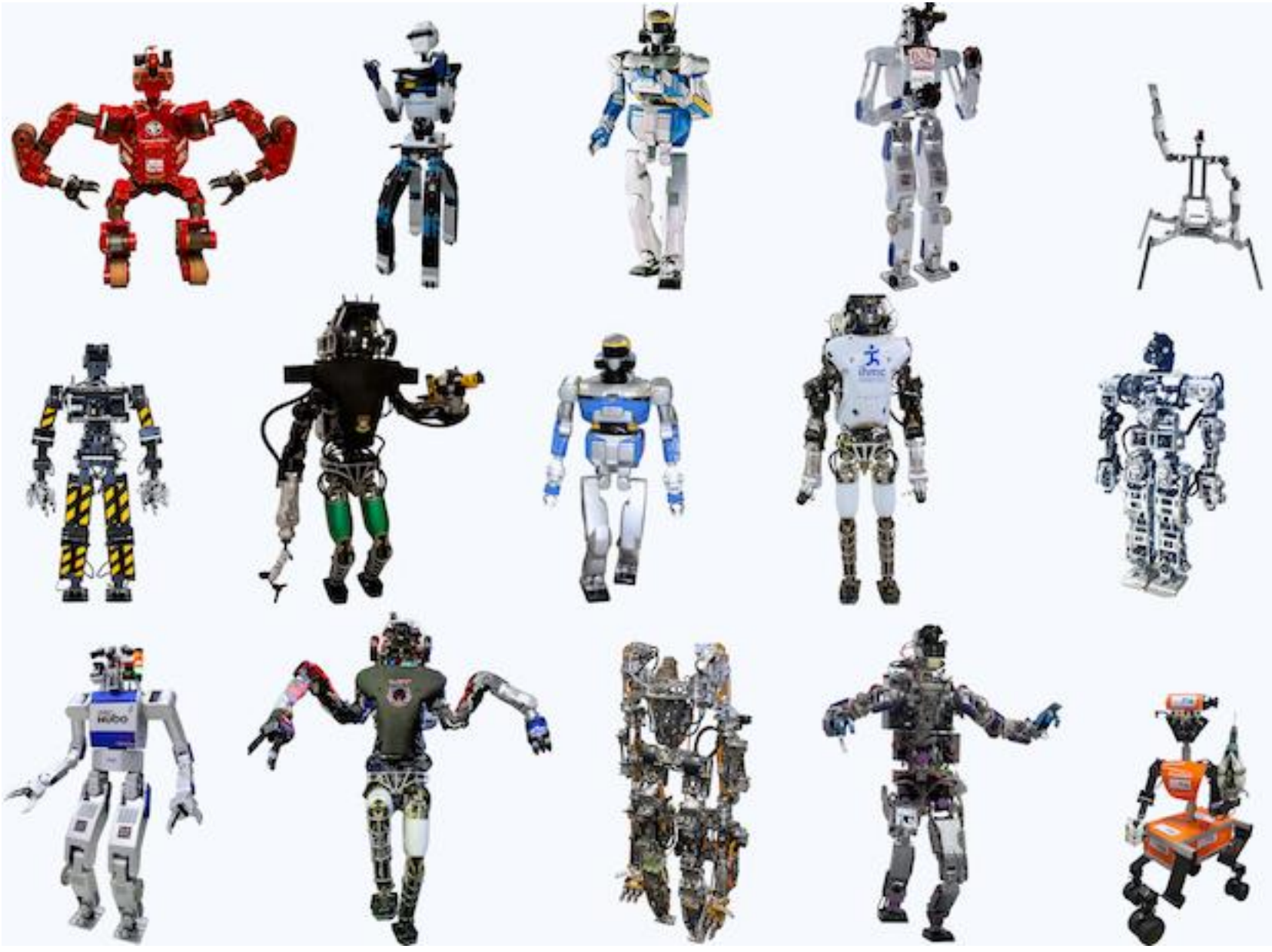
- Perception
- Mounted Mobility
- Dexterity
- Decision-making
- Dismounted Mobility
- Strength
- Degraded Communications

THE DARPA ROBOTICS CHALLENGE FINALS

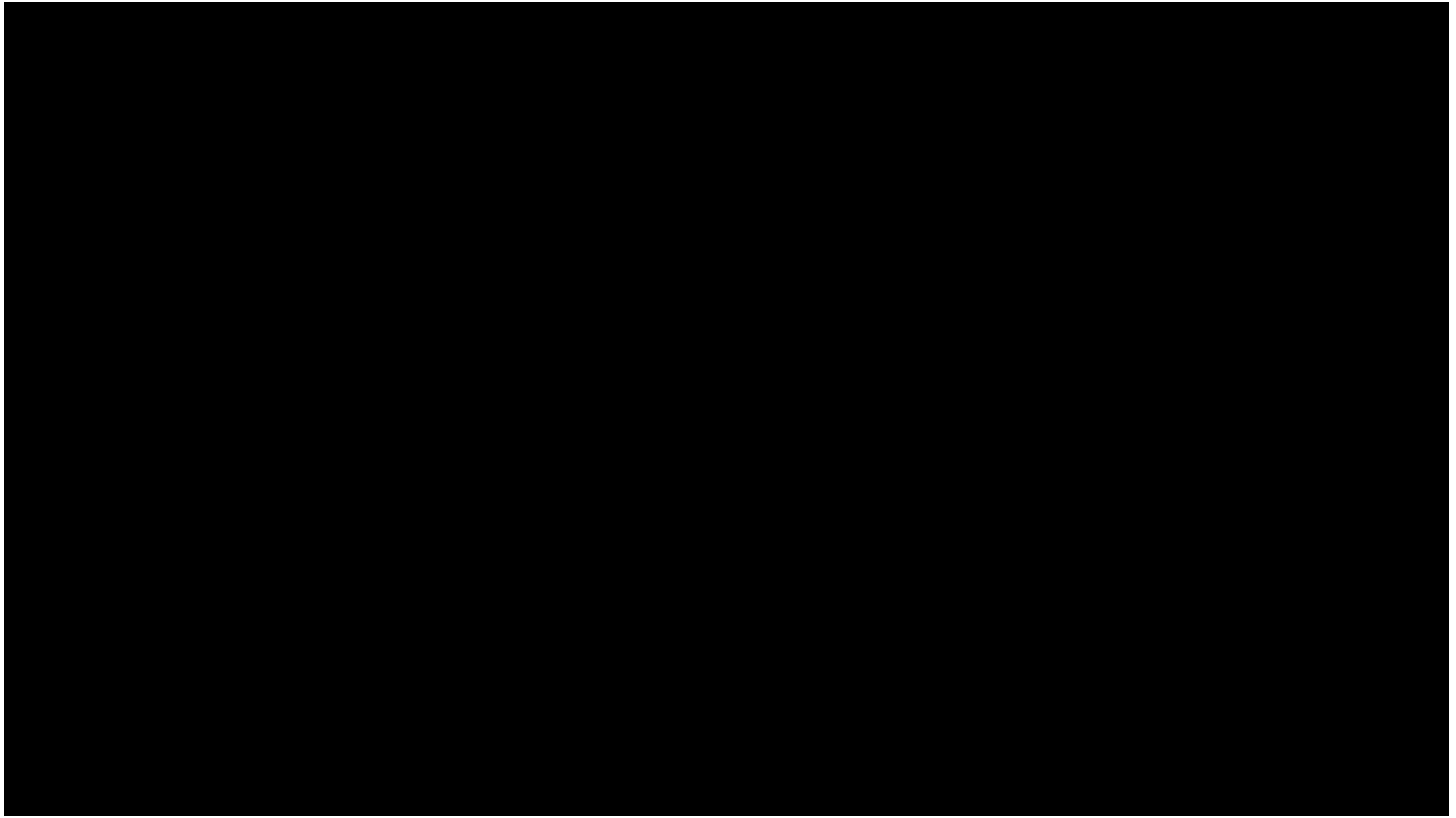
AN INTERNATIONAL COMPETITION



Wide array of Platforms



DRC Finals



DRC Finals

DRC FINALS TEAM STANDINGS

TEAM	SCORE	TIME
TEAM KAIST	8	44:28
TEAM IHMC ROBOTICS	8	50:26
TARTAN RESCUE	8	55:15
TEAM NIMBRO RESCUE	7	34:00
TEAM ROBOSIMIAN	7	47:59
TEAM MIT	7	50:25
TEAM WPI-CMU	7	56:06
TEAM DRC-HUBO AT UNLV	6	57:41
TEAM TRAC LABS	5	49:00
TEAM AIST-NEDO	5	52:30

TEAM NEDO-JSK
TEAM SNU
TEAM THOR
TEAM HRP2-TOKYO
TEAM ROBOTIS
TEAM VIGIR
TEAM WALK-MAN
TEAM TROOPER
TEAM HECTOR
TEAM VALOR
TEAM AERO
TEAM GRIT
TEAM HKU

Questions