COGNITIVIE MANUFACTURING

Session Chairs: Elizabeth Hoegeman

J.Rhett Mayor

Speakers: Dragan Djurdjanovic

Chris Will

Steve Ellet

Steven Skerlos

Smartphone

iPhone 5
From: www.apple.com

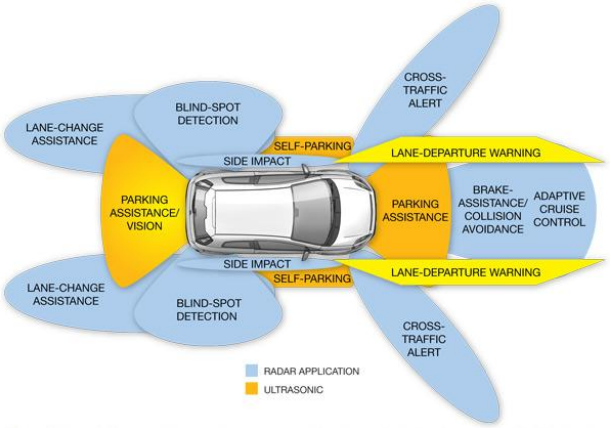
Nokia Lumia 1020
From: www.windowsphone.com;

Samsung Galaxy S4
From: www.samsung.com;

Processor	1.9GHz Quad Core (Snapdragon)
Memory	32GB
Sensors	Microphone, Camera (2MP), Camera (13MP), accelerometer, barometer, 3-axis gyro, geomagnetic (digital compass), light sensor, proximity

“Smartcar”

From: inhabitat.com, Marc Carter



From: www.edn.com

From: dc.streetsbolg.org, Anne Lutz Fernandez

http://www.centives.net/S/2012/what-effect-will-self-driving-cars-have-on-our-cities/

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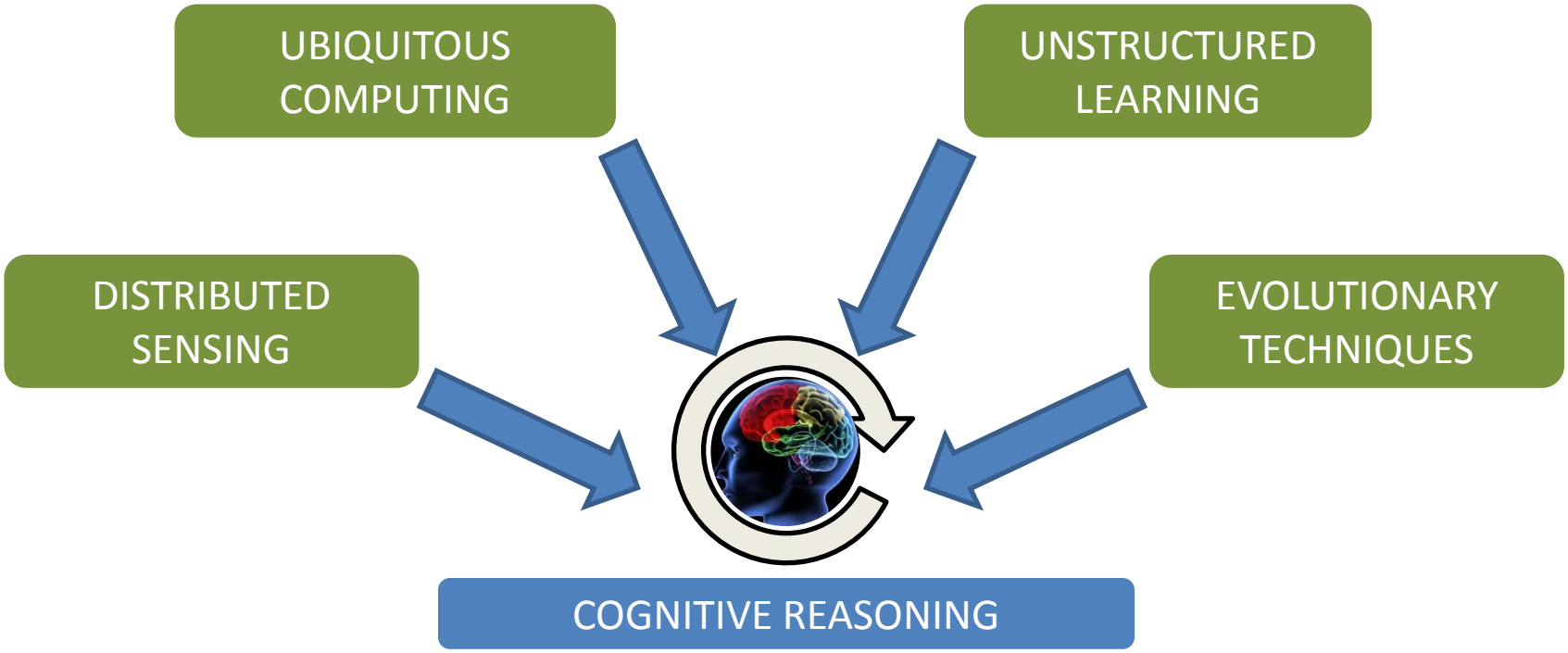
“Smart” manufacturing

- Manufacturing systems state of practice is “smart” – *intelligent* systems track production metrics and report to supervisory human operators via IT-enabled channels.
  - Decision making vests with the human operator

Cognitive Manufacturing

- Cognitive manufacturing is an evolutionary step in production system control that imbues the manufacturing system with capacity for perception, judgment and reasoning.
  - *Cognitive manufacturing systems perceive changes and know how to respond*



Cognitive Manufacturing

Market Objectives

- Sustainability: energy intensity reduction, CO_2 footprint, societal metrics

Production System Logistical Level

- Autonomous global logistics optimization (min. energy intensity, or capital intensity) through adaptation to supply variability and pricing volatility

Manufacturing System Level

- Factory-level manufacturing systems propagating autonomous operation towards market goals.
- AMES – perceive and respond to dynamics in local systems (environment, social) and interfaces with supply-chain
- Unstructured learning through peer to peer and experiential processes

Manufacturing Process Level

- Distributed COGNITIVE AGENTS embed cognitive capabilities in unit processes
- Perception imbued through ubiquitous sensing and sensor fusion.
- Reasoning imbued through *unstructured learning - Evolutionary techniques* experiential and swarm intelligence for adaptation and control.

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Topic Areas

1. Distributed Agents for Artificial Immunity in Modern Manufacturing

   Dragan Djurdjanovic, University of Texas at Austin

2. Manufacturing Execution Systems and Computer-Enabled Decisions at the Manufacturing System level

   Chris Will, Apriso and FlexNet

3. The Rise of Computer-Enabled Supply Chain Design

   Steve Ellet, CHAINalytics

4. Cognitive Agents to Advance Sustainable Manufacturing

   Steven Skerlos, University of Michigan