Modular, Integrated Subsystems in UAS platforms

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Customers demanding higher integration and lower NRE

- **New levels of functionality and performance needed in UAS platforms**

  - **Smaller, lighter, low power, low cost – SWaP-C**
  - **More processing, memory and flexibility; modular I/O**

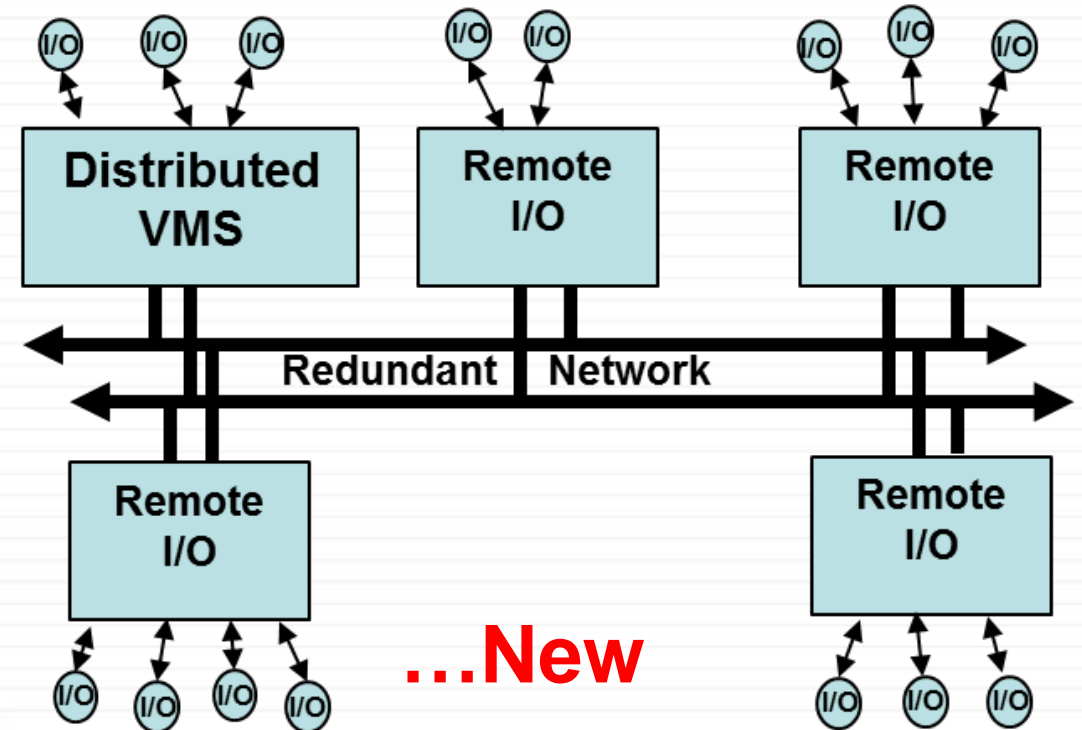- **Multicore processors in airborne, ground, naval and space**

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Changing architectures…

- **From centralized to distributed**
- **Combined system functionality – MMC and VMS**
- **Intelligent, networked remote I/O and data concentrators**
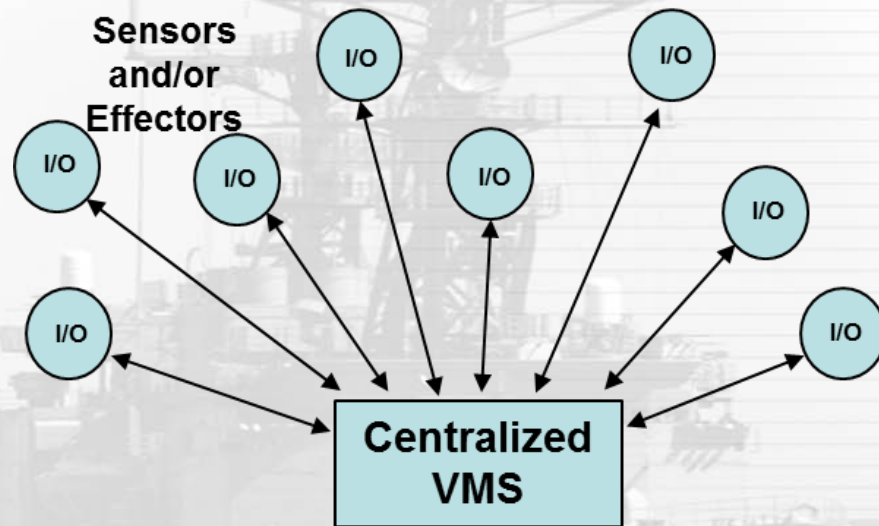
Old…

…New

Diverse applications limited only by the developer's imaginations…

- **Remotely piloted vehicles (RPVs)**
- **Fully autonomous vehicles (FUVs)**
- **Aquatic to orbital**
- **UAVs, UGVs, UUVs, USVs, the list is endless…!**

DARPA, US Navy use of multiple controlled & synchronized UAS

- **Extends C4ISR & SAR reach, resolution & accuracy**
- **Navy's LOCUST (LOw Cost Uav Swarm Tech.) program**
- **Radio astronomy has been using this VLA technique for years…**

Securing data in a wireless UAS platform

- 100's of crashes & downed RPVs worldwide
- Cyber-warfare – real and present threat
- UAS takeovers by hackers
  - RQ-170 Sentinel by Iran in Dec 2011
- Data & platform MLS and encryption are required

https://backcountryvoices.wordpress.com/2013/12/08/drone-crash-database/

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Integrated subsystems with onboard data encryption

Secure erase for all memory and Flash
- Including encryption keys, data variables, gathered intelligence

Integrated MLS (Multiple Levels of Security) in H/W vs. layered security apps

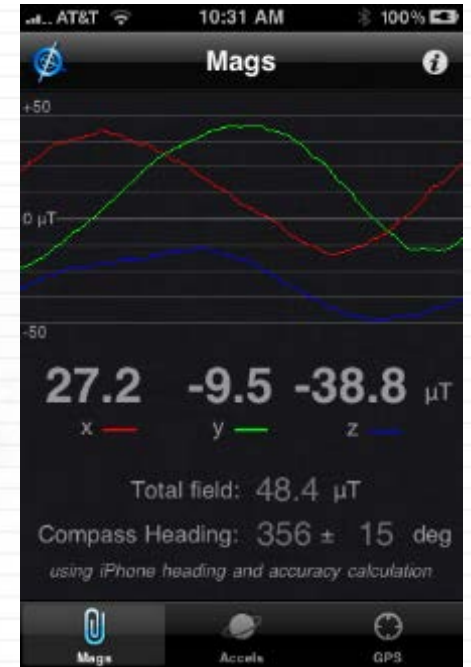# Proliferation of advanced, lower cost technologies

Self-stabilized drones market explosion

Smartphones driving technology integration

Crossbow's xSensor app for iPhone

Today's smartphones include; multicore ARM, GPS, accelerometers, magnetometers, MEMS gyros, WiFi, Bluetooth…& a boatload of Flash

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Advanced Processor Technologies for Defense

- **Advanced, multicore PowerPC, x86 and ARM processors from NXP/Freescale, Intel/AMD and T.I. supports data integrity and MLS in internal hardware**
  - **Freescale's QorIQ PowerPC has "re-introduced" AltiVec**
  - **Not everyone has switched to Intel or ARM…**

- **Today's RTOS's and development tools support greater flexibility and sophisticated multicore debug tools**

Flexible, modular integrated subsystems and Remote I/O data concentrators exist today
No NRE – truly COTS