

# Aviation and Aerospace Innovation

## CMC electronics

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### Corporate Background

#### About CMC Electronics Inc.

- 1901** Guglielmo Marconi successfully makes the first trans-oceanic wireless transmission.
- 1902** Marconi founds the *Marconi Wireless Telegraph Company*.
- 1925** Company name changed to *Canadian Marconi Company*.
- 60s** Corporate focus moves towards aircraft navigation, monitoring and display systems.
- 2001** Company name changed to *CMC Electronics*.



Marconi co. circa 1910

**CMC Electronics stands on a solid reputation based on over one hundred years of innovation. Today, CMCE is widely recognized to be a world leader in the design, manufacture, sales and support of high-technology electronic products for the aerospace and communication markets.**

### Program Abstract

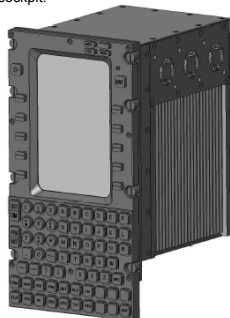


Sikorsky Cyclone CH-148

#### The Maritime Helicopter Project (MHP)

- Engineering of software design and development of flight computer systems.
- Replacing systems on board aging Sikorsky Sea-King Helicopters.
- System will include components for Flight Management, Mission Data Management, and Communication Management.
- MHP conducted to support Naval Surface Warfare, Sub-surface Warfare and Search and Rescue operations.
- Two Flight Management Control Display Units (FMCDUs) located in cockpit.

**The FMCDU creates an interactive display to present critical flight data, mission data and communication system status to the aircraft crew.**



Flight Management Control Display Unit

#### Co-op Student Activities

- Working as a member of the Military Software Engineering team.
- Working closely with the FMCDU device.
- Writing, proofreading and editing software design and requirements documents interface.
- Developing embedded user interface keyboard and display software for the FMCDU in C and in Ada languages.
- Conducting and participating in review sessions to examine produced work.

### Work Term Context

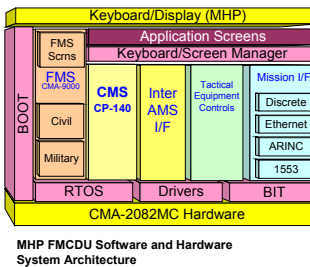
#### Student Background

- Honours Bachelor of Computing. Three of four co-op semesters completed.
- Previous Co-op Work Experience:
  - Blue Coat Systems** (2005) - Quality Assurance.
  - Rogers Cable** (2006) - Development Support. *Third Prize Winner for Best Work Term Report*
- Work Term Goals:
  - Broaden software development skills.
  - Develop agile decision-making practices.
  - Expand time management abilities.
  - Increase ability to conceptualize large projects.



### System Architecture

#### Foundation, Application and Interface Integration Layers



MHP FMCDU Software and Hardware System Architecture

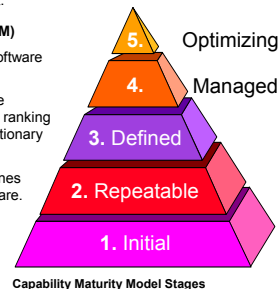
- The MHP FMCDU system is constructed on three levels:
  - Interface layer** contains the graphical user interface (GUI) software to manage user data and response feedback.
  - Application layer** includes application programming interfaces (API), drivers, the kernel and operating system software.
  - Foundation layer** consists of the existing open hardware architecture.

### Software Process Maturity Overview

- In general, lives will ultimately depend on the reliability of flight equipment.
- Developing commercial and military aviation equipment must take place in a very sensitive and high precision environment.

#### Software Capability Maturity Model (CMM)

- Internationally recognized standard for software development.
- The model helps judge the maturity of the software processes of an organization. A ranking between one and five indicates the evolutionary stage for the key procedures in practice.
- Describes and provides company guidelines used for managing and developing software.
- A proven model. Benefits include:
  - Reliable on-time delivery
  - Higher product quality
  - Predictable expenses

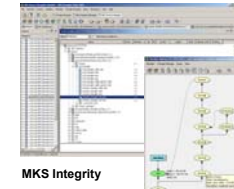


### Process Technologies

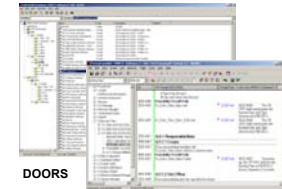
#### Measuring, Analyzing and Improving

**CMM Level Three: Defined.**  
All projects use standardized management and engineering processes for software development and maintenance.

- October 2003:** CMC Electronics was assessed and certified with **CMM Level Three**. This level provides a foundation from which all engineering processes will be examined and decisions can be made on how to improve them.
- A component of this certification is reliant upon the technologies being utilized within the process management infrastructure:
  - MKS Integrity™** is used for software version control, code and development path management, review session logging and issue tracking.
  - Telelogic DOORS®** is used for managing and tracing system requirements.



MKS Integrity



DOORS

### Conclusion



- Traceable.** All components of software functionality and low-level implementation detail must be traceable to a higher level of system and customer requirements.
- Defined.** Software which requires a very high degree of dependability necessitates a rigid and highly defined process management infrastructure.
- Consistent.** A corporation-wide set of procedures for design, implementation and maintenance will ensure that all aspects of the product lifecycle are well controlled and documented.

### Citations and Acknowledgements

#### Thanks to:

- My supervisor, **Kevin Sanford** and my coworkers, **Bryan Lowe** and **Felix Petngang**.
- My co-op support in Guelph: **Deborah Stacey**, **Sharon Popkey** and **Bruce Wilson**.

#### Source Document References:

- CMCE Corporate Outline and Presentation. 1999-2006.
- CMCE Capability and Demonstration Brochure. 2005.
- Maritime Helicopter Program Reference Document. 2003-06.
- New Hire Orientation Training Material – Marlene Walker. 2006.

