

Electronic Warfare Asia 2020

Future for EW in conducting multi-role/multi- effect EMSO

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Director International Region
II
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Timeline

- 1980s
 - Stealth
- 1990s
 - Iraq
 - Bosnia
 - WTC
- 2000s
 - 9-11
 - Afghanistan/Iraq
 - Cyber as a Domain
- 2010s
 - Ukraine
 - Syria



Losing the Advantage



“The development and proliferation of more advanced military technologies by other nations means that we are entering an era where American dominance of the seas, in the skies, and in space can no longer be taken for granted”



China – Dedicated EW Forces, Long Range Weapons

Russia - Ukraine/Syria Dedicated EW Forces

Korea – Long Range Weapons

Multiple Threats

- Population growth beyond borders
- Expansion of culture and influence
- Military forces & capabilities are growing, matched and 'racing'
- More rapid platform development & deployment of applied technology
 - Hyper Velocity
 - @ Mach 6⁺ & <10min flight times
 - Directed Energy - Laser, HP EMP
 - Swarming - UAV & UCAS
 - Undersea - Submarine & UUAV
 - Space - Mini to Micro constellations



Long-Range Emerging Threats

- Adversaries' Political and Military Advancements
 - Near Peer Competitors
 - Foreign Government Capacity and Stability
 - Shifting alliances and Socio-Economic & Political Alignments
- Dual-use Technologies
 - Artificial Intelligence
 - Emerging Technologies (QIS)
 - Internet of Things (IoT)
 - Autonomous and Unmanned Systems
- Weapons
 - EMS is at the center of most major weapons and capability developments
- Global Events and Demographic Changes

Future Environment for Electromagnetic Spectrum Operations & EW Development & Deployment

(for) Electromagnetic Spectrum Operations & EW Development & Deployment:

- Threats still will drive Requirements
- COTS & Moore's Law underpin rapid system development
- Industrial Espionage reduces time to develop
- Acquisition needs to move faster & accept more risk
- Adaptive Materials Processes
 - for coatings, manufacture & repair
- Modularity & Open Architectures
 - assist rapid prototyping & spiral technology insertion strategies
- Cyber Survivable Systems and Recoverable Data Centres
 - needed before HP EMP & DE Weapons are employed & deployed in the field and the suburbs

Global Challenges

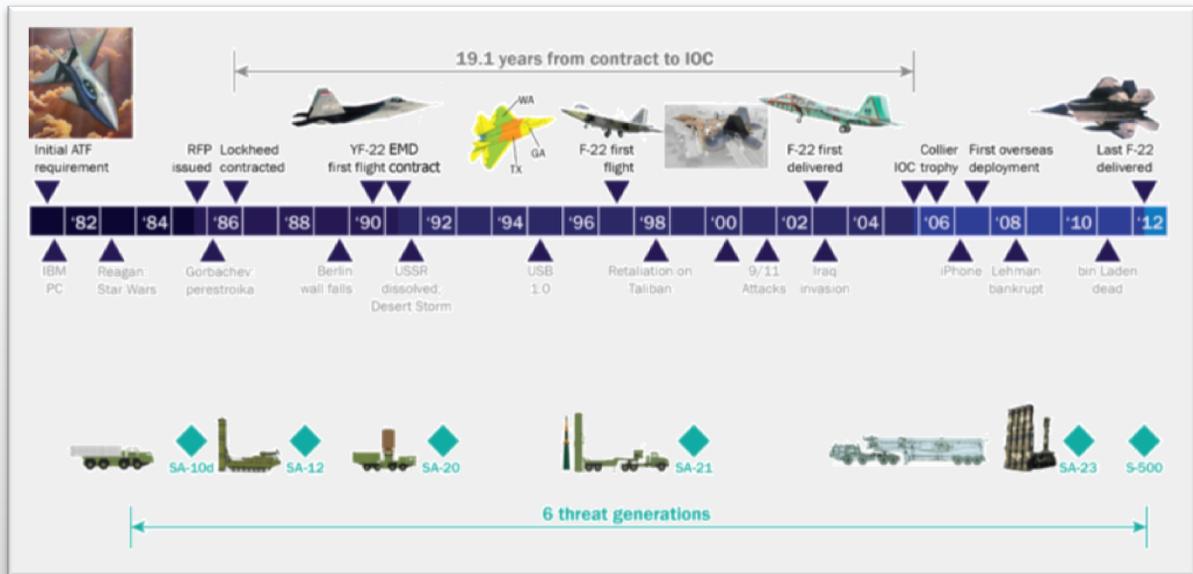
- China Expansion
- North Korea Nuclear Threat
- Russian Resurgence
- Iranian Aggression



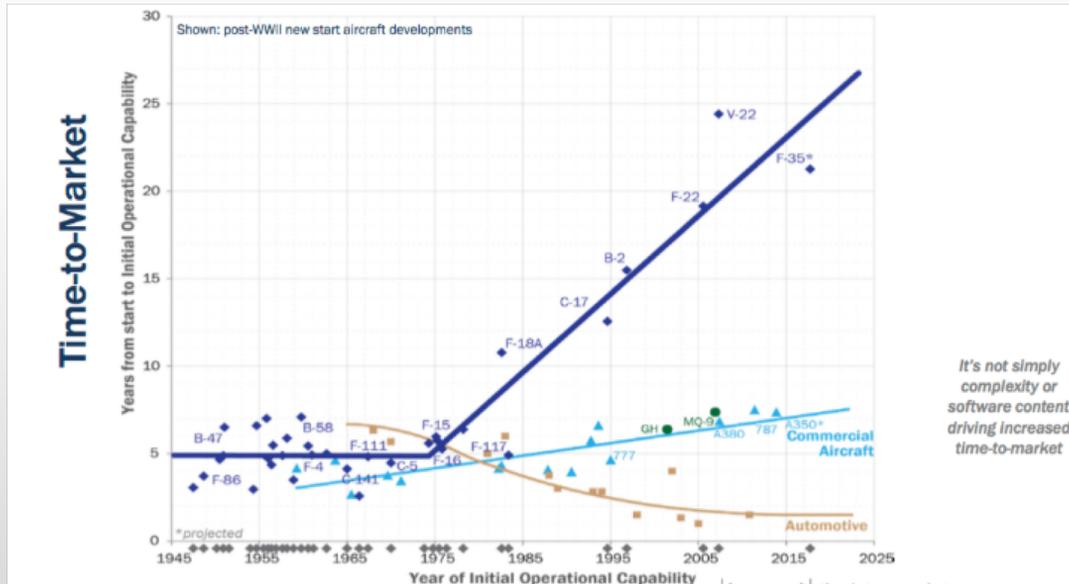
Multiple Communities to Counter Current Threats



Slow Reaction



Time to Field



What has Changed – Global Connectivity

- Security Innovation Base comes from the private sector
- Components/weapons produced by multi-national coalitions
- Connected Global networks
- Rate of change is increasing
- Asymmetric cost posed by asymmetric threats



What has Changed - Domains

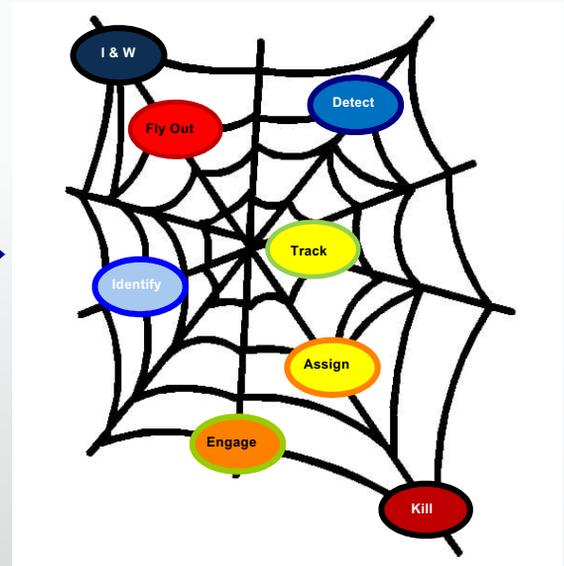
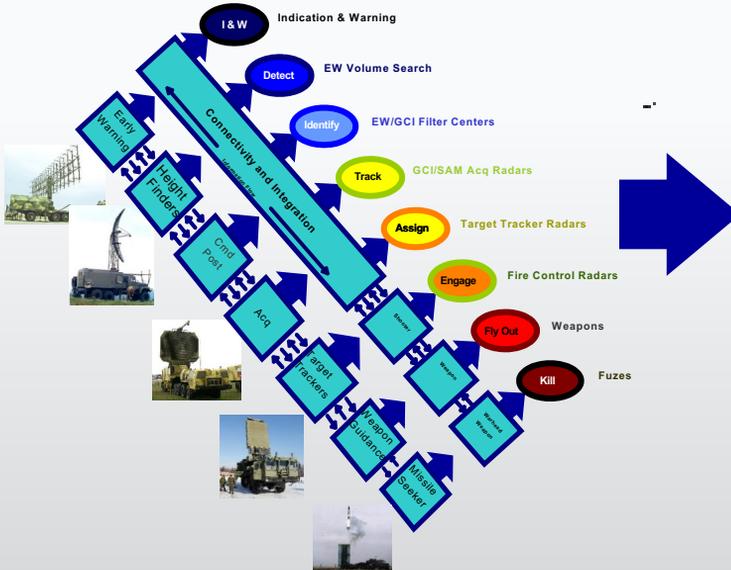
- Current Domains – Space, Air, Land, Sea & Cyber
 - Emergence of New Operating Environments
- EW more than just Airborne Electronic Attack
 - We were born from and our culture has been airborne EW, but NO LONGER
 - EW and Electromagnetic Spectrum Operations prevalent in all the current domains
 - Nations and non-State actors recognize this and adversaries are exploiting this.
- Electromagnetic Spectrum Today
 - Detect, ID, Locate, Deny, Deceive, Degrade, Delay, Disrupt, Destroy
 - Contested, Congested and Complex Environments influence EMS Operations
 - All missions that happen in all domains are reliant on the EM Spectrum

What has Changed - Technology

- **Multi-Function supported by ML/AI**
- **Cognitive, Swarming, Autonomy**
- **Disrupt, Deny, Degrade, Deceive**
 - Non-Kinetic effectors
 - EW
 - Cyber
 - Spectrum Manoeuvre
- **Multi-Function/Multi-Domain using the EME**
 - Affecting the Spectrum
 - Protecting the Spectrum



Kill Chain to Kill Web



Retaining the Advantage



- Adaptive, cognitive, swarming, multi-function, penetrating
- Cross Domain Command and Control
- Protect our platforms – EP and Cyber Survivability
- We operate and fight in the electromagnetic spectrum...
 Provide the Commander the ability/option to deliver effects on the Battlefield
 - Kinetic
 - Non-Kinetic (EW, Cyber, DE, HPM)
- Invest in and develop:
 - Multi-function Arrays
 - Machine Learning
 - Quantum Computing
- Speed up our decision cycle and acquisition cycle
- Train like you fight – Multi-National Forces

Challenges



- Organization for Multi-National Fight
- Sensing in the spectrum/data fusion
- Multi-domain Command and Control
- Joint Operations (Air Force, Army, Navy)
- Multi-National Operations
- Training



Commitment to change

- We must move faster (Development, Acquisition, Manufacturing, Integration) – next (5th) Industrial Revolution
- War Fighting Environment will continue to change, & be more reliant on Spectrum for operations
- Spectrum is a critical manoeuvre_(sp) space – you can make a difference in advancing our tradecraft
- To Counter current and evolving threat: EW, Cyber, Spectrum Operations, Spectrum Manoeuvre is required
- Airborne EW must include: F-35, UAS, Multi-function Weapons
- Rapid Threat detection, Cooperative Systems, Coherent Effects, Cognitive and Autonomous Systems

Thank You & Questions

AOC: *Advancing International Policy, Programs, and Professional Development related to Electromagnetic Spectrum Operations in all Domains*

Mission:

- **Advocate** ■ **Educate** ■ **Support**



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Spectrum Operations in all Domains

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Free Membership

- Active Duty Military
- Under 26 years old



EW Asia 2020 STEM Exhibition, Tutorial & Workshop – 04Feb20

- Introduction to AOC EW Asia 2020 STEM Exhibition
- Kangaroo Chapter Support for local Adelaide University
 - Undergraduate Student Poster Display @ Lunchtime
 - Progress in Radar Research (PIRR) Annual Seminar
 - Already judged in 4Q19 as part of PIRR2019
- AOC STEM Tutorial & Workshop
 - Here at 4.50pm for 40mins until 4.30pm
 - Further STEM examples to be showcased
 - Registered EW Asia attendees welcome
 - Participation invited & not mandatory
- Sign up at AOC Membership Booth



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EW Asia 2020 - Exhibition & Tutorial

Undergraduate Student Paper Display

- Entries selected from annual PIRR 2019 Talent Pool
- Tutorial starts in Plenary Session Hall at 4.50pm sharp
- Facilitators:
 - Dr Lee Kar Heng: Singapore Chapter President
 - Dr Mark Skanes: Australian STEM Facilitator
 - Mr Jeff Walsh; AOC Intl Director Region 2

'After 5' Tutorial-Workshop: Sign Up (overleaf)

- Catering Purposes & Record of Proceedings
- Chapter Presidents & Officers to attend
- Distribution to Activity Participants



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EW Asia: Tutorial-Workshop Sign Up

Name (1st & last / family)

Email Contact

Requests /
Interest



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