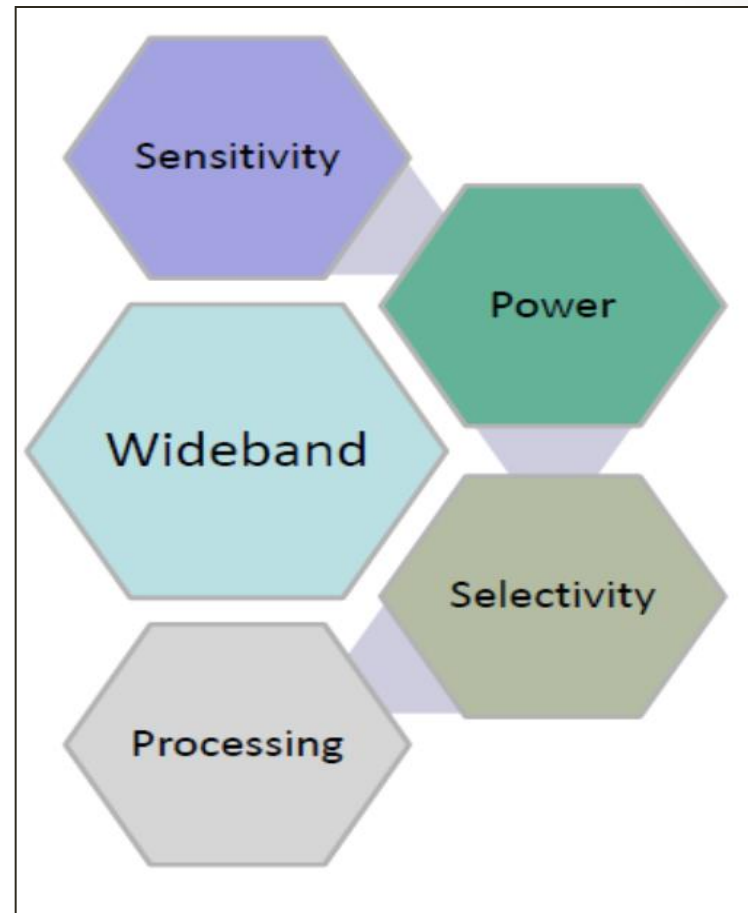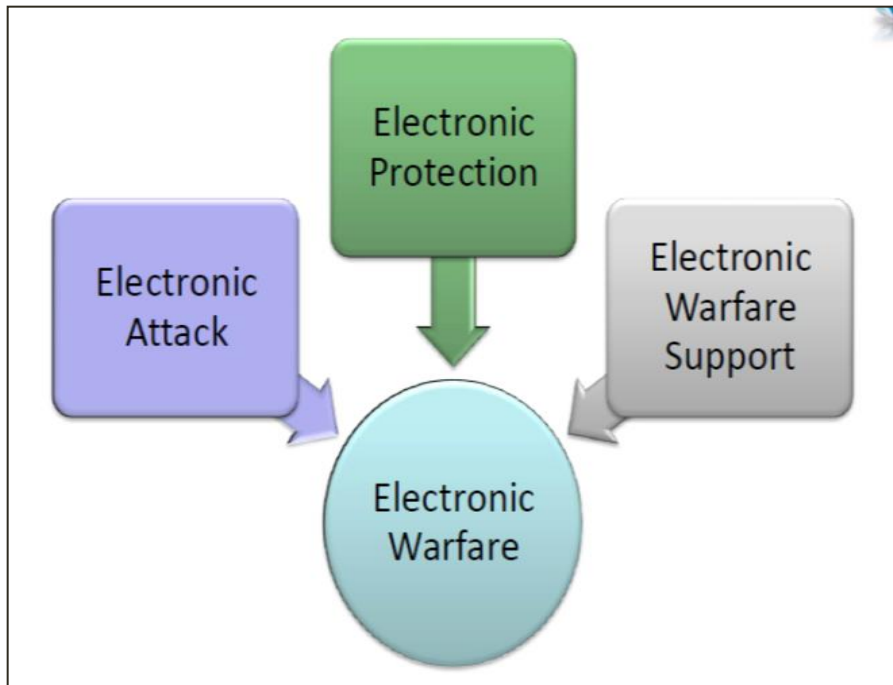# Pushing EW into the future

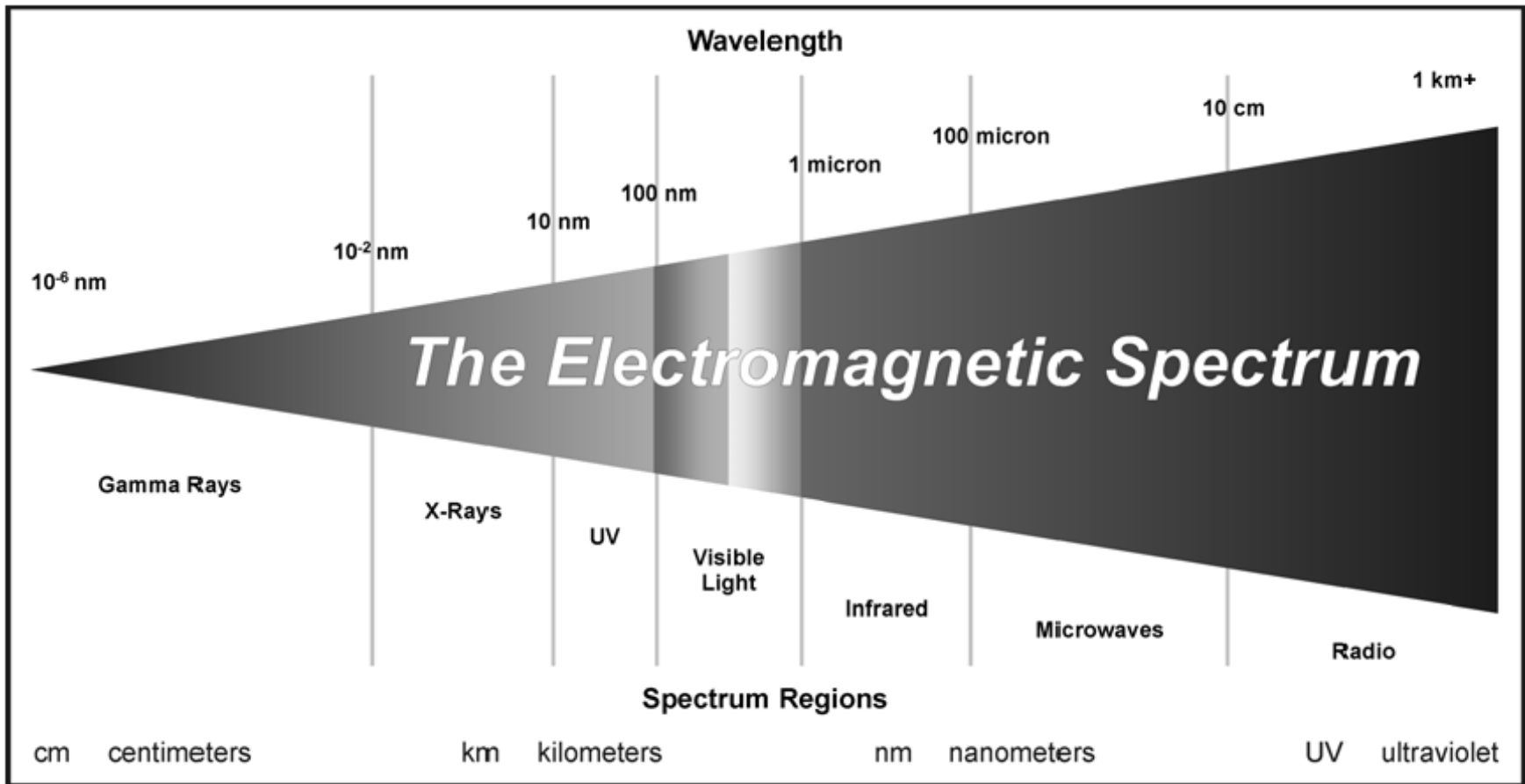By R Adm (jg) K. Wiesner

Introduction

Scope

- Spectrum.
- Military requirement for Operations.
- EW Critical Information.
- Knowledge Centres and Communications.
- Interfacing Architecture and an Example.
- Conclusion.

Electro Magnetic Spectrum

Radio and Radar designators and frequency bands

Radio Frequency Band Designator	Radio Frequency Range	Radar Band Designator*	Frequency Range	Typical Usage
ULF	lower than 3 Hz	VHF	50-330 MHZ	Very long-range surveillance
ELF	3 Hz - 3 kHz	UHF	300-1,000 MHz	Very long-range surveillance
VLF	3 - 30 kHz	L	1-2 Ghz	Long-range surveillance, enroute traffic control
LF	30 - 300 kHz	S	2-4 Ghz	Moderate-range surveillance, terminal traffic control, long-range weather
MF	300 kHz - 3 MHz	C	4-8 Ghz	Long-range tracking, airborne weather
HF	3 - 30 MHz	X	8-12 Ghz	Short-range tracking, missile guidance, mapping, marine radar, airborne intercept
VHF	30 - 300 MHz	K_u	12-18 Ghz	High resolution mapping, satellite altimetry
UHF	300 MHZ - 3 GHz	K	18-27 Ghz	Little use
SHF	3 - 30 GHz	K_a	27-40 Ghz	Very high resolution mapping, airport surveillance
EHF	30 - 300 GHz			
Sub-millimeter	300 Ghz - 1 THz			

EHF	extremely high frequency	kHz	kilohertz	THz	terahertz
ELF	extremely low frequency	LF	low frequency	UHF	ultra high frequency
GHz	Gigahertz	MF	medium frequency	ULF	ultra low frequency
HF	high frequency	MHz	megahertz	VHF	very high frequency
Hz	hertz	SHF	super high frequency		

* Radar band designators relate back to the early development of radar in World War II when the letter designators were used for purposes of secrecy. After the requirement for secrecy was no longer needed, these letter band designators remained.

Military Requirement for Operations

- Electronic Warfare Estimate

- Define the battlefield environment.

- Define the threat.

- Identify host country use of the electro spectrum.

- Identify own capabilities, shortfalls and readiness.

- Identify enemy "same".

Electronic Warfare Target Criteria

- Targeted capabilities.
- Target list.
- Prioritised list.
- Traditional targets.
- Asymmetric targets.

- Where to engage.
- Value and pay-off.
- ROE and approval.
- Fixed or mobile.
- GPS, cell, EODs.

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Critical EW Ops Information

- Target information.
- Prioritised target description and frequencies.
- Time of "window".
- Controller.
- Own forces.
- Frequency restrictions.
- De-confliction.

Joint EW Capabilities

- Suppression of enemy defences.
- Stand-off and escort jamming.
- Integrated air, sea and ground electronic attack.
- Self-protection and time-critical strike support.
- Growth commonality.

Open Architecture for Joint Interfacing

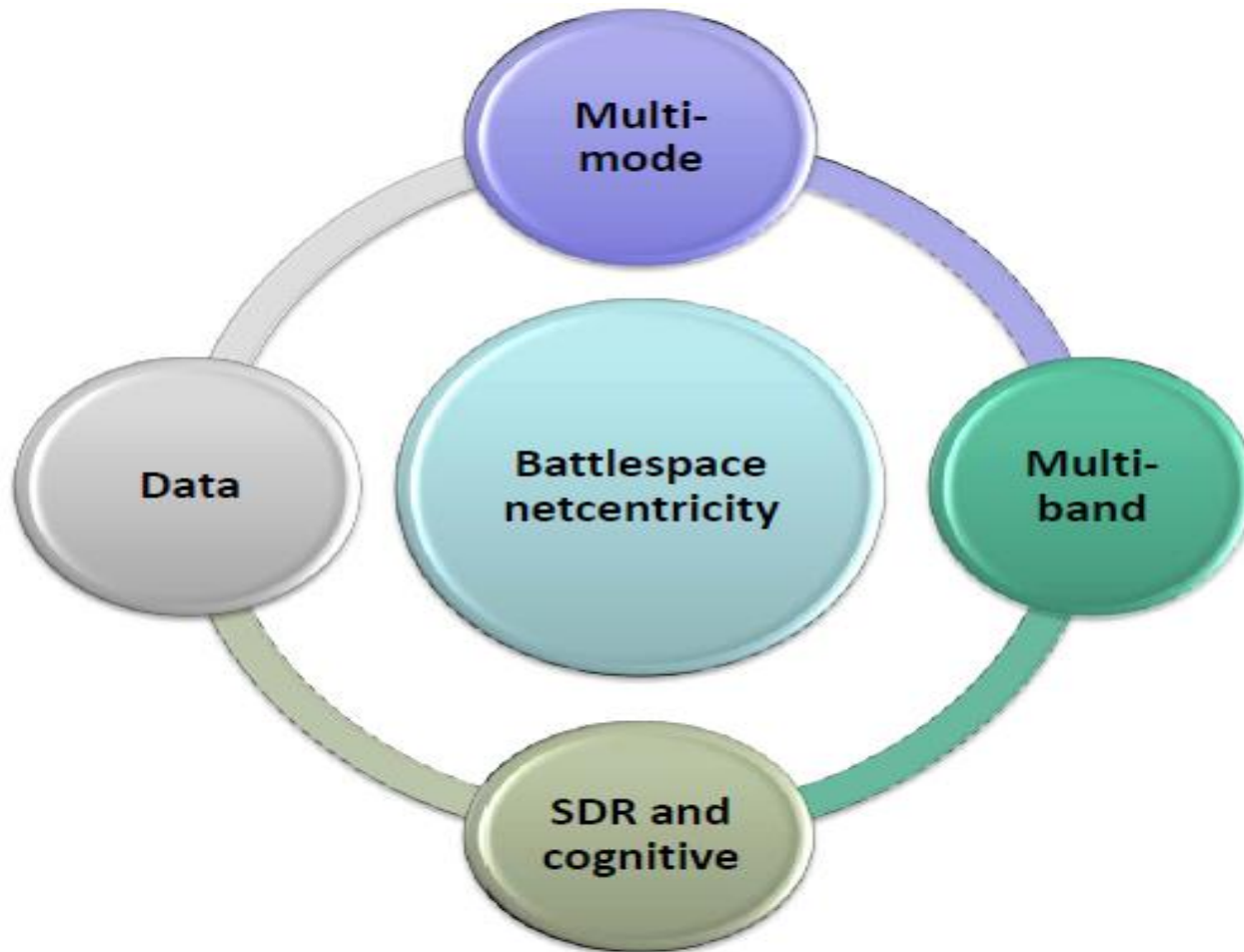| Domain/Mobility	ARMY	AIRFORCE	NAVY
Airborne			
Ground			
Sea surface Underwater			
Unmanned			
Fixed/Mobile			

Knowledge Centres

Economy of Scale , Distribution and Pricing

Open Architecture, Interfacing and Protocols
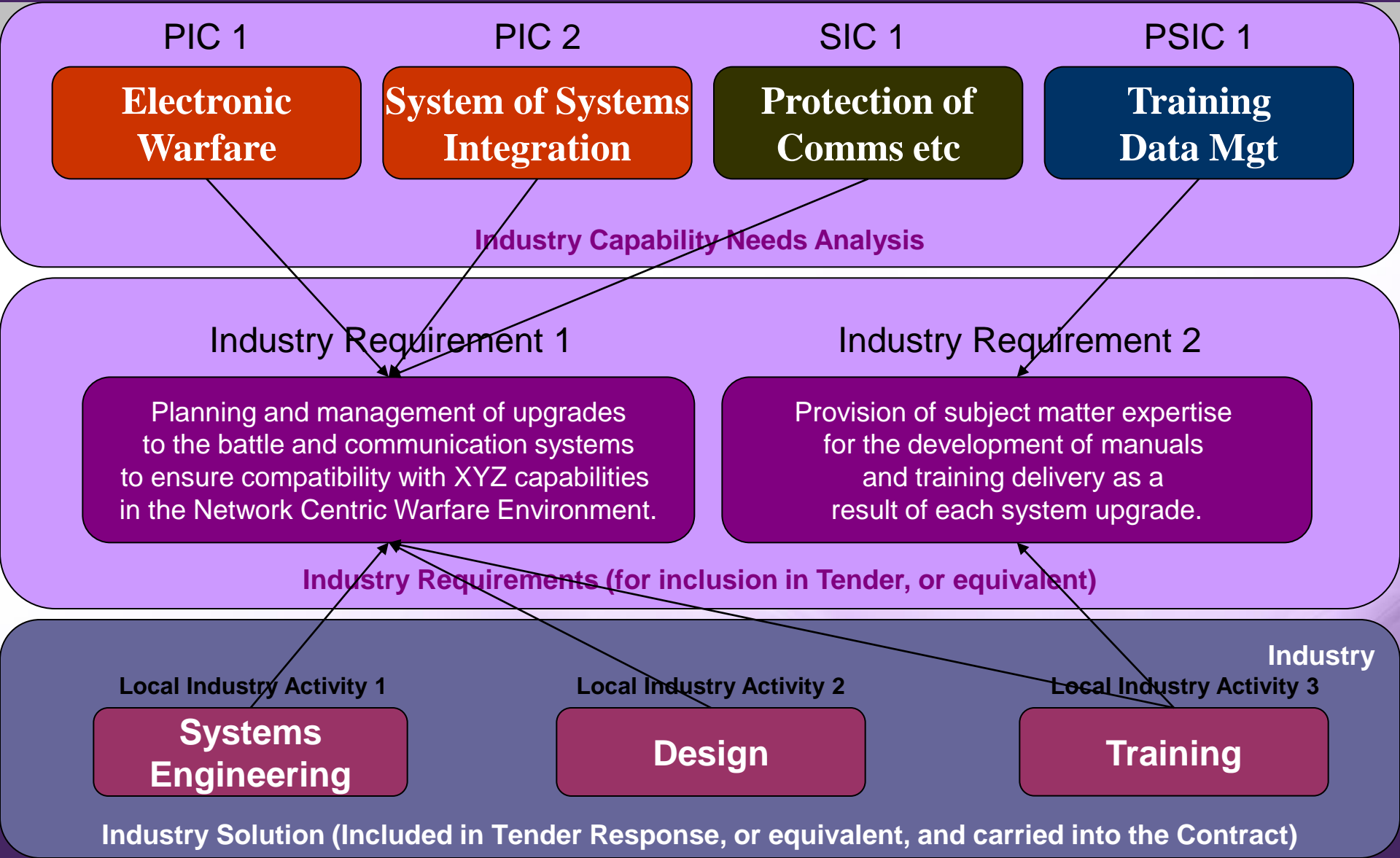
Communication System Requirements

Conclusion

- Critical focus on the military operations requirement.
- Economy of Scale through joint architecture.
- Extensive use of industry knowledge centres.
- Communication cost reductions.
- Integration of system capabilities.