Systems Engineering Management
An Israeli Perspective

C. Gallagher
12 November 2004
The SA’AR 5
Contract Provisions

Foreign Military Sale
Direct Commercial Contract
Fixed Price
Design & Construct Three Corvettes
Shared Combat Systems Integration
Start 1 May 1989
Third Ship Delivery 1 November 1994
Positive Cash Flow
Some Extended Warranties
On-site Involved Israeli Engineers
Characteristics of SA’AR 5

- RCS Signature Reduction
- IR Signature Reduction
- Extensive Automation
  --- One Man Control
  --- Low Manning
- Sea Keeping Stability
  --- Helicopter Safe
- 1200 Tonnes, L/B 6.7
- Quality Marine Equipment
  --- Some Foreign Sources
- Repairable Sensors
Team Selection Characteristics

Previous Tour in US
PG School Graduate
--- Technically Broad
--- Business Sensitive
Married
--- With Children
Three Year Tour
--- First Year Near JJ MA
------ Cramped
------ Locked
------ Unmarked
Live Near Each Other
Original Team

CAPT Amiram Raphael
CDR Eitan Karon 100,600
CDR Igel Bodenheimer 200,500
CDR Meir Hanan 300
CDR David Bachar 400,700
LCDR Avner Borman Logistics, Budgets, Secretary (US Temp)
Vendor brochures
Sensor Selection
Shock Qualification
Hull Weight
Stability Requirements
Diesel Generators
Pipe Selection
Motor Operated Valves
Compartment Arrangement
Technical Manuals
Remanufacturing Requirement
Vendor FATs
Ship Monitoring and Control System

Israeli Navy selected CAE
Two engineers on site
Added young bachelor
On-plant and remote control
Extensive signal list
--- 3666 sensors
--- 38 columns per sensor
Helm wheel
Signal interfaces fully used
Extensive logic diagrams
Full software documentation
Lengthy engineering meetings
Extensive HSI review
Ship Monitoring and Control System

One man can start and sail away
One button quite ship
Training mode available on two consoles
Separate network from Combat System
Automatic fire suppression
Fail set
Four AC generators and three DC systems
Multiple acceleration modes
Three levels of access to software
Manning results

Charles.Gallagher@ngc.com
228-872-7589