Defending the New Order
by Derek K Hitchins
Part A—The Present Scene
The UK is poor at forecasting/predicting:—
Project timescales and costs
Threats
Defence needs
## The Debacle—£1,000 M p.a. for 10 years

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>YEARS LATE</th>
<th>COST OVERRUN (£M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foxhunter (Blue Circle)</td>
<td>?</td>
<td>&gt;1,000</td>
</tr>
<tr>
<td>Chevaline (Polaris W/H)</td>
<td>?</td>
<td>&gt;1,000</td>
</tr>
<tr>
<td>Nimrod AEW</td>
<td>Scrapped</td>
<td>&gt;1,000</td>
</tr>
<tr>
<td>EH101 Merlin</td>
<td>5</td>
<td>&gt;322</td>
</tr>
<tr>
<td>LAW80 Missile</td>
<td>5</td>
<td>&gt;82</td>
</tr>
<tr>
<td>Warrior Personnel Carrier</td>
<td>2</td>
<td>190</td>
</tr>
<tr>
<td>BATES</td>
<td>?</td>
<td>+140%</td>
</tr>
<tr>
<td>JTIDS</td>
<td>5</td>
<td>£4.3M H/W scrap+200% S/W</td>
</tr>
<tr>
<td>RAF TRISTAR (1/2 Batch)</td>
<td>2/5</td>
<td>62/27</td>
</tr>
<tr>
<td>ALARM</td>
<td>4</td>
<td>124</td>
</tr>
<tr>
<td>T2400 Submarine</td>
<td>2-3</td>
<td>135</td>
</tr>
<tr>
<td>Churchill H/K Subs</td>
<td>Decommissioned</td>
<td>400</td>
</tr>
</tbody>
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Upholder Submarine

Financial Times, 16 May 91

- "I do not wish to pretend it was a total success story"...Brian Hawtin, Ass Und Sec (materiel/naval)
- £40M over budget, 3 years late
- Torpedo tubes leak....water enters when torpedoes fired
- Engine stops dead when going from full ahead to astern
- Major engine cooling difficulties
- VSEL Consortium—Torpedo problems were design faults, down to MOD
- MOD—faults in original design by ARE
- MOD seeking £6M damages from GEC-Marconi—manufacturers of submarine diesel-electric propulsion systems
- MOD denies Upholder is incapable as a hunter killer
"IRAQ—5 GR1s Downed in 5 Days"

"US employs Remote Precision-Guided Munitions—devastating accuracy, v. few aircraft losses"
"Heavy TORNADO GR1 losses to groundfire"
"Buccaneers recalled for Laser-Guided Bomb capability"
So, we spend £18M per GR1 and equip them with close-in weapons, delivery of which endangers aircraft, aircrew and Allied reputation.

Never mind how we procure
Do we know what to procure?
Something Fundamentally Wrong!

"RAF Tendering Spirals out of Control"

Air Defence System overran two years, accepted on reduced spec
Teletype system arrived 10 years (sic!) late
Computerized message system bankrupted manufacturer—project abandoned
"Systems which are complex, specialized and state of the art are high risk whether they be new tanks, the Channel Tunnel, command and control information systems or plain inventory management and control systems"

Brigadier W Bewley, Bicester

US DOD "Only 1.5% of systems commissioned were used as delivered.....47% of systems were delivered but never used"

.................................................................Computing, 15 Nov 1990
"...due to a messianic faith in high technology", Management Today, 91
Phases and Philosophies—Past and Present

Phases
- Pre-Feasibility
- Feasibility
- PD1
- PD2
- Dev & Prod—1
- Prod—2

Interpretation
- "Do we know what we're doing?"
- "Are we sure we know?"
- "We didn't really know, did we!?"
- "Better get down to some specifying..."
- "Make the contractor worry!"
- "Let's choose a contractor who knows nothing about the subject"

Interpretation
- SSADM—1979
- Jackson System Development—1981
- Structured Systems Analysis—1979
- Prototyping—1983
- Competition with Everything
- Multiview—1985
- Information Engineering—1981

James Martin Engineering

Participative Approach—1979
Fixed Price and Carefully-Specified Obsolescence

A desire for Increased Specification Detail

During which The Threat

And An Obsolescent System

Resulting in Change in proportion to The Delay

The Delay

The Threat

Increased Specification Detail

The Environment
Competition in Perspective

Insistence on

- Inexperienced Companies
  - More Companies
    - Attracts
      - Including
        - More Companies
          - Bid Success Rate / Company
            - Which raises
              - Overheads
                - Raising

- Prices
  - Increasing and raising
    - Failures
      - Which initially compete to lower
        - Reducing
          - Overheads
            - Raising

Which raises
• International competition requires Consortia with European partners
• European governments sponsor individual companies to provide defence products e.g. Siemens and IFF
• Competing British companies find themselves competing for the same European partners to join their respective Consortia.
• The European companies refuse to collaborate until after the competition, then go with the winner.
• R&D is funded heavily funded by some governments, e.g. France and Italy. Their companies can produce much lower bid prices

**UK Industry response**—combine with European Companies—reduces MOD/MOD(PE) strategy options
Objective Procurement Support

MOD

Objective Technical Support

Seeks

Jointly-Funded Studies & Prototypes

as

To be undertaken by

The viability of

So Prejudicing

MOD Production Contracts

Who alone can recoup outlay via

Manufacturers

R&D Establishments and Systems Houses

plus
Whole Platform Procurement—Authority & Responsibility

Single contractor procures whole platform, fixed price:
EITHER
• Contractor buys systems internationally.
• Contractor seeks lowest cost, soonest availability, minimum performance.
• UK Industry and R&D Establishments compete world-wide for UK platform systems

OR
• MOD imposes preferred UK systems on contractor
• Contractor loses control on time and budget
We have been working from a defined Threat but…
…actual conflicts and Threats are not those predicted.
We plan defence and control the defence market, yet…
…we are largely unable to predict defence project time and cost.
We analyse and decompose, with logical, structured planning…
…and experience the same degree of success as similarly planned economies
Part B—Looking Afresh
• How can the UK maintain a sound defence when the threat has diversified, proliferated, but is presently indistinct?
Inevitability of War

There is no case for relaxing our defence

\[ y = a \cdot x^b \]

\[ y = \text{Conflicts/1000years} \]

\[ x = \text{Deaths/Conflicts} \]
### History Lessons

**Scientific American, April 91**

- Correlates of War Project—118 wars+1000 lesser disputes (<1000 deaths) from 1800s to present, University of Michigan
- No support for "Peace through Strength"
- A build up of military armaments, far from deterring war, is one of its most frequent pre-cursors
- No evidence that alliances keep peace. A nation's alliances increase its risk of warfare, particularly against its allies
- Little evidence that allowing aggression to proceed unchecked leads to more aggression (Hitler provides a counter example)
- Democracies seldom wage war on democracies—virtually no exceptions since 1815
- Last bullet seems to be powerful in all societies and at all levels. Arises where people have control over the political process, and have something to lose in conflict(?)
The Psychology of Prediction

- Hooked on predicting, planning
- Planning bonds planning team
- Unable to predict weather, economics, stockmarkets, football, gambling...
- Demonstrably unable to predict defence needs, given a "defined" threat
- Planned Defence equates to Planned Economy

Conclusion:
— on evidence, designing defence against a known threat ineffective
— alternative is to synthesise capabilities
The Raison D'Être of Defence

- With all the wasted money, why do we not simply **buy abroad**, let some other nation take the risk and the strain?
- **Is the money wasted?** Certainly, it has not gone into existing weapon systems, so where has it gone?
- employment, profits, corporation taxes, income tax, value added tax, technology development, technology spin-offs, etc.
- in other words, to say that the money has been wasted is not to count the **pros** against the **cons** from a *national account viewpoint*.
- Looking at Defence as a **National Asset** suggests there may be a variety of **stakeholders**. Consider the following…
National Defence Stakeholders and their Objectives

- **Defence Contractors**—employment, survival, profit, wealth creation, technological advance, national creative cauldron
- **UK Economy**—wealth creation, foreign exchange, international economic stability
- **UK Foreign Policy**—influence, independence, bargaining power
- **UK Forces**—effective weapon systems, compatible systems, ample systems, comprehensive capability
- **UK Public**—National Confidence, National Pride, employment
- **International Democracies**—co-operative defence, stability, deterrence
- **UK Technology Development**—technology demand, employment, export potential, technology testing ground
Fitting the Stakeholders' Objectives Together

"...helps to achieve...

Export Potential
  ↑
Bargaining Power
  ↑
Independence
  ↑
Deterrence
  ↑
Comprehensive Capability
  ↑
Co-operative Defence
  ↑
Effective Weapons

Technological Advance
  ↑
Technology Demand
  ↑
National Creative Cauldron

Political Stability
  ↑
National Pride
  ↑
Industry Survival
  ↑
Wealth Creation
  ↑
Foreign Exchange
  ↑
International Economic Stability
  ↑
National Confidence
  ↑
Employment
  ↑
Profit

Ample Weapon Systems
  ↑
Compatible Weapon Systems
A sound Defence Industry provides the basis for national political stability—despite bleats from the "let's buy US weapons" brigade.

Co-operative defence, with partners, depends on having something worthwhile to offer.

International influence and stability enhanced by strong defence.

As the US have shown, strong defence improves export potential for the weapon systems which it employs.

National confidence and pride are very much tied up with wealth creation, economic performance and political stability.

Evidently, the Defence Industry is central to maintaining our national identity.

Defence has a much wider impact than simply defence against external threats.
A Simple Model of Systems within Systems within ... Babushka Russian Dolls
Any System-of-Interest can be evaluated in terms of its contribution to its Containing System's Objectives, made in conjunction with other systems in the Container, e.g. an air defence fighter contributes to the objectives of the AD system in conjunction with many other systems, including the ADGE, airfields, SAM defences, etc.
The value of any system lies exclusively in the degree to which it contributes to its containing system's objectives.
• If all systems were evaluated using Net Contribution then—due to the recursive nature of the technique—a hierarchy of Net Positive systems contained within Net Positive systems must develop.
• Contribution from the smallest change to the overall capability can be traced through successive system hierarchies
• This contrasts with cost-effectiveness, which evaluates systems in mutual isolation, and which can—and does—result in mutual shooting-in-the-foot
Defence Synthesis vs Defence Analysis

- The UK can **synthesize** its defence requirements
- Synthesis opposite to **analysis**, which **pulls things apart**
- Synthesis develops **synergy** (co-ordination and co-operation) between parts to achieve some overall effect
- *Need to see the world through different eyes*
**Synthesis and Infrastructure**

- **Synthesis** recognizes the interaction between parts in any system
  - Whole=parts+inter-relationships, whole \( \Leftrightarrow \) sum of parts
- Which does AD need—Interceptor, SAM, IUKADGE, Logistics or airbases?
  - needs all, *but co-operating and co-ordinated too*
- **Theory**—adding one new part to \( N \) existing parts in a system introduces up to \( 2*N \) new inter-relationships = infrastructure
- **Practice**—the greater part of defence spending establishes and maintains that infrastructure
- **Conclusion**—current emphasis on individual projects (e.g. MSAM, EFA, Tank, Frigate) largely misses the point—it's the sum that counts!
Adding MSAM to UKAD

- Air Bases
  - Replenishment
  - Maintenance
  - Protection?
- Interceptors
  - Some Protection when airborne
- Operational tasking
  - Direction
  - Control
- IUKADGE
- Logistics and Engineering
- MSAM

24 hour, night all-weather protection

Complementary capability

Logistics and Engineering

MSAM

Adding MSAM to UKAD

Inputs

Outputs
Where is the equivalent matrix for adding MSAM to UK Industry? Instead of operational systems, see industrial systems for design, manufacture and in-service support of interacting defence systems:—

- platforms—aircraft, ships, tanks
- propulsion systems
- command and control systems
- maintenance and servicing systems
- sensor systems
- weapon systems
- logistics systems
- transportation systems

Supported by electronics, mechanical, explosive, propellant, and other industries.

Adding MSAM creates web of interactions which results in effective, interoperable, supportable, transportable MSAM and continuing, flourishing, creative industry.

Accountants isolated equipment cost-effectiveness seen as nonsense.
Simultaneous Multiple Containment

Environment
- Economic
- Technological
- Political
- Social, etc.

e.g. SOI=MSAM
Container 1=Air defence
Container 2=AD Industry

Sibling System

System of Interest

Container 1

Container 2
• Complex defence procurements call for complex evaluation
• Calculate the Net Contribution of each procurement within two Containers—Defence and Industry
• Choose options that favour both
So, how can we make matters better?

1 Free defence market.
2 Eliminate antagonism
   promote Synergy
3 Treat National Defence as a System
Free Market Conditions

- Eliminate **constraints** and **half-measures**:—
  — whole ship procurement is incompatible with **GFE** combat and weapon systems, DRA-designed hulls, pre-determined propulsion
  — **IPRs** prevent the UK Forces from fielding excellent facilities available from UK Industry to other nationalities (e.g. RACAL ESM)
- UK Defence contractors operate to a disadvantage vis-à-vis their European counterparts:—
  — "suspect" **ICB rules**, preferred contractor, government subsidies, etc
  — do not featherbed UK industry, but insist on **fair competition**
- Support an active, **multi-faceted** defence industry **exporting abroad**, so that we **avoid planned defence** in the future, where most of our output is planned to go to our own Forces
Treat UK Defence as a System

- Consider whole National Defence as **one system**—develop a **system model**, *including UK defence industry*
- Treat individual projects as **part of the whole system, only**
  - all requirements to show how they **contribute** with their siblings to the overall defence capabilities, i.e. **stop isolated optimization**
  - encourage all contractors for a composite system to bind together contractually, such that **all benefit only** when **all succeed**.
- Introduce much more **carrot**, much less stick—**incentive** bonus in place of penalties? **Follow-on** business for successful performance?
• **Government** determines **defence "capabilities"** they need to achieve their objectives—economic, political, deterrent, influential, stabilizing.

• Typical capabilities: "to undertake up to two policing actions simultaneously as part of international teams anywhere in the world." OR "to secure UK centres of population and resources" OR "to make an opposed bridgehead into another country"

• **Treasury**, as directed, provide money direct to **Services** who will be responsible for **identifying** and **procuring** the "capabilities".

• Amount is **proportion of GNP**—individual expenditures within amount are Services' concern, not politicians or economists. **Service chiefs to have authority with their responsibility**
Specifying a Threat Spectrum

• Recognize threat spectrum: advanced tactical fighters, PGMs, attack helos, terrorists, saboteurs, etc.
• Assume wide variety of potential sources, current and potential weapons systems, uncertain timescale
• Determine level of threat to address—avoid “free rides” for enemies

Then need either:

- higher technology defence systems to cover the broader Threat
- OR
- more defence systems, each to cover a particular spectral band.

_Higher technology solution seems more appropriate to current economic situation._
Creating a Sound Defence against a non-specific Threat

• Services directly responsible for buying a **balanced force** to achieve "capabilities". **DRA** act as objective technology adviser. **Systems houses** act as total systems advisers/consultants—PM, systems engineering, software, architecture, evaluation, tradeoffs, etc.

• **Services compete** full "capability" to industry: either a **whole** capability is procured, or parts are added to existing capabilities to achieve the overall "capability". *No project procured in isolation.*

• **UK Industry** free to compete against/with international suppliers, but **under the same conditions** as those other suppliers. i.e. no unilateral government support, no "preferred contractor" privilege —unless all competitors are equal
Restructuring "UK Unlimited"

- Companies, ministries, defence organizations all flattening management structures, reducing bureaucracies, cutting decision delays.
- Delegation fosters organizational creativity — no leader has monopoly on good ideas.
- UK unlimited needs same approach:—
  — industry must be creative source—not politicians, not military leaders, not MOD(PE), not OR branches—too few, lack training, current technological experience, motivation, systems understanding
  — government to return creative initiative to industry, give economic support, encourage fair competition, determine strategy, become ever more "discerning customer".

UK Unlimited—only source of UK prosperity