Discontinuing obsolescence issues …

… with comprehensive Obsolescence Management !!!

Deutsche Gesellschaft
für Luft- und Raumfahrt
Lilienthal-Oberth e.V.

ROYAL
AERONAUTICAL
SOCIETY
HAMBURG BRANCH e.V.

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Verein Deutscher Ingenieure
Hamburger Bezirksverein e.V.
Arbeitskreis Luft- und Raumfahrt

Discontinuing obsolescence issues ...

... with comprehensive
Obsolescence Management !!!

absc

Obsolescence Management (OM)

1.
Content

2.
Me and ABSC

3.
Why OM?

4.
Comprehensive
Obsolescence
Management

Reactive

Mitigations
applied

Mitigations
applied

Mitigation
approach
strategy and
refresh plans

Proactive

Strategic

Forecasts

System health
measurement

Refresh plans

5.
Contact Us
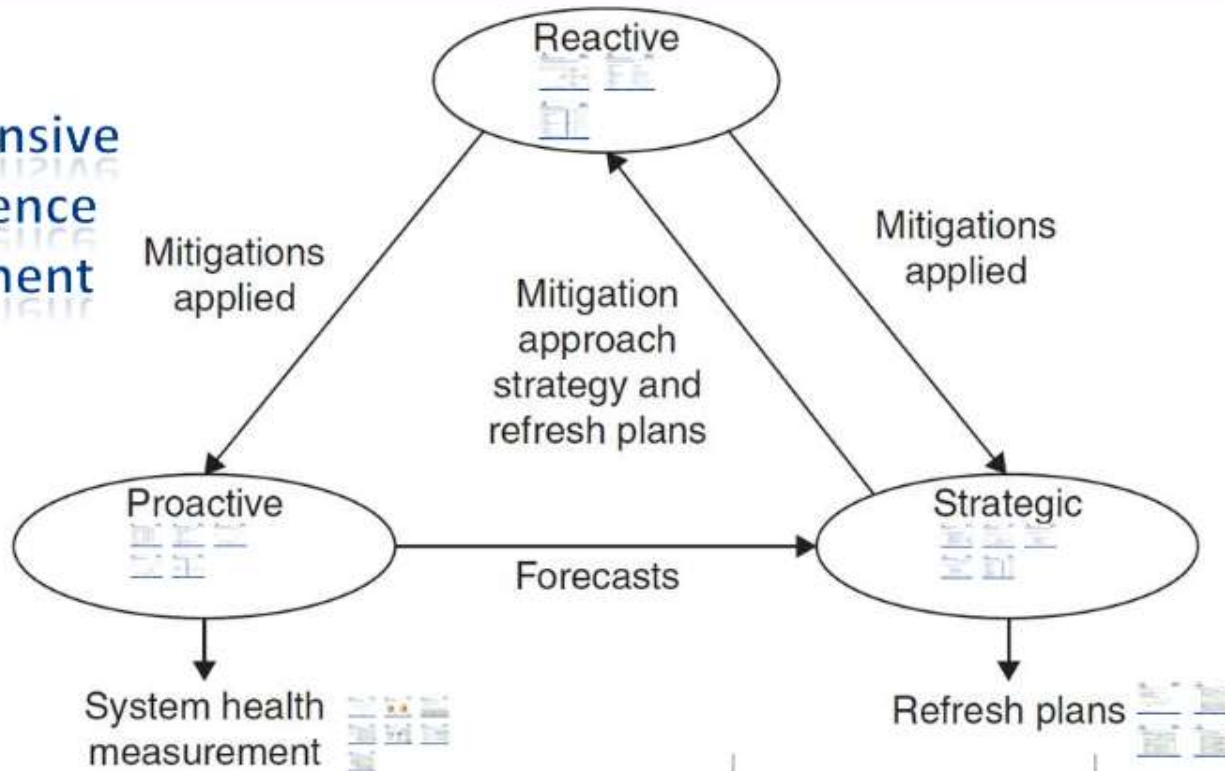
Objective: Comprehensive Obsolescence Management – an overview

- Me and ABSC GmbH

- Why Obsolescence Management?

- Reactive Obsolescence Management

- Proactive Obsolescence Management

  → System Health Measurement

- Strategic Obsolescence Management

  → Refresh Plans

1. Content

2. Me and ABSC

3. Why OM?

4. Comprehensive Obsolescence Management

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Proactive

Strategic

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Mitigations applied

Mitigation approach strategy and refresh plans

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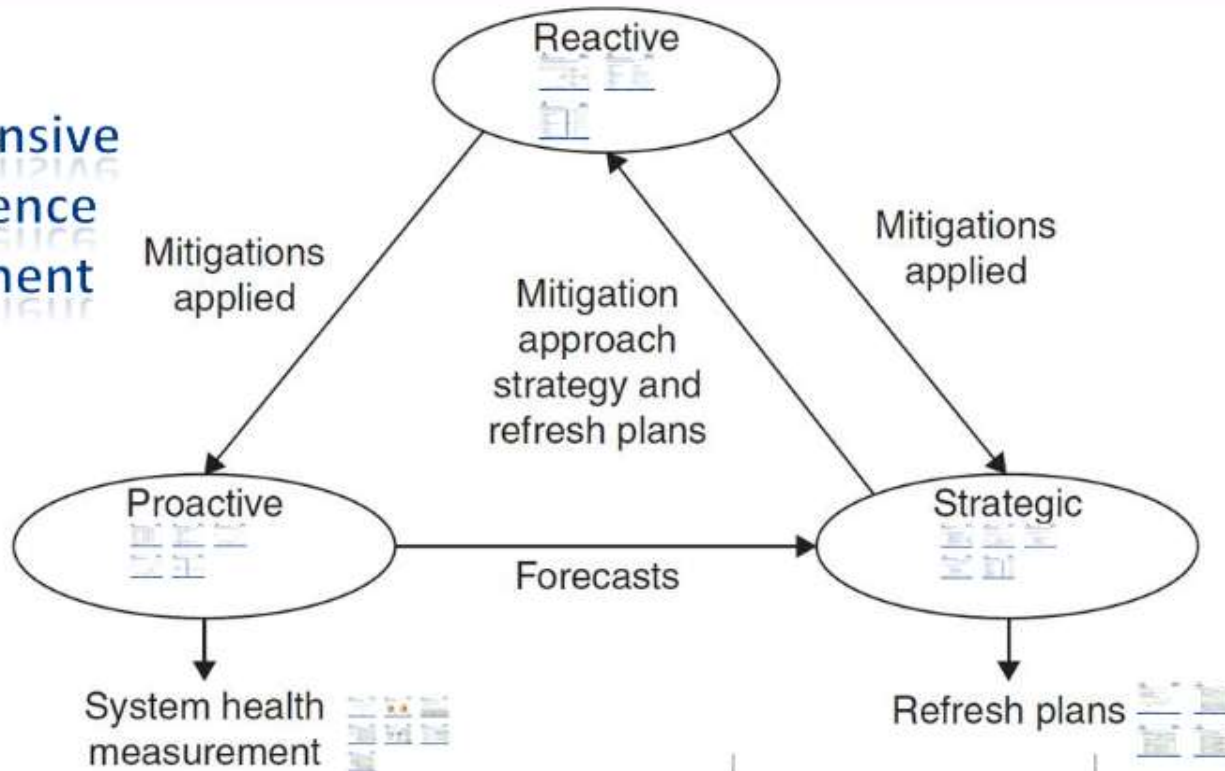
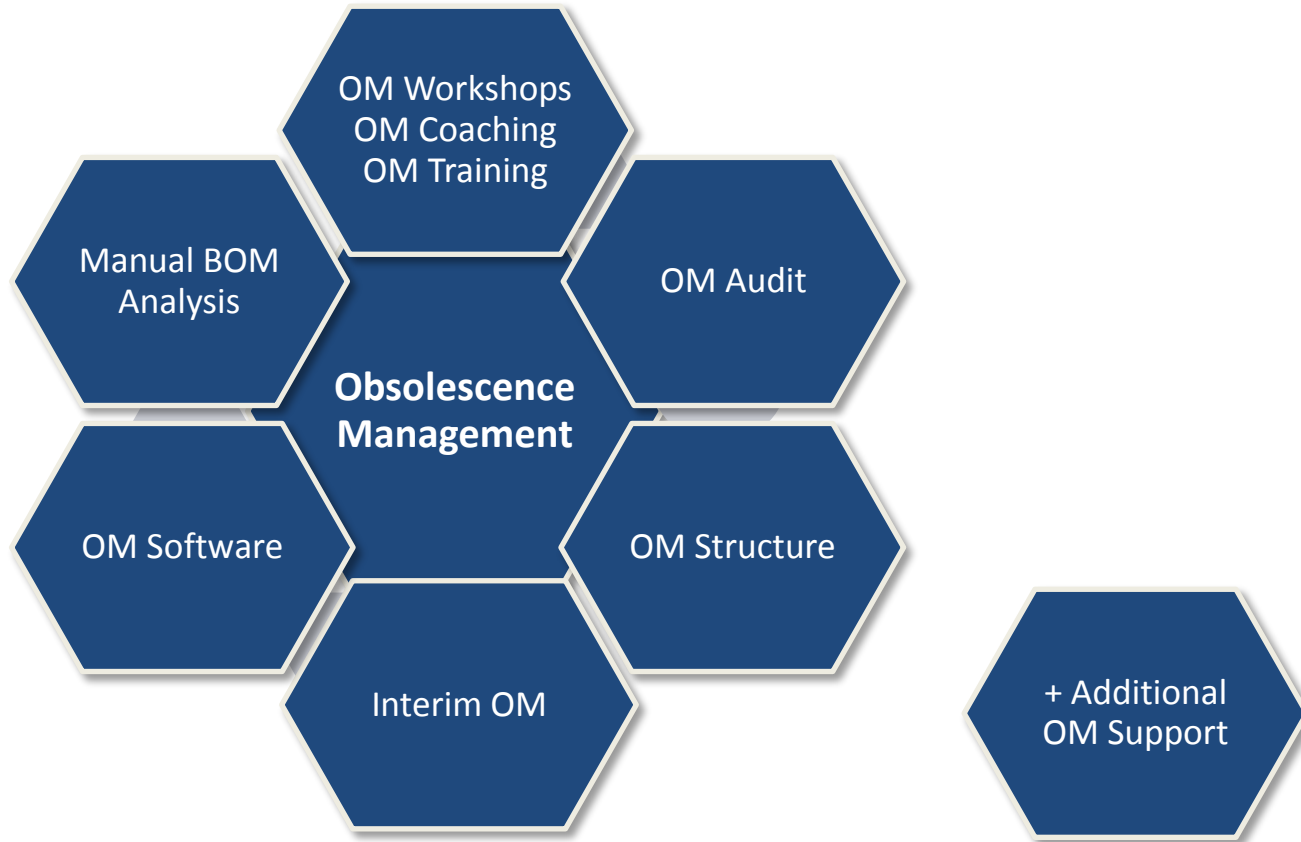**5. Contact Us**

About me:

- Master of International Business I Industrial Engineer

- Senior Consultant I Obsolescence Management Lead at ABSC GmbH

- Coauthor of the co-operational work with the CALCE Institute of the University of Maryland, USA: „Strategies to the Prediction, Mitigation and Management of Product Obsolescence" (May 2012, Wiley)

- VDI-chairman of the expert committee „Obsoleszenz-Management (FA209)"

- Active member of the Component Obsolescence Group (COG) association

STRATEGIES TO THE PREDICTION, MITIGATION, AND MANAGEMENT OF PRODUCT OBSOLESCENCE

BJOERN BARTELS • ULRICH ERMEL
PETER SANDBORN • MICHAEL PECHT

WILEY
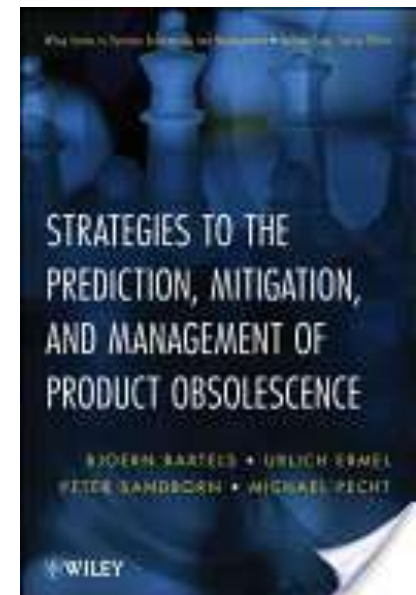
ABSC Obsolescence Management Service Portfolio

OM Workshops
OM Coaching
OM Training

Manual BOM Analysis

OM Audit

Obsolescence Management

OM Software

OM Structure

Interim OM

+ Additional OM Support

DDW Group

DDW Group
Founded:
2001

Provisionally Shared
Services

absc
Founded:
1990
Business Division:
Engineering Services
& Consulting

BLUE SILVER
Founded:
2001
Business Division:
Animation
Design

Sysberry
Founded:
2001

Business Division:
System Engineering & Development
Electro-Mechanical Design Engineering
CAD/CAE Software Engineering & Consulting
Software Engineering
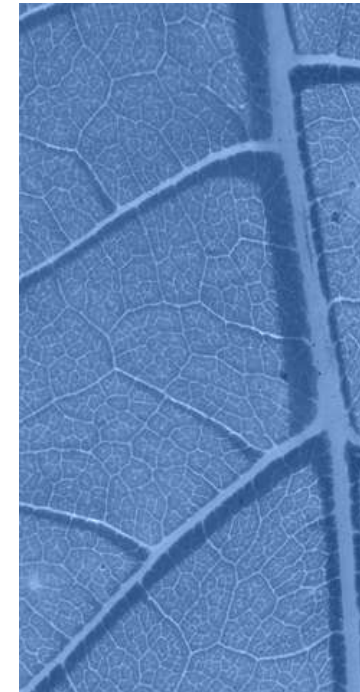
Who are We?

- As an interdisciplinary parent organization, the DDW-Group GmbH offers a full range of services in various areas.

- Employees: 200

- Locations:

    - Germany: Munich, Oberhaching, Donauwörth, Manching, Bremen, Hamburg

    - Australia: Sydney

    - UAE: Dubai

- Proposed locations:

    - France: Marseilles, Toulouse

    - Spain: Barcelona, Seville

About ABSC GmbH

- **Consulting & Coaching**

  - Tool- & Methods – Selection and -Implementation

  - Training

  - Transfer of Management Tasks

- **Complete Solutions**

  - Transfer of Complete package at fixed price

  - Projects and Performance

- **Service**

  - Providing expert knowledge

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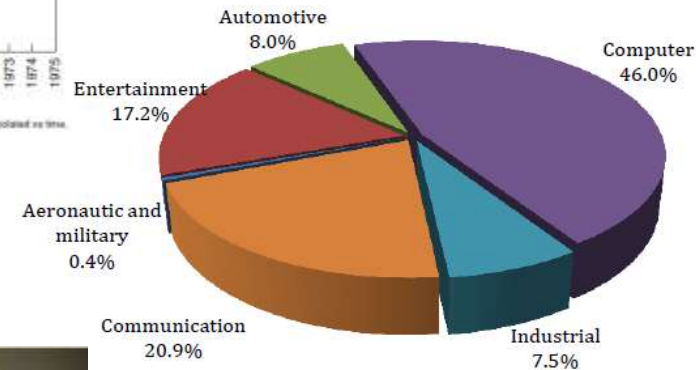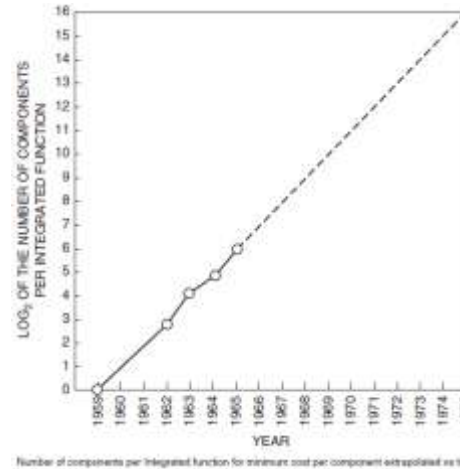
Reasons for Obsolescence

- **Technological Evolution**
    - Advanced Technologies

- **Technological Revolution**
    - New Technologies

- **Market Forces**
    - Insufficient Demand

- **Environmental Policies and Restrictions**
    - RoHS, REACH, WEEE

- **Allocation**
    - Long Delivery Times/ Temporary Obsolescence

- **Planned Obsolescence**
    - „Throw Away Society"/ Build-In Obsolescence

The oldest light bulb glows in a fire department in Livermore, USA since the 18th of June 1901 (Guinness World Record)

Figures: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence" / Rogowski, R. (COG) "The Obsolescence Minefield" / www.dailymail.co.uk / www.howtodothings.com

Costs Resulted through only Reactive Approaches

- **$81 million were used to get obsolete or almost obsolete parts and to redesign parts of subassemblies**
  - U.S. Air Force F-22 program

- **$600,000 were invested to replace an obsolete Intel chip**
  - A plane manufacturer for commercial planes

- **$500 million were spent to redesign an obsolete radar system**
  - U.S. Air Force F-16 program

- **$264,000 were invested to make a „Life of Type (LOT) Buy" of an obsolete logic device**
  - KC-130F/R program in 1997

- **$250,000 is the average cost for a redesign of a PCB to eliminate obsolescence**
  - US Deputy under secretary of defense for logistics (DUSD [L])

- **$26,000 to $2 million is the disproportion of a redesign of a PCB**
  - Electronic Industries Alliance (EIA) Manufacturing Operations and Technology Committee

Source: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the
Prediction, Mitigation and Management of Product Obsolescence"

Savings realized with Obsolescence Management and Suitable Tools

- **$459 million cost savings realized since 2001**
  - Space & C3I programs - Hill AFB, Utah

- **Process reached a 23 to 1 Return on Investment (ROI)**
  - Independent Air Force judgment of SMART

- **$34 million cost savings realized since 2009**
  - B-2 program - Tinker AFB, Oklahoma

- **$100 million cost savings realized since 2001**
  - Boeing, Mesa – AH-64 Apache

- **F/A-18E/F, over $50 million cost savings realized since 2003**
  - Boeing, St. Louis

- **AV-8B Harrier, over $30 million cost savings realized**
  - Boeing, St. Louis

- **$150 million cost savings realized since 2001**
  - AEGIS Weapon System - NSWC, Port Hueneme

Source: Supportability Management Assessment Report Tool (SMART) by RAC

If Beer Becomes Obsolete, Would You...

- ... try to negotiate with the manufacturer?

- ... pay more for the left overs?

- ... struggle to find another drink that substitutes beer?

- ... invest for development, testing and qualification of a new drink?

- ... stock beer and still drink it although the expiry date is long exceeded?

If none of the suggestions mentioned above sound like a suitable resolution for you ...

...be forward-looking and develop, implement and continuously improve an obsolescence management system!!!
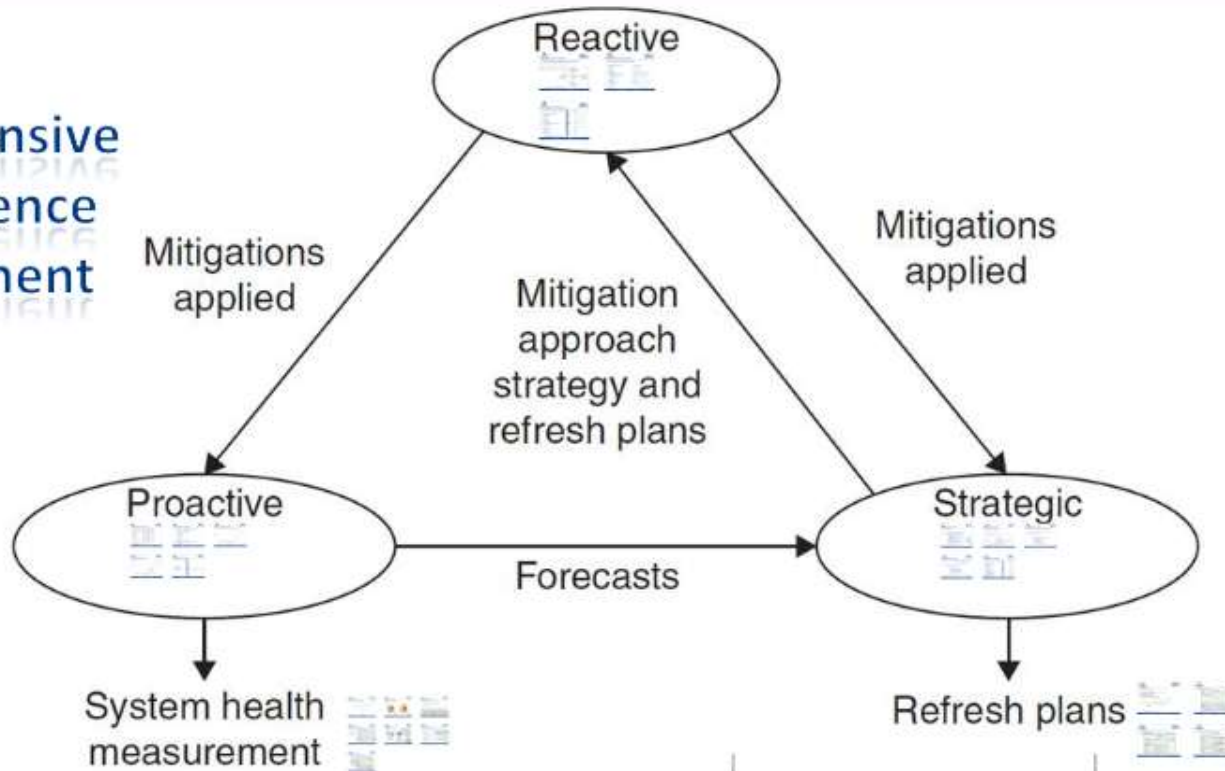
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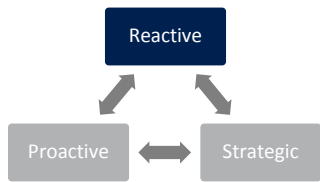Comprehensive
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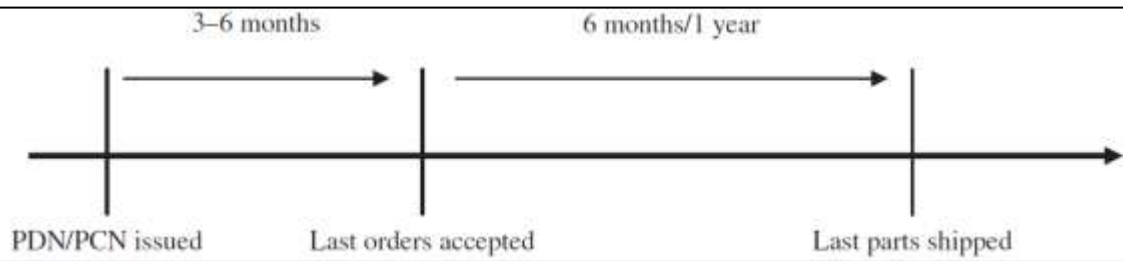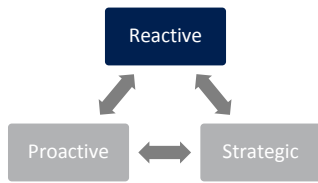Contact Us

End Of Life (EOL) and Part Change Notification (PCN) Paths
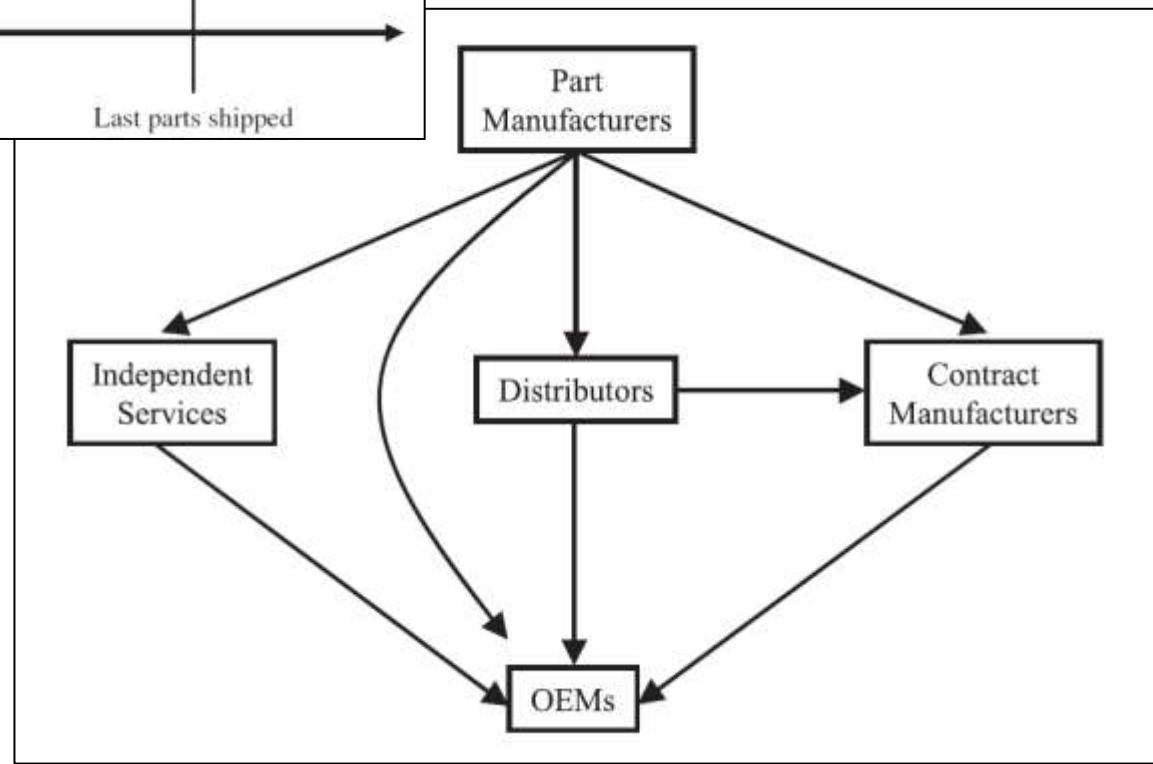
Choice of Suitable Strategies (Resuolutions)

- **Negotiating with the Manufacturer** → Original Manufacturer

- **Existing Stock** → Own Stock or Brokers

- **Reclamation** → Cannibalization

- **Alternate Parts** → Equal or Higher Performance

- **Part Substitution** → Fit/Form/Function (+ Finance) Replacements

- **Increase Performance of Components** → „Uprating" (e.g. COTS as MIL)

- **Aftermarket Sources** → Use Official Sources (!Counterfeit Parts!)

- **Copy Components** → Emulation

- **Redesign** → Expensive but can solve several obsolescence issues

- **Reverse-Engineering** → Reproduction

- **Component Buys** → „Life Of Type (LOT) Buy" or „Bridge Buy"
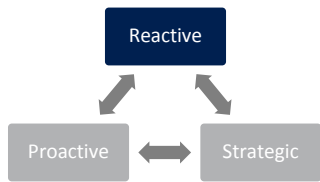
Objective - Process with Suitable Strategy

- **Negotiating with the Manufacturer**

- **Existing Stock**

- **Reclamation**

- **Alternate Parts**

- **Part Substitution**

- **Increase Performance of Components**

- **Aftermarket Sources**

- **Copy Components**

- **Redesign**

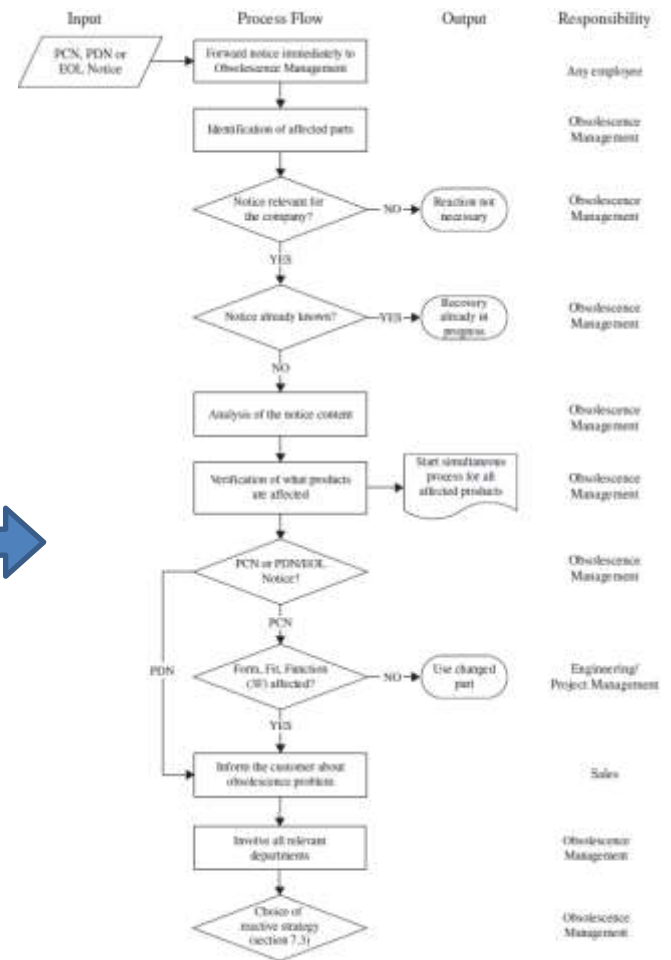- **Reverse-Engineering**

- **Component Buys**

Transform In Process

Figure: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"

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Recurring Engineering Costs of Obsolescence Resolutions

Resolution Type	90% Confidence (Left Limit)	Mean	90% Confidence (Rt Limit)
Reclamation	$1,000	$20,000	$39,000
Alternate Source[1]	$0	$41,000	$92,000
Admin Substitute	$1,000	$3,000	$5,000
Desktop Substitute	$0	$5,000	$10,000
Normal Substitute	$22,000	$34,000	$46,000
Complex Substitute	$122,000	$423,000	$724,000
Emulation[2]	$29,000	$73,000	$117,000
Aftermarket Mfg	$0	$33,000	$58,000
Redesign - COTS[3]	$82,000	$1,118,000	$2,154,000
Redesign - CP[4]	$542,000	$1,094,000	$1,646,000
Redesign - PNHA[5]	$654,000	$1,010,000	$1,366,000

[1] Alternate source includes parts from a different manufacturer (not already in the applicable technical data package) that meet the part specification.

[2] Emulation cost values provided do not include integration into the using next higher assembly or system

[3] Redesign – Commercial Off-the-Shelf

[4] Redesign – Custom Part includes the development and validation in the application of new component-level parts

[5] Redesign – Peculiar Next Higher Assembly

Figure: Defense Microelectronics Activity "DMSMS
Non-Recurring Engineering (NRE) Cost Metric Update"
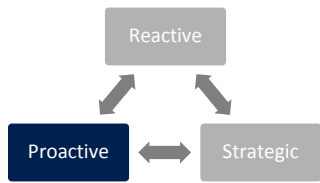
Further Example - Used Time for Obsolescence Resolutions

Resolution Type	Weeks to Resolve (Avg)
Reclamation	12
Alternate Source[1]	11
Admin Substitute	4
Desktop Substitute	8
Normal Substitute	25
Complex Substitute	40
Emulation[2]	26
Aftermarket Mfg	21
Redesign - COTS[3]	42
Redesign - CP[4]	61
Redesign - PNHA[5]	64

[1] Alternate source includes parts from a different manufacturer (not already in the applicable technical data package) that meet the part specification.
[2] Emulation time values provided do not include integration into the using next higher assembly or system
[3] Redesign – Commercial Off-the-Shelf
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[5] Redesign – Peculiar Next Higher Assembly

Figure: Defense Microelectronics Activity "DMSMS
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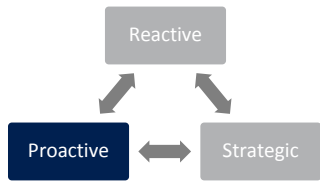
PROACTIVE OBSOLESCENCE MANAGEMENT

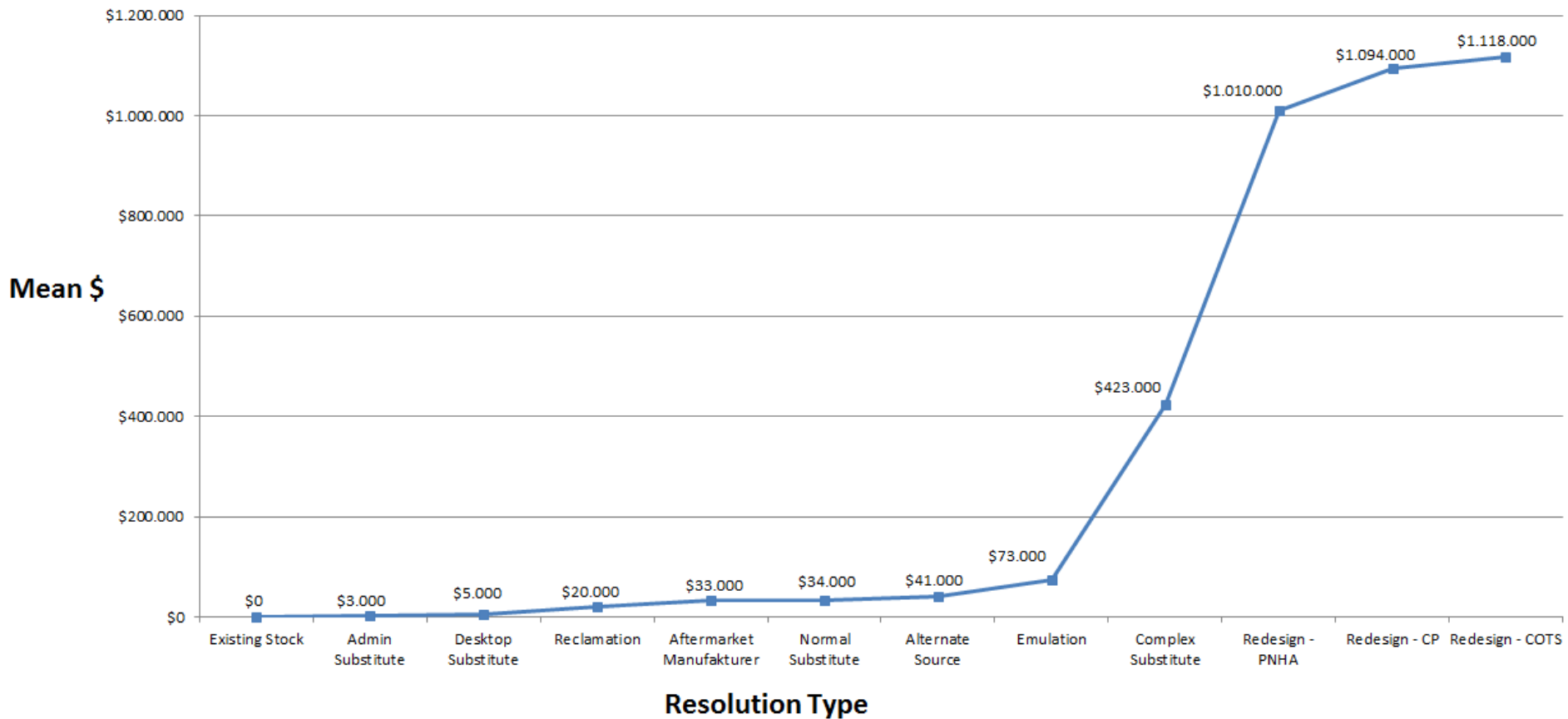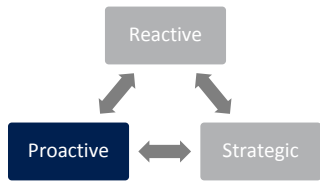## Recurring Engineering Costs of Obsolescence Resolutions

Figure: B. Bartels – ABSC GmbH

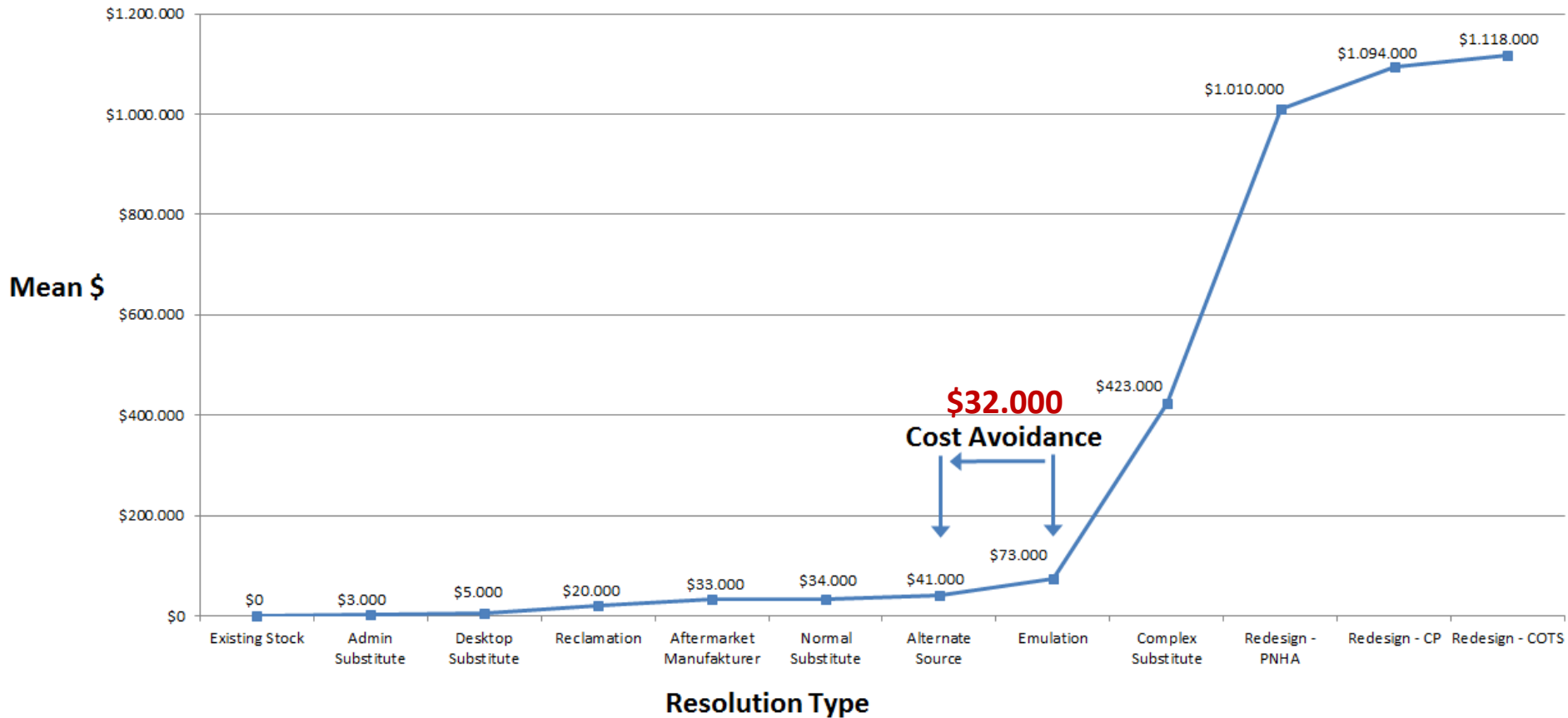**Obsolescence Management (OM)**

Objective - Cost Savings
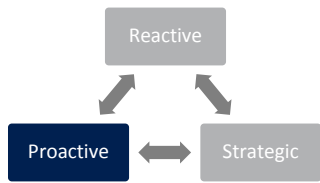
Objective - Choice of the Right Strategies

- **Bill of Material Management**

- **Material Risk Index**

- **Health Monitoring**

- **Component Availability**

Figure: B. Bartels – ABSC GmbH
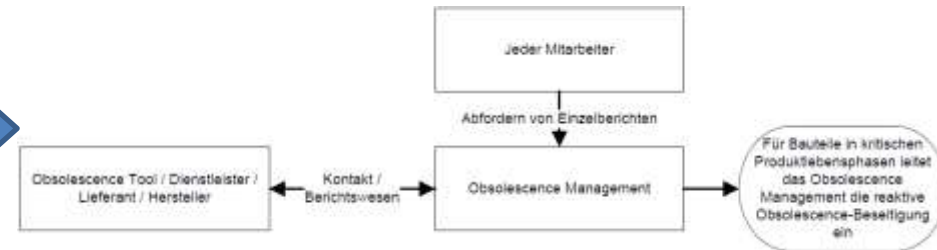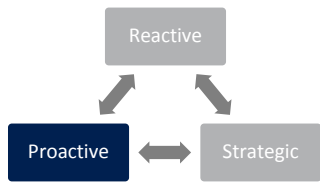
Manual BOM Analysis - Risk Analysis

Manual BOM Analysis - Risk Analysis

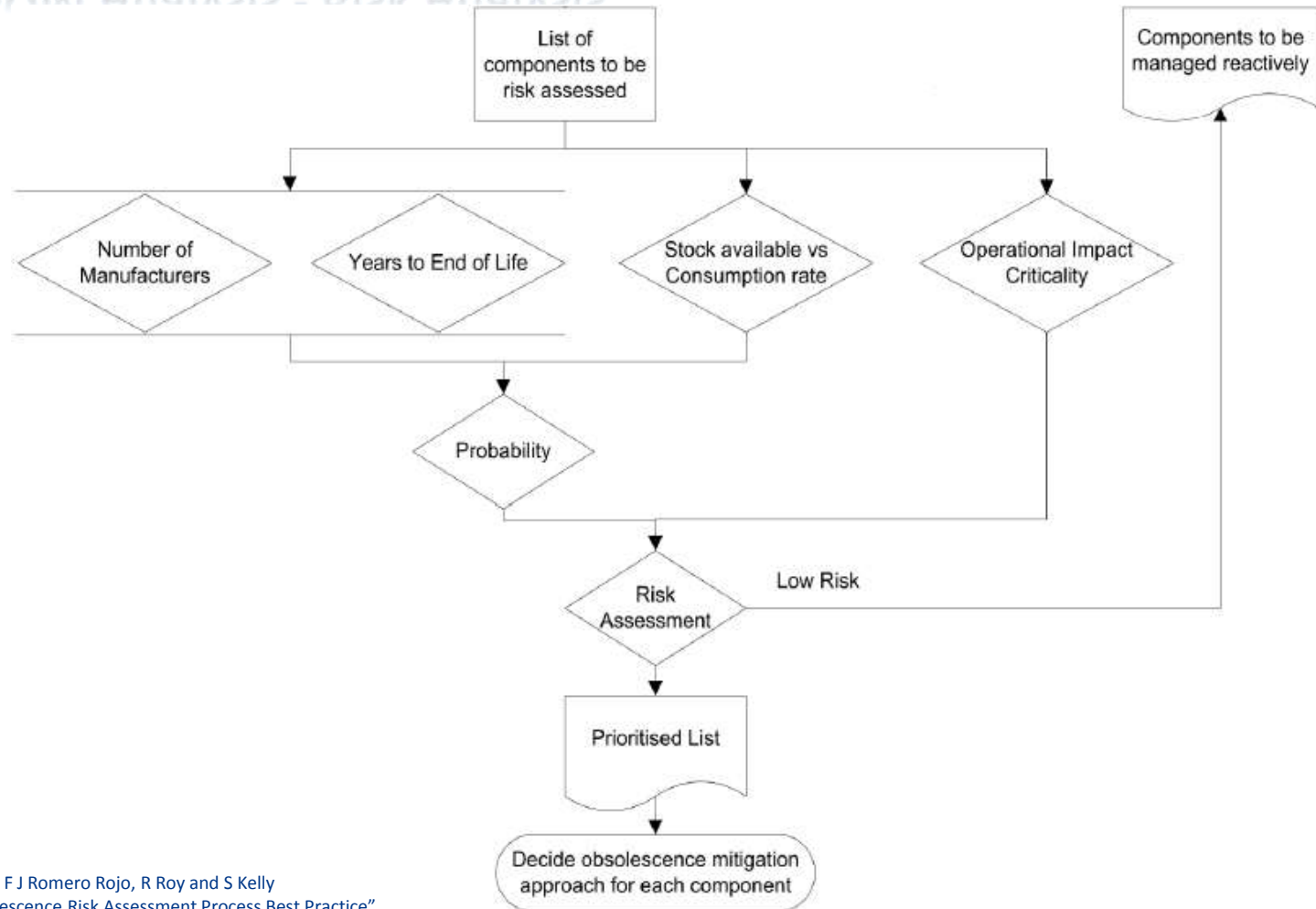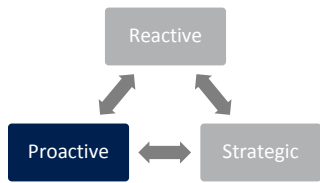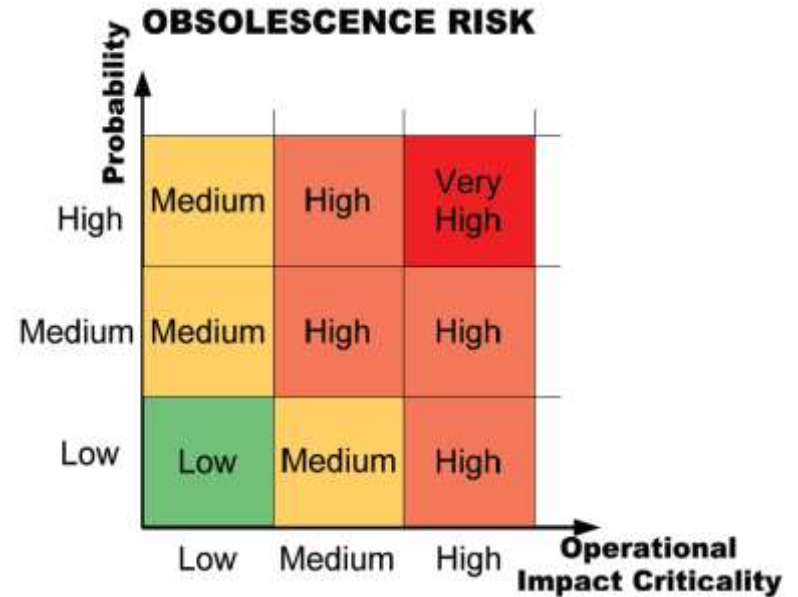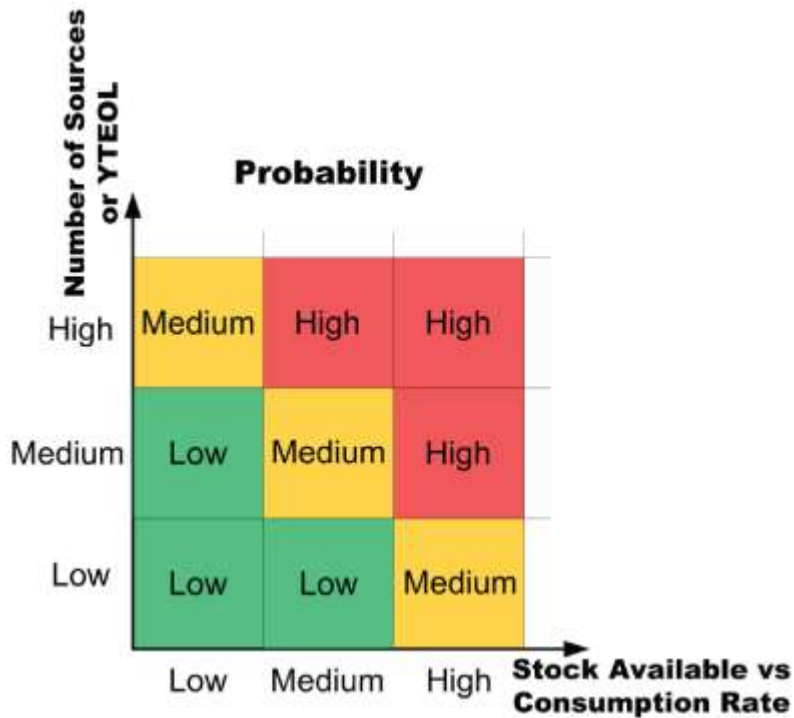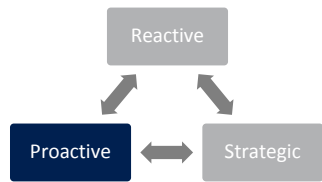

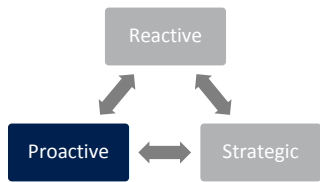Figure: F J Romero Rojo, R Roy and S Kelly
"Obsolescence Risk Assessment Process Best Practice"

Manual BOM Analysis - Obsolescence Analysis

- **Analysis of availability of required components on the basis of the BOM**

- Once or repeated in preset time frames

- Prediction of availability

- Normally resistors, capacitors, customer drawing parts and standard parts aren't analyzed

P/N	Manufacturer	Description	Quantity	Part Status	Life Cycle Stage	Life Cycle Code	YTEOL
CX0805MRX7R0BB103	Yageo	Ceramic capacitor -125 °C 10% min. 50VDC	3	Active	MATURE	3.85	> 8
ADS7800AH	Texas Instruments Inc	12-Bit 10ms Sampling CMOS ANALOG-to-DIGITAL CONVERTER	5	Active	DECLINE	4.89	2 to 4
LG M47K-G1J2-24	OSRAM	LED green	1	Discontinued	DISCONTINUED	5	0
M38510/05353BCX	Defense Supply Center Columbus	QUAD 2-INPUT XOR GATE, CDIP14, CERAMIC, DIP-14	2	Active	MATURE	3.89	> 8
AD9215BCP-80	Analog Devices Inc	10-Bit, 65/80/105 MSPS, ANALOG-DIGITALKONVERTER 3V	6	Discontinued	DISCONTINUED	5	0
FAN7888M	Fairchild	3 Half-Bridge Gate-Drive IC	1	Active	DECLINE	4.01	4 to 8
TPS54160DGQ	Texas Instruments	1.5-A, 60V STEP DOWN SWIFT DC/DC CONVERTER WITH ECO-MODE	1	Active	MATURE	3.8	4 to 8
JMK212BJ106K	TAIYO YUDEN	Ceramic capacitor -85 °C 10% min. 6,3VDC	3	Active	MATURE	3.34	> 8

Figure: B. Bartels – ABSC GmbH

Tool Support - Analysis Of Obsolescence Information

- Availability status with "Discontinued" and "Obsolete" predictions

- "Part Replacement" information with FFF Rating and statement about key parameters

 Part Number	Description	S	C	O	R	E	Overall
900514-021	MICROCIRCUIT,DIGITA	78		95		93	88

Part Details:

Availability Status:	Mfr. Part Number:	Functional Description:
Discontinued with Replacements	DM54L74J/883	D-TYPE, Flip-Flop, Dual

CAGE:	NSN:	Part Type:	Unit Price:	Total Quantity:
92059	5962-01-178-7748	Active - Microcircuit	$35.21	154

Availability Key Elements:

Approved Sources:	Replacement Sources:	Years To Discontinued:	Years To Obsolete:
0	2		2.5

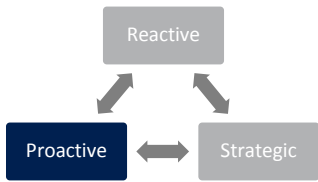| Manufacturer Depth:	Life Time Buy End Date:	Life Time Buy Days Remaining:	Life Cycle Code:
0			5

View Data Source Details   View Parametric Data

⇐ Part 1 of 16 ⇒
1 2 3 4 5 6 7

Part Replacements:

Mfr. Part Number	Active	Inactive	FFF	L.C.C.	Device Type	Package	Quality	Temp. Range	Family	Lead Free
DM54L74J/883	0	2	100%	5	LTTL	CDIP	883	-55° to 125°	LOGIC	No
SNJ54L74J	0	1	100%	5	LTTL	CDIP-TH	883	-55° to 125°	LOGIC	No
M38510/02105BCA	1	1	100%	4.89	LTTL	CDIP	Military	-55° to 125°	LOGIC	No
M38510/02105BCX	1	1	100%	4.89	LTTL	CDIP	Military	-55° to 125°	LOGIC	
DM54L74J/883B	0	2	100%	5	LTTL	CDIP-TH	883	-55° to 125°	LOGIC	No
DM54L74J/883C	0	2	100%	5	LTTL	CDIP-TH	883	-55° to 125°	LOGIC	No
DM74L74J/A•	0	2	100%	5	LTTL	CDIP-TH	Hi-Rel	0° to 70°	LOGIC	No

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Tool Support - SMART Tool

Client Data

Tight Security Controls

Client Hosted or RAC Hosted

Bill of Material Configurations & Internal Data

System Admin

SMART Users
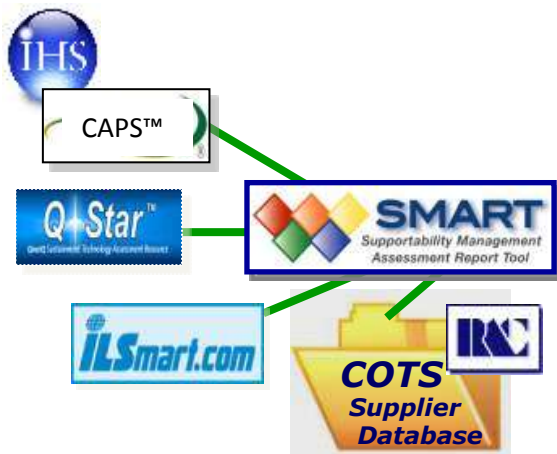
Industry Embedded Data Sources

- *Content 'Neutral' using Best of Breed Industry Data*
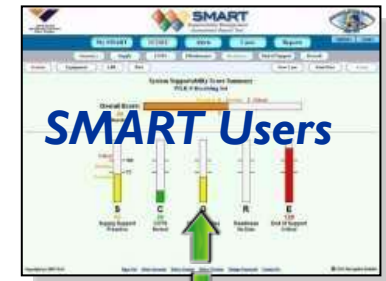- *Data Portal with Seamless Integration and Exchange*

Intelligent Content Engine (ICE)

- *Intelligent Content with Business Logic and Ranking*
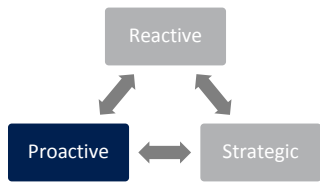- *Powerful Data Engine to manage Internal & External Content from desired sources*

SUPPLIERS Web-based Collaboration

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Reactive

Proactive — Strategic

Tool Support - Analysis Of The Most Important Coverage Area

- **Supply Support / Logistics**
  - Assets - Serviceable, Sponsor Owned, Repairable...
  - Data from DLA, ICP and internal sources

- **COTS Availability**
  - Board End-of-Life data with Replacements

- **Obsolescence Impact**
  - Parts Procurability with Lifecycle Predictions

- **Readiness Drivers**
  - Repair, Failure Rates, MTBF, MTTR, etc.

- **End of Support Dates**
  - Combination of Key Supply, Obsolescence & Readiness Data to Project when Equipment will reach End of Support with Impact Dates
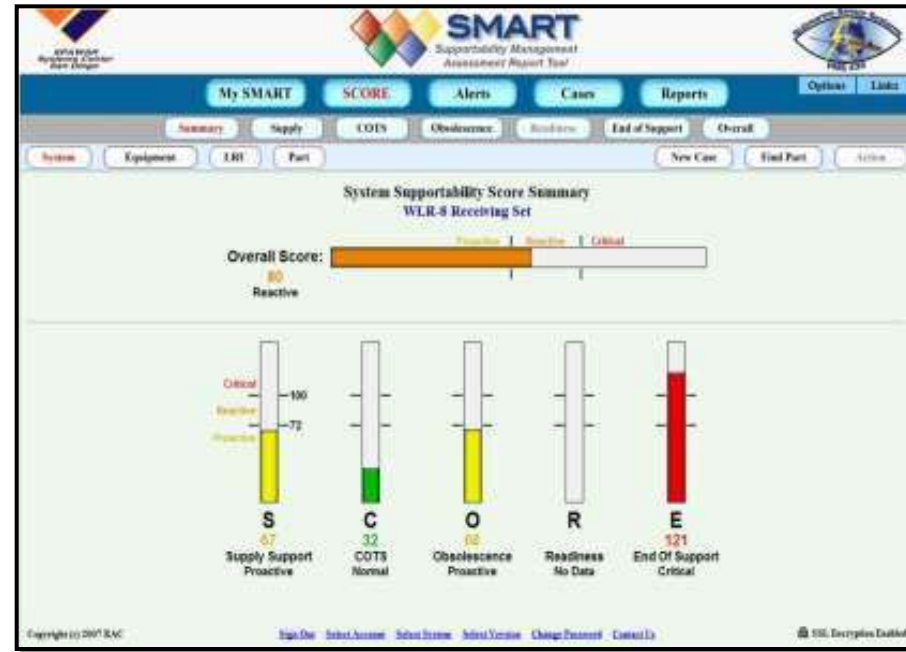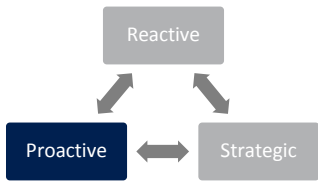

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Tool Support - Obsolescence Overview

Obsolescence Overview

Selected System

System Name	S	C	O	R	E	Overall
Apache D Unique Block 3	120		63			64

Critical - Immediate Action Required

Reactive - Replacement Options Possible

Proactive- Nearing End of Production

	SRA	COTS	Active	Passive	Total
Obsolete:	3	0	31	4	38
Discontinued:	27	0	64	23	114
Unprocurable:	18		18	8	44
LTB Single Source:		0	15	0	15
Proc. Single Source:			467	484	951
Procurable:	35	0	134	538	707
Resolved:	0	0	104	24	128
Unknown:	5	18	175	523	721
Total:	88	18	1,008	1,604	2,718
View Chart:					

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

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Proactive

Strategic

Forecasts

System health
measurement

Refresh plans

5.
Contact Us
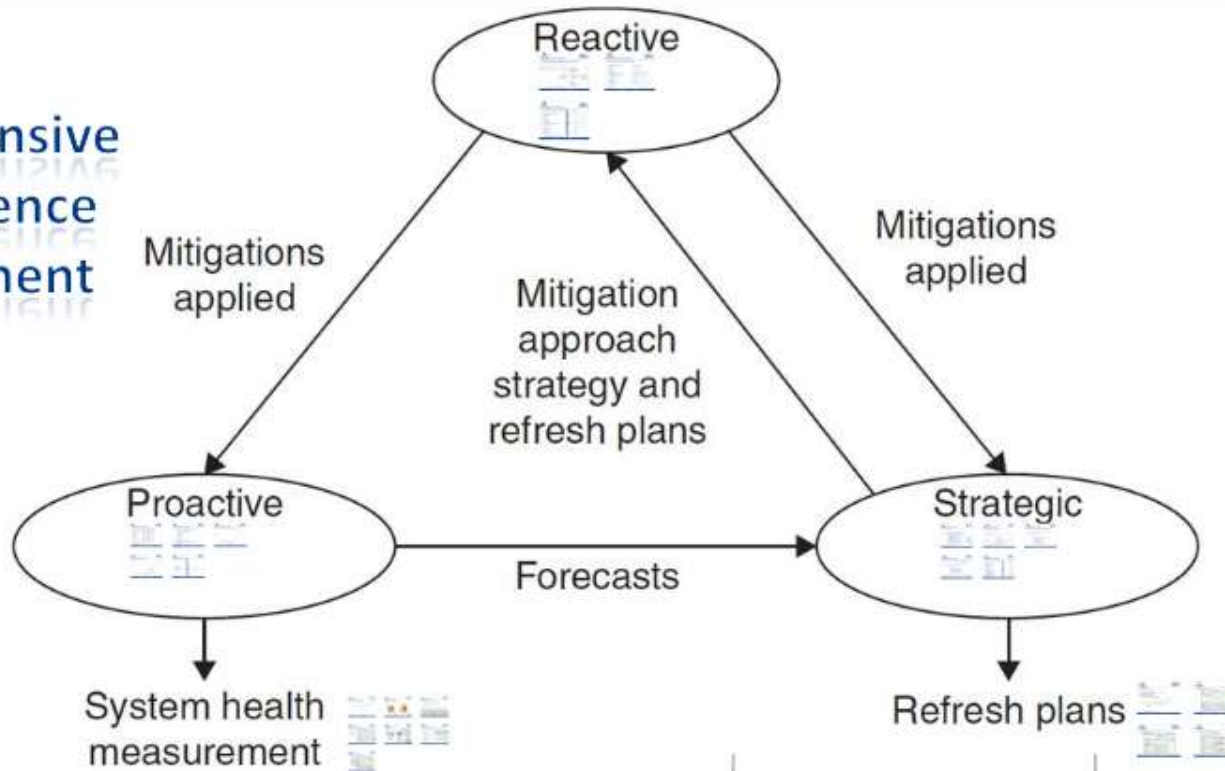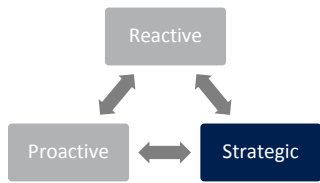
Process Analysis - Audit

- Detailed studies with different approaches to spot obsolescence issues within a company

- Process studies

- Brown Paper

No.	Question	Result
	Audit Questionnaire	
01	Do you deal with obsolescence or the negative effects of obsolescence on your organization?	-
02	What are the reasons for supply shortfalls caused by obsolescence within your organization and at suppliers?	-
03	Is a comprehensive obsolescence management system implemented in your organization?	-
04	Is your organization in possession of a general or program-specific obsolescence management plan?	-
05	Is this obsolescence management plan improved continually to assure a constant qualitative performance increase?	-
06	Is your organization a member of an obsolescence management organization or do you participate regularly in industry and government obsolescence conferences and/or working groups?	-
07	What kinds of components are used for production (electronics, mechanics, textiles, and software)?	-
08	Is your organization affected by obsolescence caused by directives, rules, and other legislation imposed by governments (e.g., directives for environmental protection)?	-
09	Are you able to estimate the cost impacts of obsolescence on your organization?	-
10	Who is in charge of obsolescence management in your organization?	-
11	What obsolescence recovery tactics are used in your organization to react to an obsolescence problem?	-
12	....	-

Figure: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"

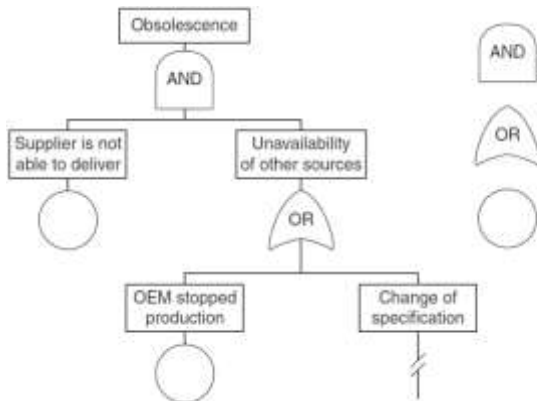www.obsolescence.com © ABSC GmbH
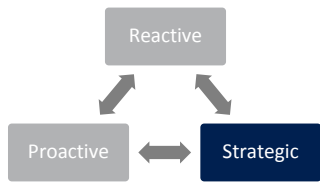
Analysis of a Suitable Product Design

- Analysis of the product design and used components

- Classification in **critical components, critical designs, their origins and possible alternates**

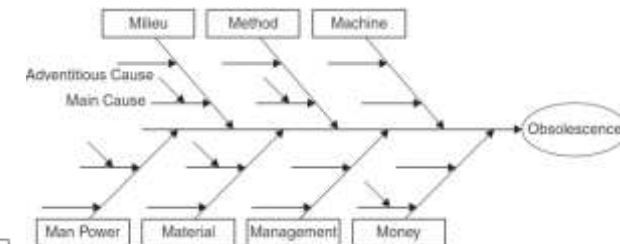- Identification of obsolescence cases in the past

Fault Tree

FMEA

Ishikawa

Figures: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"

Detailed Study - Part Identification / Preferred Parts List (PPL)

- Analysis of product definition in Preliminary Design Review (PDR), Critical Design Review (CDR), etc.

- Classification of distinct, ambiguous, and erroneous part identification / description

- Identification of causes of insufficient part description

Minimal standard to an exact part identification

- Name and/or description
- NATO Stock Number (NSN) (for military use)
- Part number(s) from the OEM(s)/OCM(s)
- Name(s) of the OEM(s)/OCM(s)
- Commercial and Government Entity (CAGE) Code of the OEM(s)/OCM(s) (for military use)
- Number of parts needed per board (or other level of indenture)
- Issue of the drawing or the software (if applicable)
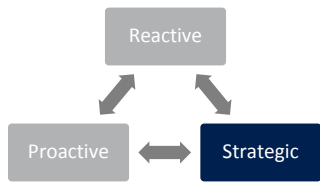
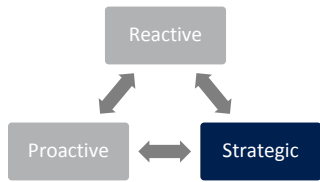# STRATEGIC OBSOLESCENCE MANAGEMENT

Detailed Study - Supplier and Customer Management / Contracting

- Analysis of contracts

- Classification of contracts on the supplier side and the customer side

- Analysis of existing responsibility clauses about obsolescence

> "The Contractor is responsible for managing obsolescence over the entire period of the contract, and notwithstanding any obsolescence issues or problems, the Contractor remains responsible for meeting all performance and other requirements of this contract. […] The Contractor shall prevent any additional costs […| The contractor shall provide […| with obsolescence status briefs, as part of the periodic program reviews provided for under the contract."

- Present potential of revisions and support potential in drafting of contracts and contract re-negotiation, if necessary

Figures: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"

Objective: Selection of Suitable Strategies

- **Process Analysis**

- **Design products to avoid obsolescence**

- **Forecasting the Product Life Cycle**

- **Parts Selection Process**

- **Demand Specification**

- **Customer/Supplier Management**

- **Contractual Language**

- **Management Above the Piece Part Level**

- **Hardware-Software Independence**

- **Design Refresh Planning Optimization**

- **Monitoring and Controlling**

Transform In Process

Figure: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"
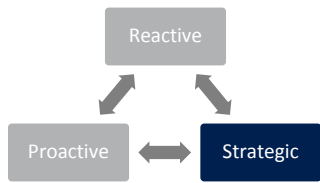
Design Refresh Planning

Optimum location(s) of these refreshes depends on:

• which part(s) become obsolete

• when they become obsolete

• how the obsolescence is mitigated
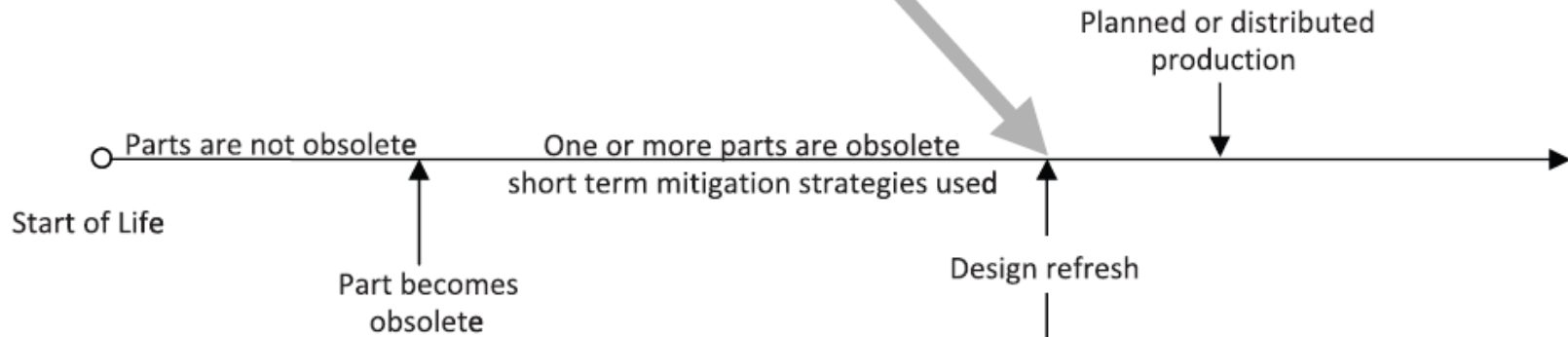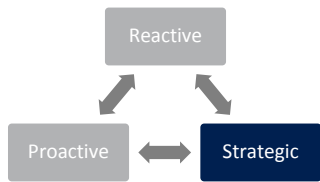
• resulting system re-qualification requirements

Figure: B. Bartels, U. Ermel, P. Sandborn, M. Pecht "Strategies to the Prediction, Mitigation and Management of Product Obsolescence"

End of Support Analysis

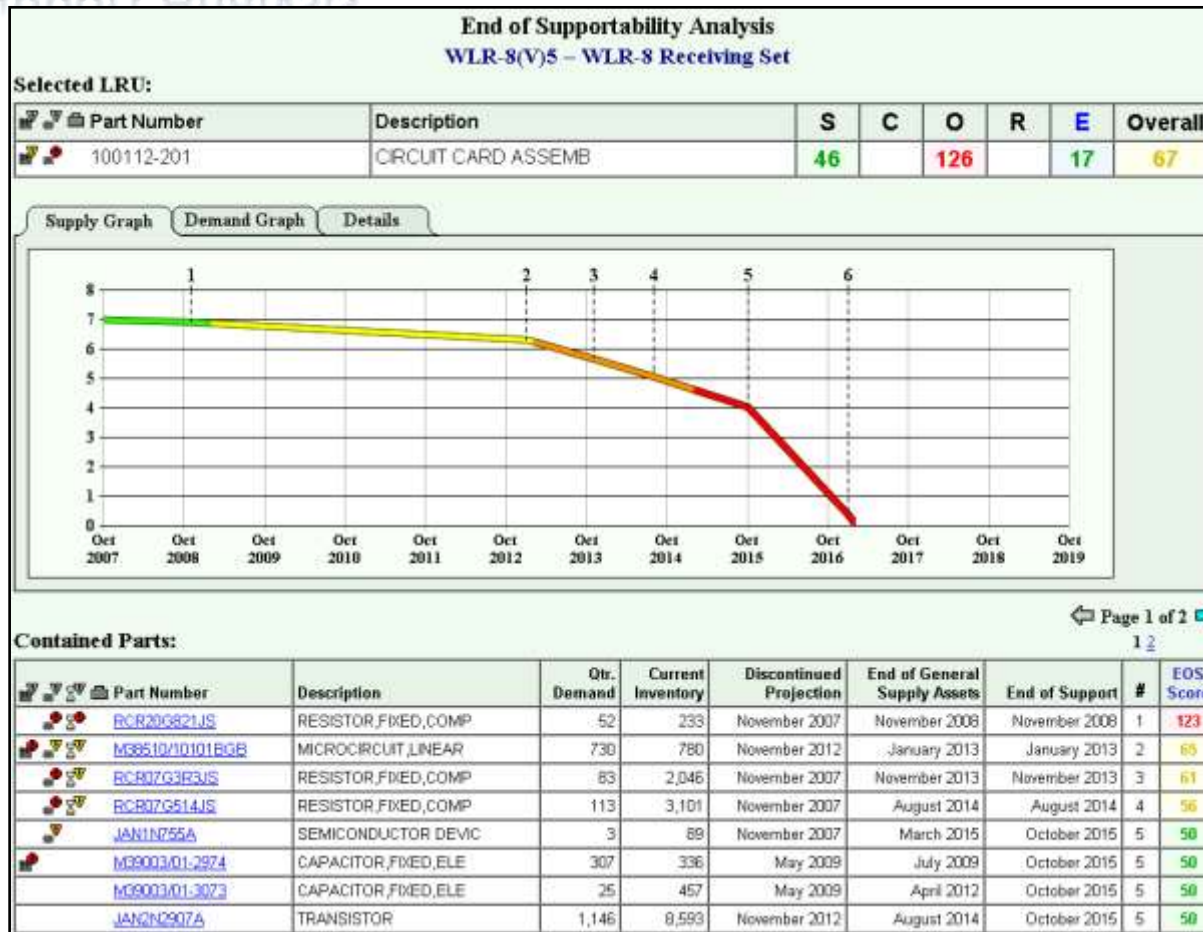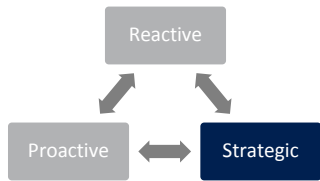Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Reactive

Proactive ⟷ Strategic

REFRESH PLANS

Applied Logic in SMART

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Cost Avoidance based upon Actual Costs

Metrics – Cost Avoidance
WLR-8 Receiving Set

Cost Avoidance Summary: Fiscal Year: 2005 [Update]

Solution Description	Solution Count	Solution Cost	Cost Avoidance - Program Actual	Cost Avoidance - Industry Average	Cost - Without DMS
Reclamation	22	$70,883.13	$2,502,007.00	$766,000.00	$5,429,117.00
Alternate (Tech. Refresh)	68	$482,794.90	$1,384,742.00	$2,924,000.00	$16,517,191.00
Life Time Buy	10	$47,462.50	$472,306.00	$515,000.00	$2,452,536.00
Bridge Buy	1	$27,587.13	$87,821.00	$122,000.00	$222,413.00
Substitution (Tech. Insertion)	2	$38,652.06	$82,850.00	$139,000.00	$461,348.00
Use Existing Stock	2	$1,095.50	$14,615.00	$12,000.00	$498,905.00
Total	105	$668,475.22	$4,544,341.00	$4,478,000.00	$25,581,510.00

Metrics – Cost Avoidance
WLR-8 Receiving Set

Cost Avoidance Summary: Fiscal Year: 2006 [Update]

Solution Description	Solution Count	Solution Cost	Cost Avoidance - Program Actual	Cost Avoidance - Industry Average	Cost - Without DMS
Alternate (Tech. Refresh)	39	$135,235.54	$697,360.00	$1,372,000.00	$9,614,763.00
Use Existing Stock	54	$23,342.31	$206,327.00	$371,000.00	$13,476,658.00
Reclamation	3	$64,649.25	$198,859.00	$288,000.00	$685,350.00
Total	96	$223,227.10	$1,102,546.00	$2,031,000.00	$23,776,771.00

Figure: Supportability Management Assessment Report Tool (SMART) by RAC

Obsolescence Management (OM)

1.
Content

2.
Me and ABSC

3.
Why OM?

4.
Comprehensive
Obsolescence
Management

Reactive

Mitigations
applied

Mitigations
applied

Mitigation
approach
strategy and
refresh plans

Proactive

Forecasts

Strategic

System health
measurement

Refresh plans

5.
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