

Commerciality of Performance Contracting

**A Market Survey Conducted by the Corporate
Contracting Working Group**

October 11, 2005



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Forward

Background:

The 2001 Quadrennial Defense Review (QDR) endorsed Total Life Cycle System Management (TLCSM) and Performance-Based Logistics (PBL) as the Department of Defense (DoD) strategy to improve material readiness. This endorsement, and subsequent direction to implement via the Defense Planning Guidance (DPG) and Strategic Planning Guidance (SPG), was based on a few relatively simple observations:

- To focus on end-item readiness, the DoD needed to establish single point accountability across the life cycle – This was accomplished by recognizing the Program Manager as the Life Cycle Manager.
- Traditional weapon system support was functionally optimized within supply, maintenance, and transportation – DoD needed to turn to industry as partners to integrate those functions and deliver **outcomes** – readiness.
- Equipment reliability was degrading rapidly (and costs were rising) due to deferred modernization and aging equipment – DoD needed to implement business strategies that inherently incentivize reliability growth.
- Commercial industry demonstrated unprecedented gains in customer service and cost performance through logistics chain integration – DoD needed to draw upon that experience rapidly.

The QDR and SPG guidance were quickly followed by leading implementations across the Services. For these initial programs, the Services were afforded latitude in implementing practices, contract structure, and metrics.

In 2003, the Defense Business Board Supply Chain Task Force conducted an independent review of DoD progress and concluded the following:

- PBL was the right strategy – more rapid implementation was both warranted and needed.
- DoD should document and promulgate PBL best practices to drive to more consistent methods and metrics.
- Financial process adjustments were necessary and appropriate to foster greater PBL implementation.

Although much outstanding success has been demonstrated by programs utilizing PBL, the time to establish a PBL contract is long and the rate of PBL implementation has been less than desirable. In the fall of 2003 under the sponsorship of the ADUSD Logistics, Plans and Programs, a series of working groups (“PBL Tiger Teams”) consisting of experts from industry and Government were convened to make recommendations to facilitate the implementation of PBL. These teams addressed issues in the areas of Business Case Analysis, Appropriations and Budgeting (“Color of

Money”), PBL Metrics, Training and Best Practices, Public-Private Partnerships (PPP), and Time-to-Contract.

Based on these findings, the Deputy Secretary of Defense directed the Under Secretary of Defense (Acquisition, Technology, and Logistics) (USD(AT&L)) and the Under Secretary of Defense (Comptroller) (USD(C)) to accelerate implementation by:

- Promulgating consistent guidelines on buying performance
- Defining consistent PBL metrics
- Testing enabling financial accounting procedures via Management Initiative Directive 917 (MID-917).

Building upon Joint Chiefs review of Focused Logistics Functional Capabilities and unprecedented partnerships with the Services and industry (via the Aerospace Industries Association Product Support Committee), USD(AT&L) issued clear guidance on purchasing performance – outcomes – using multiyear contracts, consistent metrics, and appropriate incentive structures. This guidance is being implemented as new PBL contracts are awarded and existing contracts are renewed. Performance was defined by five specific metrics:

- Operational Availability
- Mission Reliability
- Cost-Per-Unit of Usage
- Logistics Response Time
- Logistics Footprint

In the fall of 2004 as a result of the “Time-to-Contract” Tiger Team recommendations, a team of experts from industry and Government was asked by the ADUSD(LPP) to investigate and make recommendations for accelerating the implementation of PBL through Corporate Contracts. In its simplest context, a Corporate Contract is the notion of a single vehicle for contracting for PBL between all the DoD Services and Agencies and a corporation (all sectors or segments or divisions, etc.). This idea builds upon precedents already developed by DLA and some of the Services to improve the efficiency of spares purchasing. By establishing such a vehicle, the time to add additional PBL programs to the contract would be greatly reduced.

A white paper “Corporate Contracting: Accelerating the Implementation of PBL” presents the recommendations of the “PBL Corporate Contract Working Group.” The issues associated with the implementation of PBL are complex and inter-related and contribute significantly to “Time-to-Contract.” One of these issues is the utilization of FAR Part 12 to facilitate the utilization of best commercial practices in Performance-based Logistics contracts. Therefore as a part of the overall effort, a survey was conducted to examine this issue.

The FAR Part 12 Study Team and Process:

The FAR 12 Study Team members were selected for their particular industry's experience with both commercial and military hardware and services or (for the DoD members) their experience with implementing FAR 12 in PBL contracts. Industry representatives from Parker Hannifin, BAE Systems, Boeing, Rolls Royce, Raytheon and Honeywell and Government representatives from NAVAIR, NAVICP and OSD participated.

Industry members polled their organizations for lessons learned and examples or comparisons of commercial to military contracting practices, particularly those that could lead to greater efficiency and lower total ownership cost for DoD. Additionally, all industry findings and relevant FAR Part 12 contracting experience was examined and analyzed by the collective government/industry team. Data was also collected and analyzed from the "pure" commercial (non-aerospace) marketplace. This document is a compilation of the market survey data examined by the Working Group that precipitated the recommendations put forth in the white paper.

Attachment 1

Commercial Antecedent To PBL; Product Services

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Commercial Antecedent To PBL; Product-Services

- Product-Services have been in use by Commercial Industry for decades, are emerging as an “industry best practice” and the driver of a new business model that has the same goals as that of the PBL initiative
- The Aircraft Industry has led the way with concepts such as “power-by-the-hour” ...but other sectors are also involved in a business model in which the customer is assured to be delivered fixed effectiveness and efficiency performances for managing product lifecycle activities
 - Aircraft
 - GE/Pratt & Whitney/Rolls Royce-Jet Engines (40-60% of engines under programs)
 - Honeywell/Rockwell Collins-Avionics
 - Lucas Aerospace-Landing Gears
 - Honeywell-Auxiliary Power Units
 - Others (selected examples)
 - Embrex-Poultry Egg Inoculation
 - HP-Large Format Printing
 - FMC Tech-Juice Extraction
 - Hanover Compressor-Natural Gas Pipeline Compressors



20% of all new capital goods are acquired by operating lease companies and they are aggressively contracting for product-services

Attachment 2

What Are OEM Product Services?

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What Are OEM Product-Services?

OPI Focus

To provide education, market research and management consulting services that assist capital goods OEMs to evolve into suppliers of Product-Services

*“Product-Services fuel powerful growth in your company and transforms its culture and its soul”
-Jack Welch*

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***“Capital good OEM crafted services that supply solutions to operators for managing the productivity of a product ”
OPI Definition of Product-Services***

The objective of this white paper is to deliver a body of knowledge that enables capital goods OEM executives to understand the concept of Product-Services.

OEMs currently focus on marketing a single Product-Services offering (average 85% of revenues);
New-condition product sale.

The OPI believes that when OEMs strategically focus their business model on supplying a large variety of Product-Services, they will experience:

- Faster organic revenue growth
- Higher profit margins
- Greater customer loyalty

“The task is, not so much to see what no one has seen, but to think what nobody has yet thought, about which everybody sees.”

-Eric Schrodinger

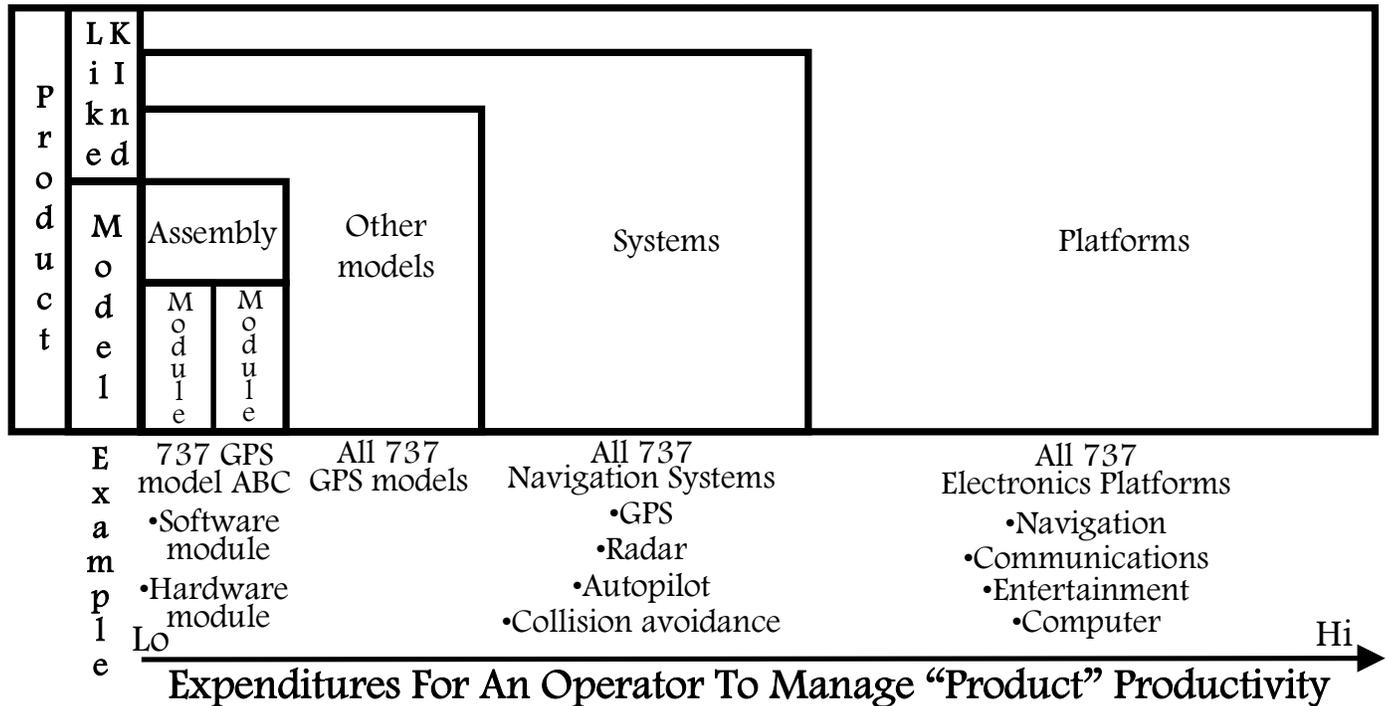
Who Are Capital Good OEMs (Original Equipment Manufacturers)?

Sector	Major US OEM	Sector	Major US OEM
Construction	Caterpillar, Terex	Multi-sector Components	ITT Industries, Flowserve
DataVoiceNetworks	Cisco, Lucent	Multi-sector Instruments	Agilent, Perkin Elmers
Diversified	GE, Honeywell	Office	Xerox, HP
Entertainment	Int. Gaming, GTech	OilGas	Halliburton, BakerHughes
Farm	Deere, AGCO	Specialty	Lincoln Electric, Diebold
Healthcare	Waters, Variance Medical	Transaction Capture	Symbol, Zebra
Mfg. Automation	Rockwell, Nordson	Transportation Aerospace	Boeing, Goodrich
Mfg. Design	Intergraph, Silicon Graphics	Transportation Railroad	Greenbrier, Wabtec
Mfg. Material Shaping	Milicron, Unova	Transportation Trucks	Navistar, Paccar
Mfg. Semiconductor	Applied Materials, Novellus	Others	Others

Capital Goods

Economic lifetime of at least 3 years	Focused upon favorably impacting enterprise productivity	Goods used in the creation of other goods and services (B2B)	Reflected upon a balance sheet as a fixed asset
--	---	---	--

What Is A Product?



There are many ways a product can be defined, resulting in many different paths in crafting offerings ...and the "product" may not even be one produced by the OEM!

Who Is A Product Operator?

Product	Operator	Product	Operator
Bulldozer	Construction contractor	Barcode readers	Public warehouse
Router	Data network provider	Aircraft	Cargo airline
Slot machine	Casino	Truck cab	Trucker
Combine	Farmer	Locomotive	Railroad
MRI	Hospital	Compressor	Gas extractor
Laser metal cutter	Manufacturer	Instrument	Laboratory
Refridgerator	Food wholeseller	Drill	Oil platform operator
Printer	IT department	Turbine	Electric utility
ATM	Bank	Computer	Design Engineer
Projector	Movie theatre	Others	Others

What Is The Productivity Of A Product?

Product Productivity Metric
Output:
 Units-of-Value Delivered
 By A Product

Input:
 Net Resources Expended
 By Product Management Processes

Legend				
↑↑	↑	↔	↓	↓↓
hi increase	increase	no change	decrease	hi decrease

Output:	Input:	Productivity
↑↑	↑	↑
↑	↓	
↑	↔	
↔	↓	
↓	↓↓	
↑	↑	↔
↔	↔	
↓	↓	
↓	↑	↓
↓↓	↓	
↔	↑	
↑	↑↑	
↓	↔	

What Are The Units-of-Value Delivered By A Product?

Product	Unit-of-Value Delivered
Bulldozer	# of Tons Excavated Per Shift
Router	# of Messages Transmitted Per Minute
Slot machine	# of Plays Per Hour
Combine	# of Acres Harvested Per Hour
MRI	# of Scans Performed Per Hour
Laser metal cutter	# of Pieces Produced Per Shift
Refridgeration	# of Tons of Frozen Food Weekly Stored
Printer	# of Color Pages Printed At Desired Quality
Barcode readers	# of Error-Free Scans Per Shift
Aircraft	# of Express Packages Moved Per Trip
Truck cab	# of Ton Miles Per Trip
Others	Others

Product operators in the same industry can have different Units-Of-Values
...the difference is often driven by their business model

What Are The Resources Expended By Product Management Processes?

Product Management Processes

- Acquire product
- Control product
- Prepare product for use
- Run product
- Monitor product during use
- Maintain product configuration
- Modify product configuration
- Remove product

Resources Expended to Manage Processes

Capital Investment

- Goods
- Software
- Facilities

Current Assets

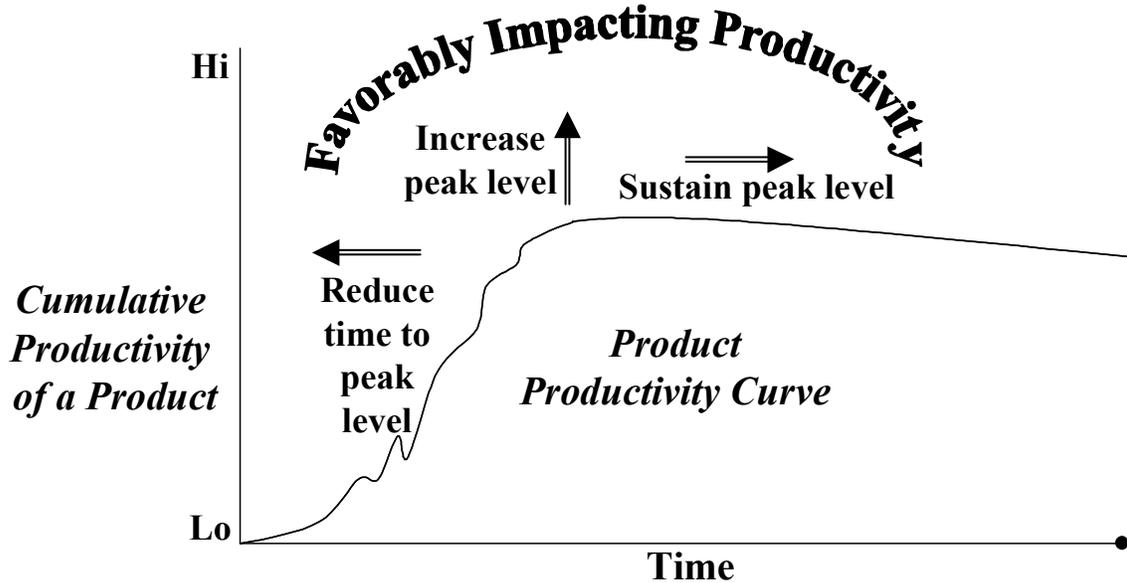
- Cash
- Inventory

Current Expenditures

- Labor
- Materials
- Energy
- Insurance
- Transport
- Others

Information

How Is The Productivity Of A Product Favorably Impacted?



There are many opportunities to favorably impact product productivity and the product lifetime ROI of an OEM, but beware of the Product Productivity Paradox (P³)

“If productivity rises too steeply, you can find that OEM profits are falling because there is too much capacity. Productivity can ruin you, which is what is happening in certain sectors.”

Jeremy Grantham, CMO Institutional Investors

What Actions Can Be Taken To Favorably Impact Product Productivity?

Favorable impact upon product productivity	Solution Required (service examples)		
Reduce time to peak productivity	Reduce expenditures that are out-of-period with output (i.e. product rental pay-per-period)	Achieve peak output earlier by improving installation and run processes (i.e. on-site consulting)	Reduce net expenditures to acquire product by providing residual value for like-kind product (i.e. trade-in)
Increase peak productivity	Decrease unplanned downtime duration (i.e. provide 24/7 service parts availability)	Increase output capacity by modifying product configuration (i.e. off-site remanufacturing)	Increase output thru operator effectiveness (i.e. simulator training classes)
Sustain peak productivity	Ensure continuity from “Acts of God” (i.e. disaster recovery program)	Guarantee output alignment with input (i.e. pay-per-unit-of-value delivered thru long-term contract)	Assure duration of planned maintenance downtime (i.e. provide like-kind service parts exchange programs)

How Can Net Resource Expenditures Be Impacted?

Net Expenditure Scenario			
Product Management Process/Activity: Maintain Product Configuration/Replace Current Parts With Like-Kind Parts to Prevent Unplanned Product Downtime			
Activity Task Requiring Resource: Plan & Acquire Service Parts			
Resource Required: Advanced Planning & Scheduling (APS) Software			
Resources Expended			
Resource Type		Description of resource	Impact upon expenditures
capital investment	software	invest in license for software	↑
current assets	inventory	reduce turnover as a result of better planning	↓
current expenditures	labor	reduce labor for acquisition and storage	↓
	transport	reduce inbound freight expenses	↓
information		increase data collection for software	↑
Net Impact			↓

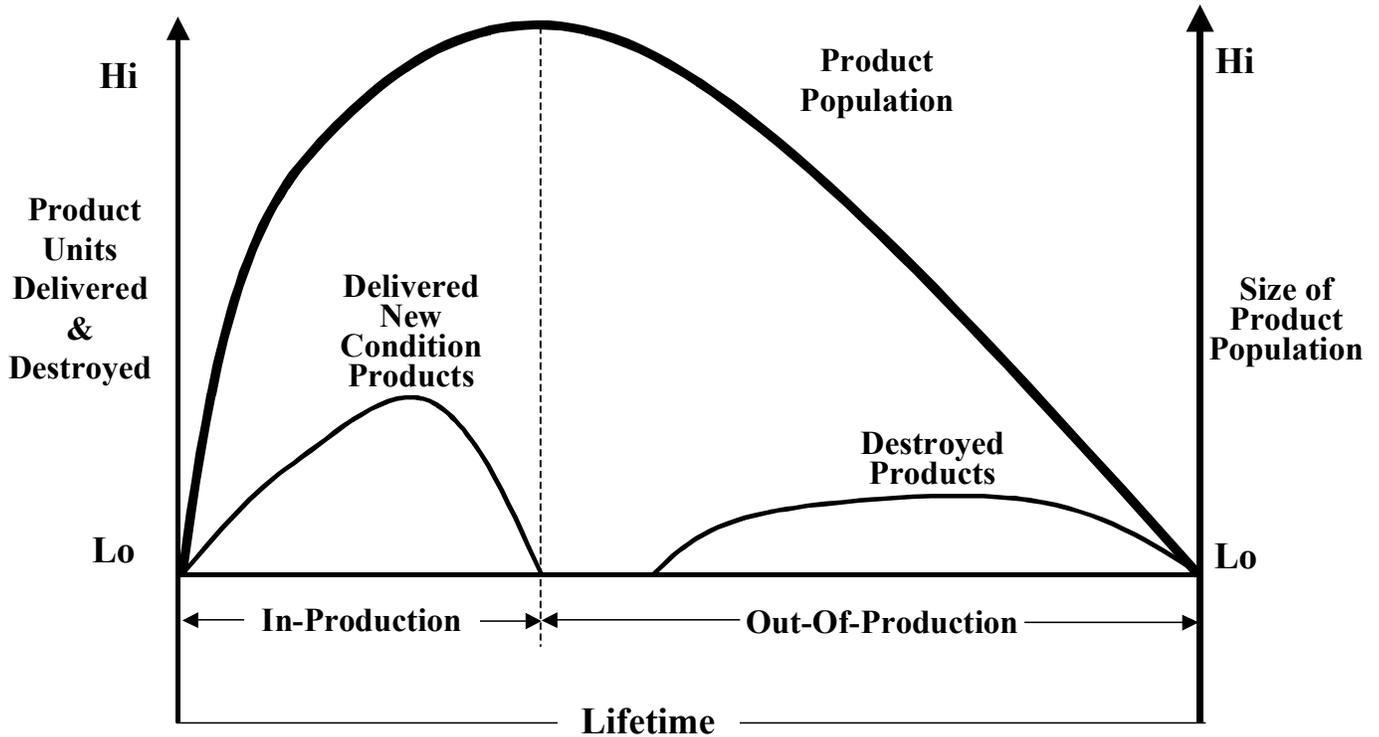
How Do OEMs Measure Financial Performance? Through The Product Lifetime ROI Metric

<p><i>Product Lifetime ROI Metric</i> Returns From Services Crafted By An OEM Over The Lifetime Of A Product</p> <hr/> <p>OEM Design + Manufacturing Investment In Resource Expenditures For All New Product Units Produced</p>	<p>Returns (Revenues x Profit Margin)</p>	<p>Investment In Designing + Manufacturing</p>	<p>OEM Product ROI</p>
	↑↑	↑	↑
	↑	↓	
	↑	↔	
	↔	↓	
	↓	↓↓	

“There are three kinds of expenditures--the costs of capital, the risk premium of economic activity and the capital needs of the future—and they overlap to a considerable extent. But any company should be expected to cover adequately these expenditures. Otherwise it operates at a genuine, certain and provable loss.”

-Peter Drucker

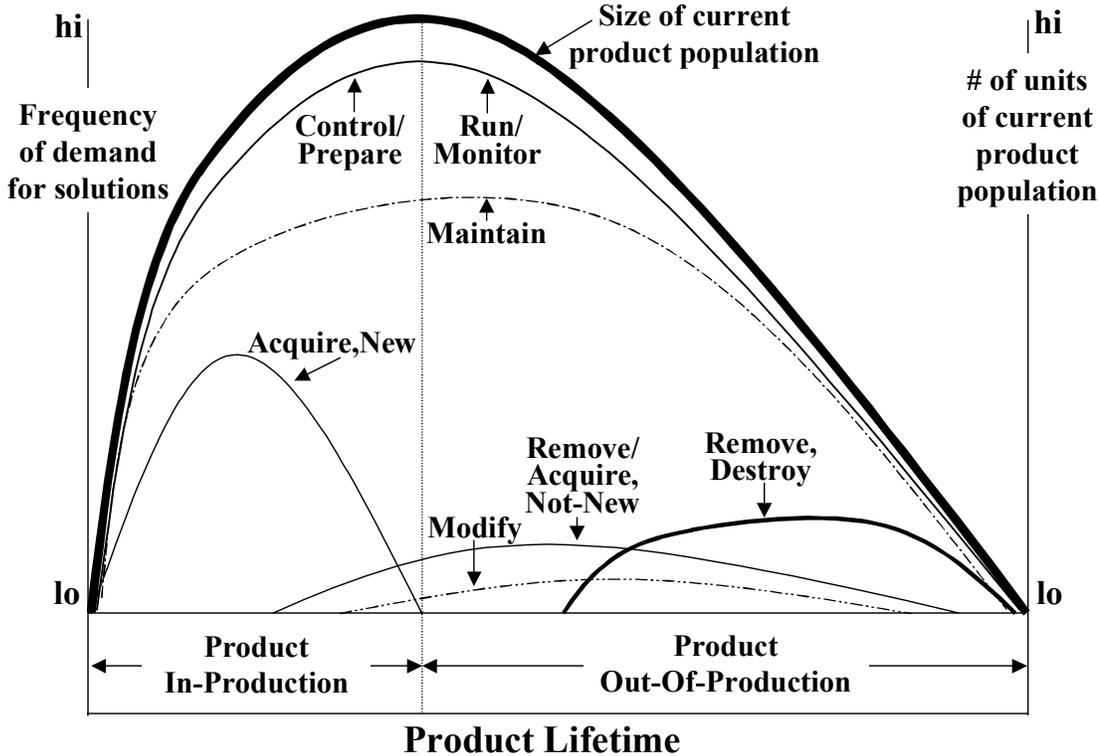
What Is A Product Lifetime?



How Can OEMs Impact The Revenues Of Their Product Lifetime Returns?

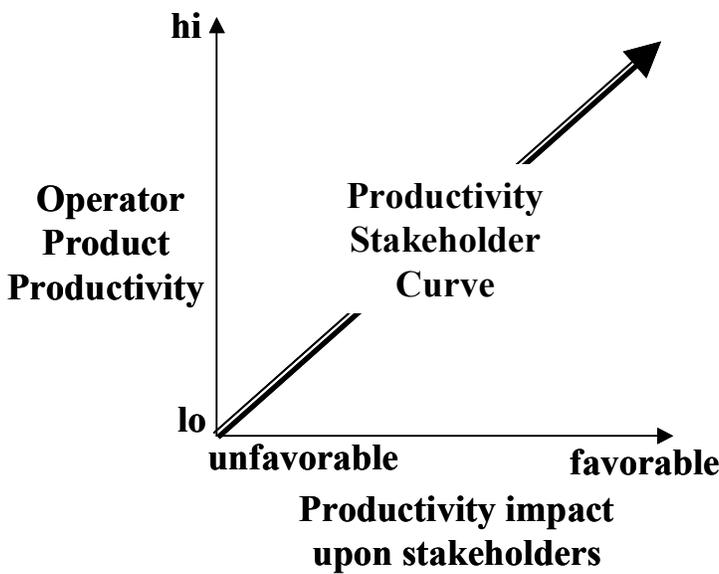
Marketing Strategy Revenue Driver	Revenue Market Size (example)	
	Larger	Smaller
Product Range	All 737 Electronic Platforms	737 GPS Model ABC Hardware Module
Operator Geographical Location	World	US East Coast
Operator Application	All Commercial Passenger, Cargo and Corporate Aircraft	Cargo Aircraft Supporting Auto Industry
Product Lifetime Duration	Modify Product Configuration To Extend Planned Lifetime By 10 Years From Original 15 Years	Do Not Modify Product Configuration To Extend Original Planned Lifetime Of 10 Years
% Of Product Duration Lifetime To Provide Services	Will Supply Services Until Less Than 1% Of Products Manufactured Are Still In Use	Will No Longer Supply Services 3 Years After The Last Product Has Been Manufactured

What Is The Frequency Of Demand For Solutions That Impact Product Lifetime Returns?



The range of services crafted to supply solutions demanded by operators can have a material impact upon not only revenues but contact with operators

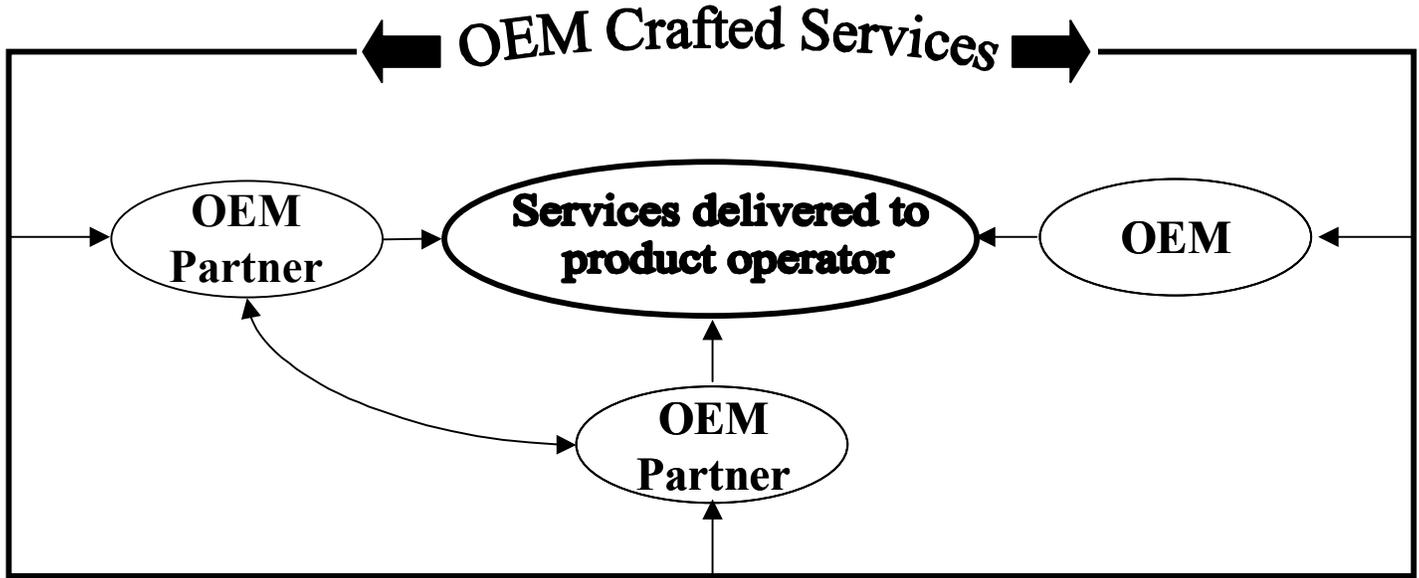
How Can OEMs Impact The Profit Margins Of Their Product Lifetime Returns?



Stakeholders In A Product Operator's Performance	Productivity Impact Upon Stakeholders
Investors In Product Operator Enterprise	Earnings
Product Operator Employees	Wages
OEM as Supplier To Product Operator	Profit Margins
Others	Others

One of the tenets of capitalism is that stakeholders share in the benefits, or the pain, of productivity performance.

How Does An OEM Supply A Service That It Has Crafted?



**The OEM does not have to deliver a service that it has crafted
 .. but it must ensure that it retains the largest share of the profits by working
 closely with its partners and product operators**

Who Are The Enterprises That Supply OEM Crafted Services To Product Operators?

Enterprises Supplied Services To Product Operators	Legacy Solutions Supplied For Managing A Product		
	Acquire, Control, Remove	Prepare, Run, Monitor	Maintain, Modify
OEM direct	✓	✓	✓
<i>OEM partners</i>			
New product distributor	✓		✓
Leasor	✓		✓
Integrator	✓		
OEM subsidiaries	✓	✓	
Maintainer			✓
Trainer		✓	✓
OEM mfg. process supplier		✓	✓
Service parts distributor			✓
Software supplier		✓	✓
Others	✓	✓	✓

What Services Are Supplied To Operators For Managing The Productivity Of A Product?

Service Delivered	Solution Demanded By Operator							
	Acquire	Control	Remove	Prepare	Run	Monitor	Maintain	Modify
Product Sale	✓						✓	
Product like-kind exchange	✓		✓					
Product short-term rental	✓		✓				✓	✓
Product operating lease, long-term	✓		✓				✓	✓
Product multi-operator pooling	✓	✓	✓				✓	✓
Product capital lease	✓							
Product disaster recovery program	✓	✓	✓	✓	✓	✓	✓	✓
Product installation/acceptance				✓				
Product asset tracking software		✓						
Product de-installation			✓					
Product sale/lease-back	✓		✓					
Product buyback/trade-in			✓					
Consumable sale				✓			✓	✓
Technician training				✓	✓	✓	✓	✓
Technical documentation distribution			✓	✓	✓	✓	✓	✓
On-site calibration & testing				✓		✓	✓	✓
Regulatory compliance reporting				✓	✓	✓	✓	✓
Tooling/instrument sale				✓			✓	✓
Operator labor					✓			
Operator scheduling software				✓	✓			
Energy consumption monitoring						✓		
Remote quality of output monitoring						✓		
Hazardous waste disposal			✓		✓		✓	✓
Vendor managed consumables				✓			✓	✓
New service parts sale							✓	✓
Technical consulting			✓	✓	✓	✓	✓	✓
Regulatory requirement change kit sale								✓

What Services Are Supplied To Operators For Managing The Productivity Of A Product?

Service Delivered	Solution Demanded By Operator							
	Acquire	Control	Remove	Prepare	Run	Monitor	Maintain	Modify
Product configuration records mgt.							✓	✓
Maintainer scheduling software							✓	
Life-extension exchange program								✓
Off-site remanufacturing/rebuild/overhaul							✓	✓
On-site maintenance labor							✓	
Reliability records management						✓		
Like-kind component exchange program							✓	✓
Service parts planning software							✓	✓
Remote reliability monitoring						✓		
Pay-per-units-of value delivered							✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓
	✓		✓					
Others	✓	✓	✓	✓	✓	✓	✓	✓

Innovative OEM Product-Services Programs

Description	Program
OEM: Sector	Caterpillar: Construction
Program name: Offering	Cat Rental: Short-term rentals
Who has contact with operator	OEM partners: OEM created new partnership relationship, to differentiate from new product distributors (note that most Cat Rental enterprises are owned by Cat new product distributors)
Operator solution demanded	Acquire/remove product and maintain product configuration
How did solution favorably impact operator productivity	Reduced time to peak performance by reducing capital good investment expenditures and assured the sustainment of peak performance by providing on-site product maintenance or product replacement
Resources supplied	<ul style="list-style-type: none"> Capital investment of new or not-new products capable to deliver units-of-value required by operator (Product delivered is not required to be manufactured by Caterpillar) <ul style="list-style-type: none"> All expenditures for product removal All resources for product configuration maintenance and product configuration modification

Innovative OEM Product-Services Programs

Description	Program
OEM: Sector	Hanover Compressor: OilGas
Program name: Offering	Service Rental Fleet: Buyback and manage former operator's gas extraction compressor. Charge customer on a pay-per-cubic foot of uplifted natural gas basis
Who has contact with operator	OEM
Operator solution demanded	Reacquire, control, prepare, run, monitor, maintain and modify product (complete product management outsourcing)
How did solution favorably impact operator productivity	Increase productivity by extracting residual value thru buyback by OEM and assuring the sustainment of productivity thru guaranteed performance by OEM
Resources supplied	All capital investment, current assets, current expenditures and information

Description	Program
OEM: Sector	Embrex: Healthcare
Program name: Offering	Inovoject: Pay-per-egg inoculated
Who has contact with operator	OEM
Operator solution demanded	Acquire, remove, prepare, maintain and modify
How did solution favorably impact operator productivity	Reduced time to peak productivity, increased peak productivity and assured the sustainment of peak productivity
Resources supplied	Capital investment, current assets for consumables and current expenditures for maintenance

Innovative OEM Product-Services Programs

Description	Program
OEM: Sector	Honeywell Aerospace: Transportation Aerospace
Program name: Offering	MSP: Pay for engine operation on a fixed price per hour of flight (program begun in 1976 for corporate jet market)
Who has contact with operator	OEM authorized repair stations
Operator solution demanded	Maintain and modify engine configuration
How did solution favorably impact operator productivity	Assured sustainment of operator productivity level; guaranteed by OEM. Program also has resulted in higher residual value of engines due to documented maintenance program
Resources supplied	Capital investment (tooling and facilities) Current assets (service parts inventory), current expenditures (labor and consumables) and information

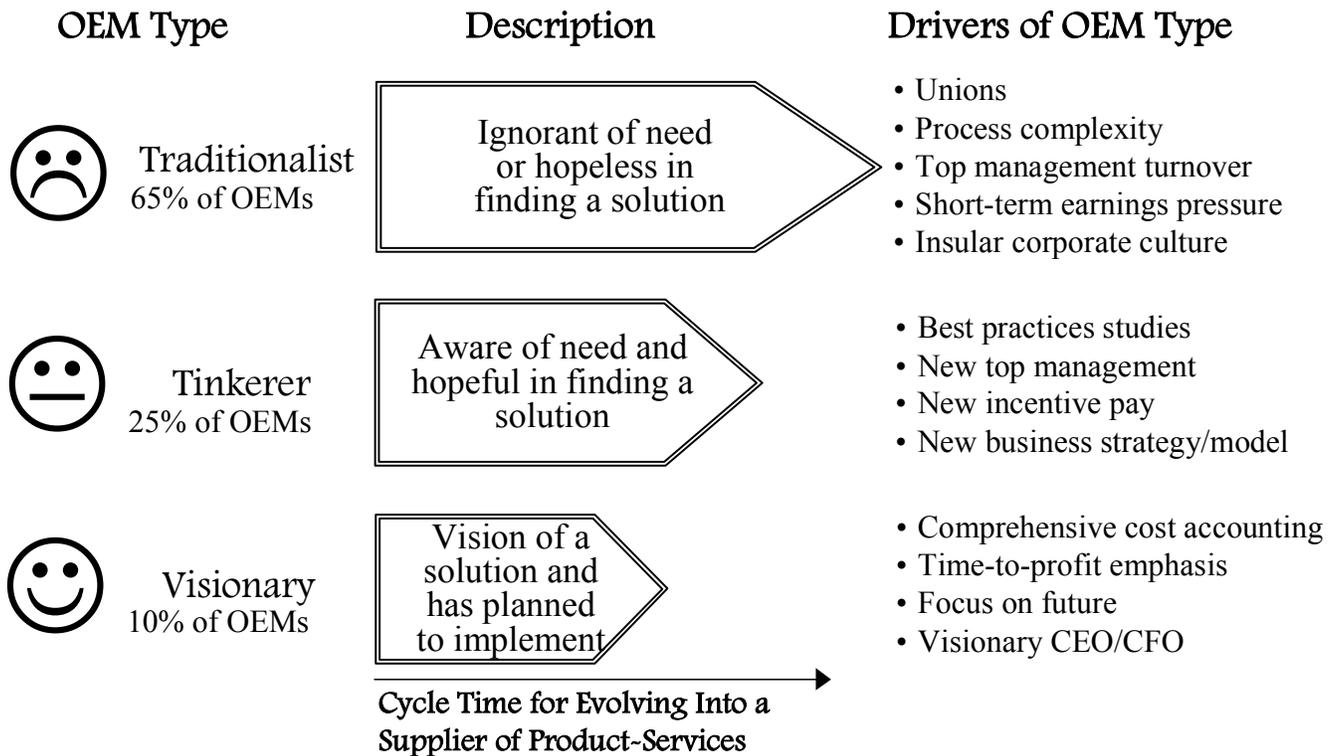
OEMs Have 25 Stakeholders In Their Evolving Into Suppliers Of Product-Services

1. **OEM executives**; improve financial performance resulting in an increase incentive compensation, such as stock option value
2. **OEM new product manufacturing suppliers**; higher profit margins and more stable demand throughout product lifetime
3. **OEM service delivery partners**; closer relationship with OEM, resulting in greater profit opportunities
4. **Product operators**; lower lifetime expenditures per output unit-of-value
5. **Financial services**; fees for creation of Special Purpose Entities (SPE), managing captive financial enterprises, issuing asset-backed securities and others
6. **Enterprise application software providers**; new processes will require new software codification either through modifications to current code or the issue of new modules
7. **OEM investors**; higher market capitalization due to higher profit margins, faster profit growth and more stable earnings
8. **Accountants**; more complex balance sheets and income statements will require higher diligence resulting in higher auditing fees

OEMs Have 25 Stakeholders In Their Evolving Into Suppliers Of Product-Services

9. **Lawyers**; more fees due to: more complex contracts between OEM suppliers, channel partners and customers, more legal entities for managing risk (such as LLCs, JVs partnerships), anti-trust due diligence
10. **Management consultants**; new processes will require the re-engineering of the business model, resulting in higher revenue
11. **Educators**; will provide seminars and workshops for stakeholders, resulting in higher revenue
12. **Stock analysts**; changing balance sheet and income statement configuration will require astute financial analysis leading to either higher fees for independent analysts or the attractiveness of recommendations for captive analysts to their brokerage customers
13. **EPA**; will see the benefits of material productivity and its resulting reduction in waste and pollution
14. **Trade groups**; ensures the long-term financial health of their members
15. **Magazines and newspaper press**; driver for “cutting edge” articles
16. **Politicians**; ensures continuity of jobs at OEMs in territories they represent
17. **DOD**; ensures continuity of the capital goods manufacturing industrial base for maintaining future military equipment
18. **Market researchers**; redefinition of the OEM’s market will require studies on market size and share, resulting in fees
19. **Information providers**; accurate information becomes critical in the new OEM business model, such as reliability data, resulting in payments to information gatherers
20. **Product design software providers**; new software will be licensed and maintained for such product design characteristics as design-for-maintainability, design-for-reuse and design-for-disassembly
21. **Professional societies**; create demand for special interest groups that add greater value for members
22. **Logistics services providers**; significantly higher levels of reverse supply chain management will require more transactional activity resulting in more fees
23. **Unions**; will embrace for ensure stable levels of employment by reducing impact of imports
24. **Product operator’s customers**; ensures cutting edge performance from their suppliers
25. **Book publishers**; many opportunities for distributing the Body Of Knowledge (BOK) resulting in additional revenues

Which OEMs Will Successfully Evolve Into Suppliers Of Product-Services?



Final Thought

“In our study of what it takes to turn good companies into great ones, we found that it took on average of four years to crystallize a coherent strategic concept and seven years of intense effort below the radar screen before a company would show a significant and sustained leap to great results. It took Jack Welch over eight years in office before GE’s stock began to significantly and consistently outperform the stock market.”

James Collins, “Good to Great: Why Some Companies Make the Leap...and Others Don’t”

Attachment 3

Pricing of OEM Product Services

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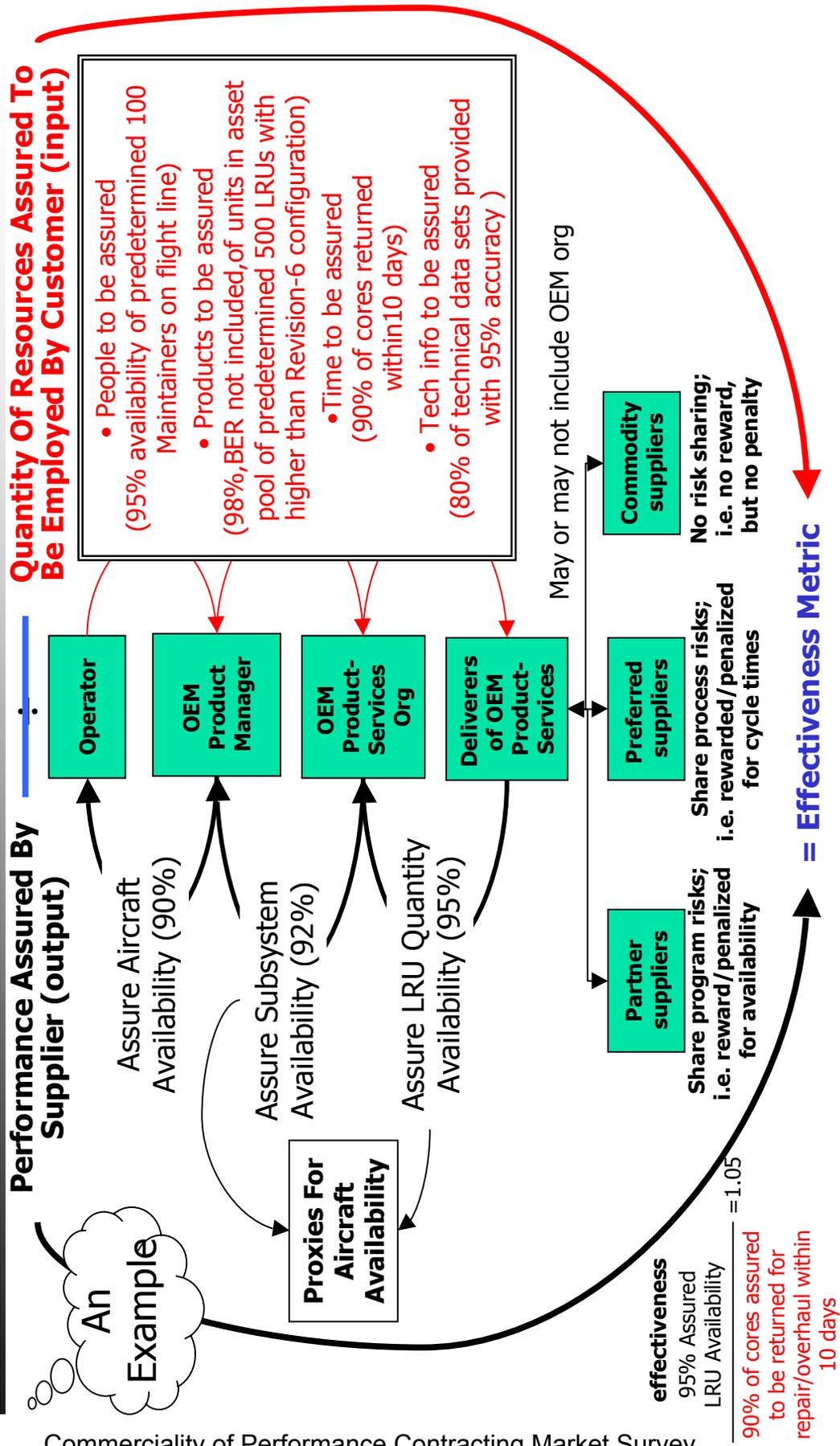
An Overview

Pricing Of OEM Product-Services

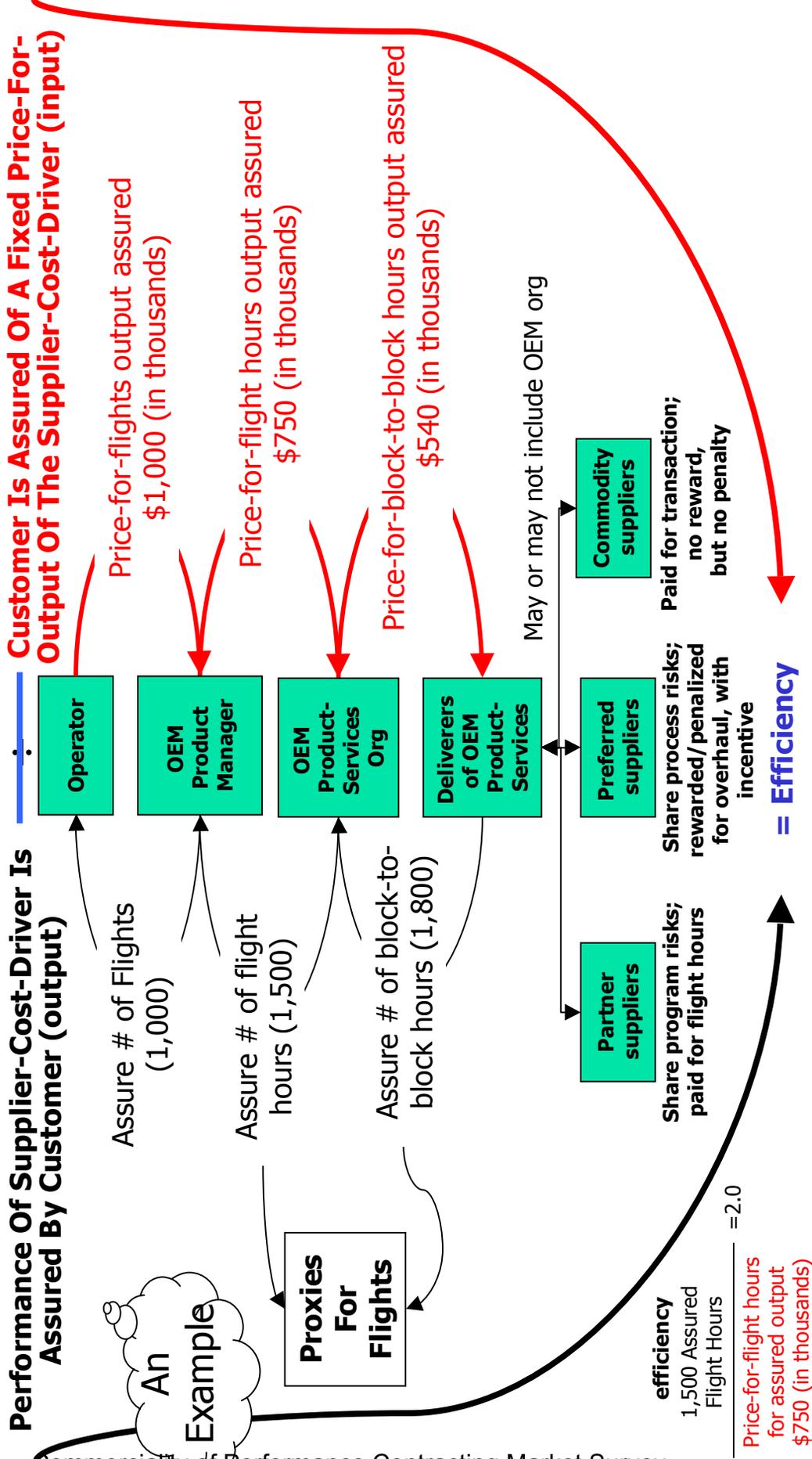
**What Are OEM Product-Services:
Services, supplied by a capital good OEM to the operators of its product,
that assure to deliver fixed effectiveness and efficiency performance,
for managing product lifecycle activities**

...the commercial version of PBL

OEM Product-Services Are Supported By 2 Webs Of Agreements: #1 Is Effectiveness-Driven



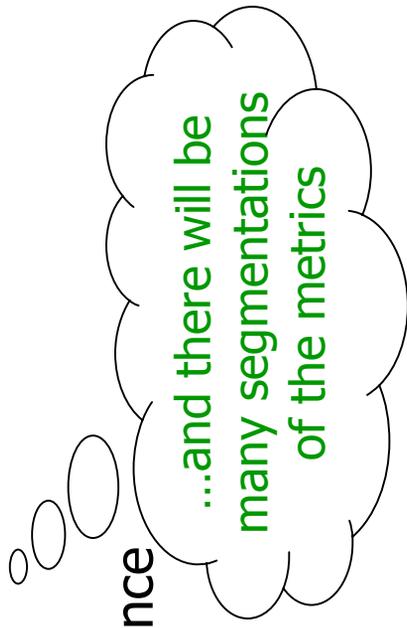
OEM Product-Services Are Supported By 2 Webs Of Agreements: #2 Is Efficiency-Driven



Craft Product-Services Value Propositions To Operators In The Form Of Metrics

Assure to deliver fixed effectiveness and efficiency performances for managing product lifecycle activities:

- Product Possession
- Product Configuration & Condition Maintenance
- Product Utilization
- Product Removal



Once effectiveness performance is agreed upon,
then efficiency metric can be crafted

Effectiveness Metric

Effectiveness Availability Metric Example For Product Condition Maintenance			
	Description	Assured	Actual
Output (supplier performance)	% of LRU supplier-forward, like-kind exchange transactions that are shipped within 24 hours from order receipt placed by airline maintainers: (# of LRUs shipped on time)/ (# of total LRUs ordered)	92%	91%
Input (customer performance)	% of cycle days that impaired LRUs returned by airline < 6 days: (# of impaired LRUs received in < 6 days)/ (# of impaired LRUs received)	95%	90%
Output/Input metric supplier performance: actual > assured		.97	1.01
Analysis: LRU supply availability remained the same, but airline was holding impaired LRUs longer, causing LRU pool size disruptions.			

Effectiveness Metric

Effectiveness Reliability Metric Example For Product Condition Maintenance			
	Description	Assured	Actual
Output (supplier performance)	% of installed LRUs for fielded systems which did not experience unplanned removals: (# of LRUs not removed on all systems)/ (# of LRUs on all systems)	95%	89%
Input (customer performance)	% of airline maintainers with > 6 months of system experience: (# of maintainers with > 6 months system experience)/(# of airline maintainers)	85%	82%
Output/Input metric supplier performance: actual < assured		1.18	1.09
Analysis: LRU reliability decreased and airline had additional experienced maintainers who would be less abusive to system.			

Effectiveness Metric

Effectiveness Footprint Metric Example For Product Condition Maintenance			
	Description	Assured	Actual
Output (supplier performance)	Average daily % during period that non-impaired LRU pool quantity < 400 pieces (average daily # of non-impaired pieces)/(400 pieces)	96%	92%
Input (customer performance)	Average daily % during period that total fielded units engine hours < 200 (# engine hours)/(200)	80%	76%
Output/Input metric supplier performance: actual = assured		1.20	1.20
<p>Analysis: Though the footprint increased, customer was using system more, which required more LRUs to support availability performance.</p>			

Efficiency Metric Input Table

Efficiency Metric Example; Price Per Unit Fielded For Product Condition Maintenance					
Segment	Price Operational Drivers	Effectiveness Weight On Price			Segment Weight
		Hi	Med	Lo	
Product Location	Level #1: US/EU/Japan/CA/AUS	1.5	1.0 <i>baseline</i>	.7	.4
	Level #2: Other Asia, SA/Mexico	2.5	2.0	1.5	
	Level #3: China, South Vietnam, others	3.0	2.0	1.5	
	Level #4: Africa, others	4.0	3.0	2.0	
Product Age In Months	<24 months	1.0	.8	.5	.2
	24-60 months	1.3	1.0 <i>baseline</i>	.7	
	61-100 months	1.6	1.2	.9	
	101-140 months	2.0	1.6	1.2	
Product Hours	0 hours	.6	.4	.2	.4
	1-15 hours	1.2	1.0 <i>baseline</i>	.7	
	16-30 hours	1.5	1.2	.8	
	31-50 hours	1.9	1.5	1.3	

Efficiency Metric Input

Price Per Product Unit Fielded Per Scenario							
Scenario #	Segment	Price Operational Drivers	Effectiveness		Segment Weight [B]	Baseline Price Per Fielded Unit Per Month [C]	Price For Fielded Unit For Month [A]*[B]*[C] = [D]
			Level	Weight [A]			
1	Product Location	Level #1: US/EU/Japan/ CA/AUS	Hi	1.5	.4	\$1,000	\$600
	Product age in months	61-100 months		1.6			\$320
	Product Hours	31-50 hours		1.9			\$760
						Price Per Unit Fielded	\$1,680

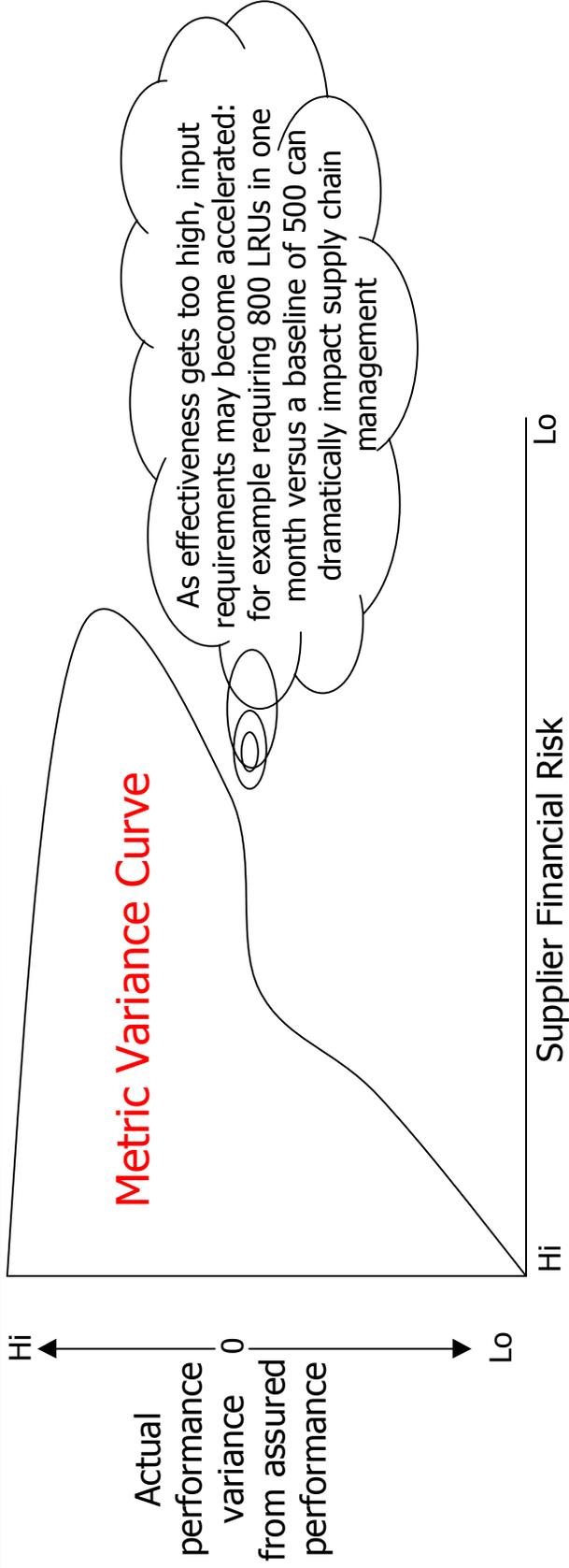
Efficiency Metric Performance

Efficiency Metric Performance Example For Scenario #1			
	Description	Assured	Actual
Output (customer performance)	# of fielded units with scenario #1	10	11
Input (contractor performance)	Price for fielded units @ \$1,680/unit per scenario #1	\$16.8 (thousand)	\$18.5 (thousand)
Output/Input metric performance: actual = assured		.6	.6
Analysis: metric performance always the same; unit price is fixed			

Customer Payment For Period

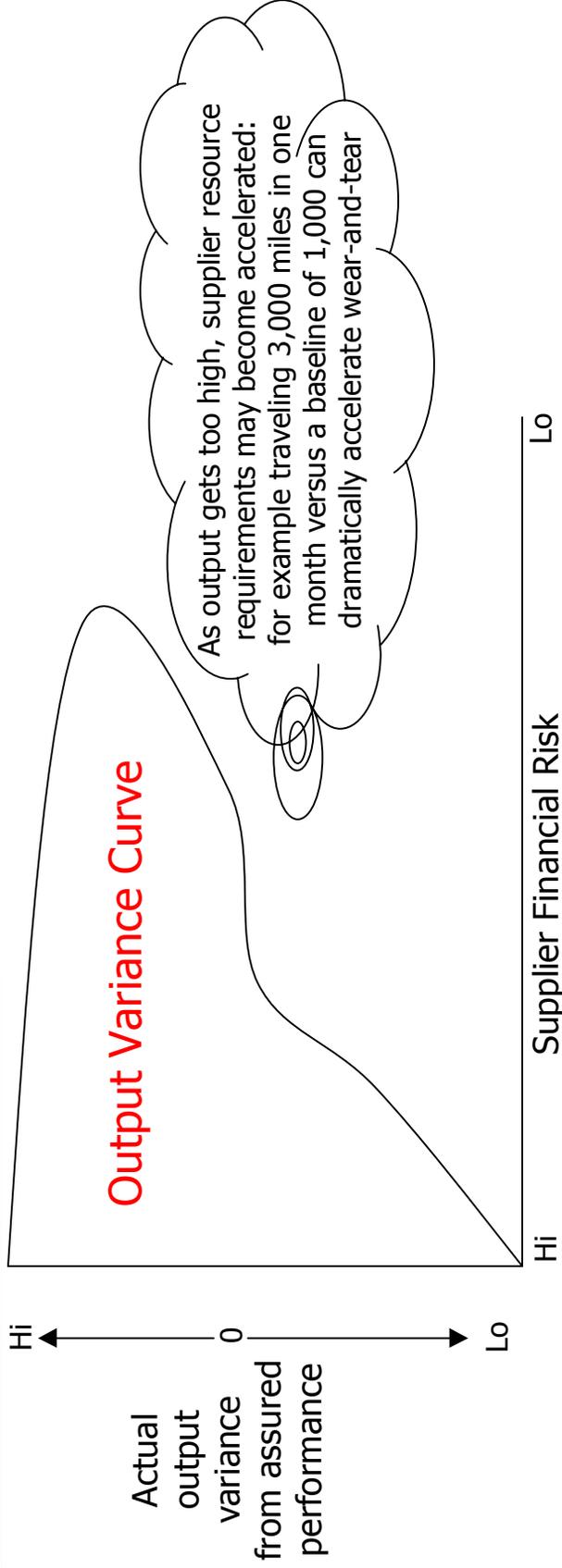
Customer Payment For Product-Services For Month; An Example	
Actual Efficiency Metric Scenario #	Payment Required
1	\$18,500
2	\$11,600
3	\$25,200
Total	\$55,300

Mitigating Risks Of Actual Effectiveness Variance From Assured Performance By Using Collars



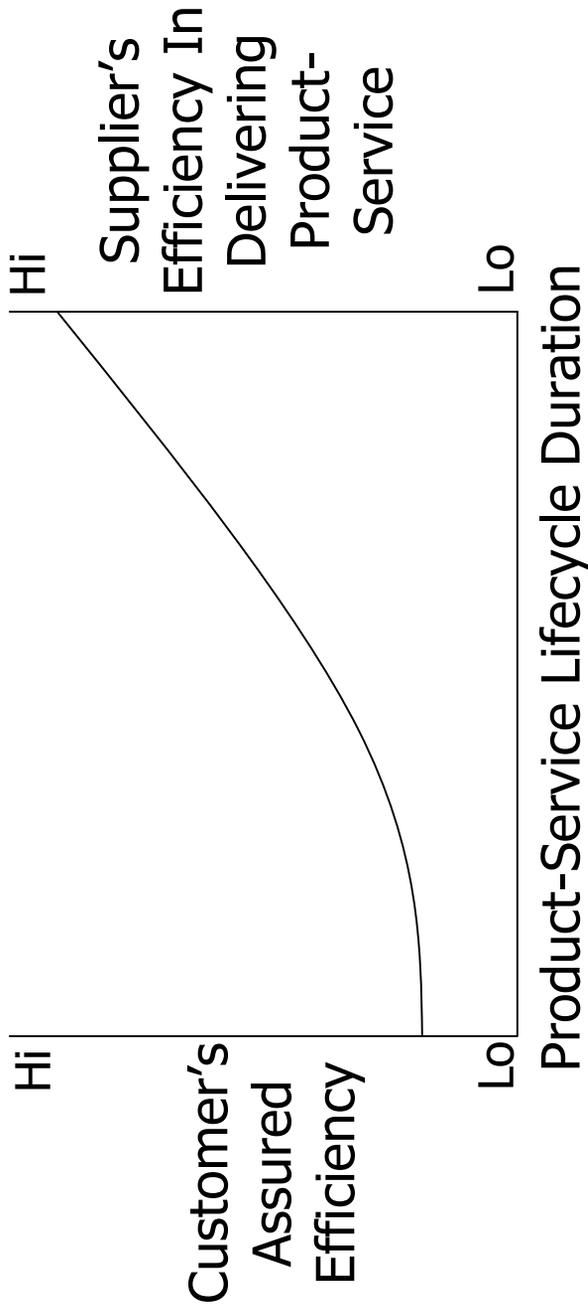
Customer Actual Metric Performance Variance Range & Supplier Actions (with examples)				
Default	Low Variance Range From Assurance	Output Acceptable Variance From Assured Metric Performance	High Variance Range From Assurance	Default
> -20%	-20% ← → -11%	-10% ← → +10%	+11% ← → +20%	> +20%
Exit strategy is required by Supplier	Supplier changes efficiency assurance; +.1% for each -1% in performance (lower price/output)	Supplier has met assured metric performance	Supplier changes efficiency assurance; -.1% for each +1% in performance (higher price/output)	Exit strategy is required by Supplier

Mitigating Risks Of Actual Efficiency Variance From Assured Performance By Using Collars



Customer Actual Metric Performance Variance Range & Supplier Actions (with examples)				
Default	Low Variance Range From Assurance	Output Acceptable Variance From Assured Metric Performance	High Variance Range From Assurance	Default
> -25%	-25% ← → -15%	-14% ← → +14%	+15% ← → +50%	> +50%
Exit strategy is required by Supplier	Supplier changes efficiency assurance; -1% for each -5% in output (higher price/output)	Supplier has met assured metric performance	Supplier changes efficiency assurance; +1% for each +5% in output (lower price/output)	Exit strategy is required by Supplier

Define A Product-Service Lifecycle Pricing Strategy



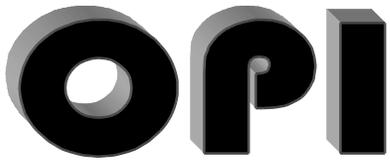
Concept

As supplier improves its efficiency in delivering its offering to its customer, it will share its "savings" with the customer; this is a basic tenet of capitalism

Attachment 4

**OEM Product-Services Review
(Issue 4, 2004)**

(Reprinted with permission from OPI)



OEM Product-Services Institute

OEM PRODUCT-SERVICES REVIEW

Marketing Strategies and Tactics for Capital Goods OEMs

"Product-Services fuel powerful growth in your company and transforms its culture and its soul"-Jack Welch

Who Is OPI?

OPI is an education, market research and management consulting organization that assists capital goods OEMs and their partners to evolve into suppliers of product-services

What Are Product-Services?

A capital good OEM crafted offering that services the requirement of an operator to manage the productivity of the lifecycle event of a product

Product-Services Segmented By Operator Lifecycle Event:

- **Product Capacity Management**
 - New condition sale
 - Not-new condition sale
 - Rental
 - Capital lease
 - Degrade
 - Upgrade
 - Sale/leaseback
 - Pooling
 - Others
- **Product Condition Management**
 - Component remanufacturing
 - New service parts sale
 - Not-new service parts sale
 - Part like-kind exchange
 - On/off-site product repair
 - Maintainer training
 - Technical documentation sale
 - Maintenance tooling rental
 - Others
- **Product Location Management**
 - Asset tracking software
 - Site preparation
 - De-installation
 - Long term storage
 - Theft prevention monitoring
 - Transport
 - Permit processing
 - Disposal verification
 - Others
- **Product Use Management**
 - Consumable sale
 - Energy monitoring
 - Regulatory record keeping
 - Operator training
 - Operator scheduling software
 - Calibration tool sale
 - By-product disposal
 - Quality monitoring
 - Consumable planning software
 - Others

Evolving Into A Supplier Of Product-Services: The Crafting of A Deal

Applied Materials (AMAT) agreed to pay \$84.6 million in cash for the \$240M revenue/yr San Jose, Calif. based Metron (MTCH); a 119% premium to its' closing price. Also included are net loss carry-forward tax reductions.

"We think the price is cheap," says Sid Parakh, an analyst at Robins Group, a small-cap research house in Portland, Ore. "AMAT is getting a huge infrastructure and experienced people."

With 30 offices in the U.S., Europe, Asia and Israel, Metron caught AMAT's eye because of its global reach and its focus on providing product-services, and not just new products, to semiconductor manufacturers. In addition to supplying service parts and specialty materials to chip makers, Metron provides the highly specialized cleaning services required to keep production lines dust-free.

"AMAT is buying Metron to expand its presence in the service business," says Timothy Summers, an analyst at Stanford Group, a brokerage firm in Boca Raton, Fla. "It wants to do this because service and customer support are not nearly as cyclical as its traditional equipment business."

According to Summers, AMAT Chief Executive Mike Splinter, who took the helm last year, after leaving Intel as its Chief Marketing Executive, has made it a priority to increase the company's presence in the product-services sector. While chip makers may curtail capital expenditures during downturns, they're more likely to continue spending on cleaning and maintenance product-services that ensure quality and extend the life of existing products. Recent alliances with Brooks Automation, Praxair Electronics and Phoenix Silicon International were made to boost AMAT's product-service offerings. But rather than piecemeal partner-by-partner contracts, AMAT needed to take a bigger bite and infuse itself with a product-services focus; an acquisition was the easiest and fastest route to that.

AMAT's gross profit margins, as a % of revenue, for new product sales, inclusive of R&D costs, is 31%. It is estimated that AMAT can obtain gross profit margins of 40-60% higher for its other-than-new-product offerings. Note that AMAT does not segment its product-services revenue on its 10K, but it appears that other-than-new-product revenue is currently material to its bottom line. AMAT currently has an estimated \$500M of service parts inventory, and if it turns 1.5 times per

year and if margins are 40%, then AMAT generates \$1.3B in sales/yr in service parts or 20% of total AMAT revenue, but 30% of its profits.

"The industry is very fragmented," says Parakh of Robins Group. "Other companies do some services, but not all the services that Metron does. Metron is the only company we know of that has a global presence and offers one-stop shopping."

Though little-known outside the chip-equipment arena, the Amsterdam-based Metron, formed via the 1995 merger of chip equipment distribution companies Metron Semiconductor and Transpacific Technology succeeded in restructuring its business from a low-margin equipment distributor to a high-margin product-services provider.

"Applied has tried to develop a product-services focus internally and quite frankly they have not been too successful. They are a technology company, having been driven by their technology focused, recently retired CEO, Jim Morgan. That's their culture. With their new CEO Mike Splinter, AMAT is now being run more like a business," said Doug McCutcheon, CFO of Metron.

But if purchasing an organization is faster than through organic growth, the acquisition route is not necessarily a simple one. Because Metron's purchase was subject to highly complex Dutch acquisition laws, AMAT, to get the deal done, opted to buy the company's 30 subsidiaries, which operate in 20 countries. AMAT had to hire counsel in each of the countries to ensure compliance with local securities laws. "It was complex and expensive for such a relatively small deal," said Richard Millard, a partner in Weil, Gotshal & Manges, who represented AMAT in the acquisition.

Without a CEO who is focused on evolving their organization into a supplier of product-services and willing to walk the talk through the entire acquisition process, that at times may be painful, an OEM will forever languish as a build-and-sell enterprise. With profit margins that are not commensurate with their financial risks of ineffective R&D, plant and equipment impairment, product liability, environmental liabilities and others, OEMs who "don't get it" will perish.

"The difficult is that which can be done immediately, the impossible, that which takes a little longer." - George Santayana

OEM PRODUCT-SERVICES REVIEW

Lessons Learned

The Imaging Services operation of **Xerox** Corporation's Global Services Division, at its 162,000 square foot Hot Springs, Ark location, has the capacity to handle more than 1 billion color, black-and-white and gray-scale images per year to support the records retention, document processes and disaster recovery planning of its customers.

For more than 17 years, Xerox has helped clients around the world digitize and manage information from hardcopy documents. In addition to creating hosted repository Web sites to provide access to electronic information, the Xerox Imaging Services Center now offers high-volume color scanning technology and advanced image compression software allowing clients to store, back-up and access business-critical documents. Market research firm IDC projects spending on imaging and document management outsourcing will increase more than 20 percent annually through 2007.

Various industries are using Xerox's Imaging Services:

- Healthcare organizations are transitioning hardcopy documents, including patient admittance forms, insurance claims, Medicaid case files to Web-based archives, allowing staff 24/7 accessibility to critical information
- Manufacturing and energy companies are capturing documents from pre-CAD blueprints to faded legacy research notes
- Banking and insurance firms are meeting government regulations for the archiving of records
- Online retailers are providing site visitors higher-quality images that open quickly with either dial-up or broadband Internet connections

Lesson Learned: In certain applications an OEM can also be the owner and user of its products. Many of Imaging Services customers are also the owners of Xerox products, but they prefer to outsource back to the OEM those jobs that disrupt the normal flow of work. Many OEMs could provide additional capacity for their customers, where applicable, with similar product-services.

The EU's regulatory environment remains unfriendly to business, especially if the company in question flies an American flag. The Commission routinely prohibits mergers on the hypothetical grounds, that as a stronger entity, the merged firm might ultimately drive rivals from the marketplace. The picture Alan Greenspan painted of EU attitudes toward competition back in a 1962 essay rings as true today: "It is a world in which competition is lauded as the basic axiom and guiding principle, yet 'too much' competition is condemned as 'cutthroat'." Among commission decisions that consistently favored less competitive market rivals was the blocked 2001 wedding of **General Electric and Honeywell**. This merger got the green light from U.S. regulators. But the Commission said no, using theories of competitive harm that were based on the hypothesis that competitors will be forced to exit the market in the face of a stronger GE/Honeywell. For the Commission, it is clear, the degree of competition in a market is attested to by the number of competitors. This approach may be consistent with neo-classical economic theory, but it is not sound public policy. A free market is such if no barriers to entry forbid new firms to enter; but the number of the competitors per se is not a relevant variable. The Commission, however, seems to believe that competition is proven by having a number of businesses producing the same kind of goods.

If antitrust authorities focus on "enforcing competition" above consumers' best interest, they will end up propping up inefficient business rivals. This turns the rules of the game into a weapon for companies who can't flourish in the market place and turn to regulators to survive.

From a Wall Street article by Alberto Mingardi.

Lessons Learned: With 25% of the global demand for capital goods originating from the EU, US-based OEMs must be very cautious as to how they roll-out their product-services strategy in the EU. If the approach is to acquire independent suppliers of product-services, they will be able to do so by making small acquisitions, country by country within the EU. Within a few years the OEM will not only be able to provide product-services for the products it manufactures, but also for its new-product rivals. This will eventually gut the profit margins of the OEMs "who don't get it" regarding product-services, because the product-services focused OEM will be able to amortize their R&D over a larger revenue base...and they will cause their new-product competitors to die. At this point the EU Commission will become involved to "protect" the failing OEM and its workers, but it will be too late. Also note that if OEMs define themselves as suppliers of product-services, their market share is often at most 10%, when you consider the market encompassing independent service providers, product re-marketers and the operators of their products.

Terex has announced an understanding with **Caterpillar** that will allow Terex the opportunity to distribute and support the Terex O&K line of hydraulic excavators through Cat's independent dealer network. Terex will continue to operate its branch locations and support its existing dealer agreements while focusing on utilizing the strength of the Caterpillar dealer network. In those areas where Terex has existing distribution, various forms of local collaboration will be explored with the Caterpillar dealers.

"We believe that this arrangement will allow Terex the opportunity to reach new customers in areas where we have historically not participated in a meaningful way due to limited capacity to service and support our machines," commented Rick Nichols, president-Terex Mining. "By seeking to distribute our mining shovel through Caterpillar dealers in geographies where we have no current representation and utilizing their capabilities to supplement other regions, we have instantly created the potential to establish a global network that will greatly expand our prospects for selling new equipment and providing service to our customers."

Lessons Learned: An OEM's value is driven by its relationship with its customer base; an operator prefers one contact point for product-services that impact like-kind products. For those OEMs who continue to focus their enterprise on a build-and-sell business model, they will evolve into enterprises that provide a contracted manufacturing service to those OEMs who have evolved into suppliers of product-services. This is already happening in the high-tech area and will impact other sectors in the not too distant future.

OEM PRODUCT-SERVICES REVIEW

Operators Obtain Value By Working With OEMs

Rockwell Automation and Penton Media sponsored a study, based on interviews with 582 OEMs and operators. Two results are of primary importance to OEMs (note that the percentages are for those organizations that answered “always”, usually” or “sometimes” to the question):

- 85% of operators and 86% of OEMs believe that OEMs are a primary source of good technical advice.
A conclusion of this finding is that operators would trust OEMs in providing expanded product-services that require technical prowess, such as upgrade installations, predictive maintenance, remote product monitoring and others
- 95% of OEM respondents believe that operators tend to choose machines and components based on lowest procurement cost, while only 78% of operators agreed with this statement.
A conclusion of this finding is that OEMs should not focus upon new product pricing as the only way to gain market share. Warranties, product resale value, product reliability, product support and other factors also drive the OEM-operator relationship.

The Product Productivity Paradox

A new economic study concludes that an OEM's insertion of technology, such as software, electronics, and sensors, into its new products actually shrinks demand for these goods; at least in the year or so following the technology's arrival. The conventional economic view is that operator productivity gains from technology insertion would quickly yield higher sales and employment for OEMs. This is from a working paper by two University of Michigan economists, Susanto Basu and Miles Kimball, along with an economist from the Federal Reserve Bank of Chicago, John Fernald.

Why does technology insertion hurt? Basu and his colleagues say that when businesses adopt technology to improve efficiency, they don't immediately share the benefit with customers in the form of lower prices. Lower prices would presumably result in greater demand for its products or services. Instead, businesses use the gain in productivity to reduce payrolls and capital goods spending. Business activity contracts. Don't make these economists out to be Luddites. Their concern is that policy makers, as well as OEMs, will misread these short-term shocks. That's because the researchers find that the productivity (efficiency and effectiveness are subsets of productivity) benefits of a new technology do start to show up after several years. Prices are lowered, demand increases and businesses invest in capital goods.

Are OEM Products Evolving Into Becoming Simply A Platform For The Suppliers Of Upgrades And Accessories?

Independent suppliers, such as DPAC Technologies, have let it be known that "The goal of our product strategy is to simplify the process of adding wireless connectivity to OEM devices and equipment." If OEMs do not take seriously the threat of independent suppliers or other OEMs creating increased efficiency or effectiveness from their products, OEMs will find themselves in the untenable financial position of being simply a commodity platform for “the guys who are really making money.”

IBM's Infoprint Manager software automates printer control to manage multi-vendor printers simultaneously. Overall, the enhanced solution presents a more effective printer output management system. "Print management solutions are a key component in our strategy of being an on-demand business supplier," said Bruce Otte, worldwide manager of production strategy for IBM Printing Systems. "By offering our customers enhanced capabilities for printing virtually any datastream anywhere across the enterprise, they can leverage the assets they currently own to improve asset and operational productivity." Note that IBM's strategy of being an on-demand supplier, a term currently used by the office equipment technology sector for pay-upon-use product-services, drives them to create offerings that often reduce the demand for additional new products by an operator....so office equipment OEMs, as a result of IBM's offering, have less new product demand, with a relatively fixed cost of R&D...not great for the bottom line... but IBM's stockholders enjoy healthy profits and a higher market cap from the OEM's product.

Another office equipment powerhouse who is “getting it” regarding product-services is Cisco. Though today Cisco generates only a little over 15% of its revenues and profits from other-than-new-product sales, it is positioning itself to materially grow this segment. “The market for services surrounding on-demand offerings is starting from zero, and the fact that Cisco is there tells you that it is going to be a sizeable one,” Silicon Valley Special Magazine's David & Goliath column

The beauty of pricing based on enhancing the productivity of an operator is that pricing is based not on “this is my cost, this is the profit I want to make, so this is my price,” but on “this is how much I save the customer, this is how much of that savings I want to keep, so this will be my price.”

Product-Services Is Important For Some OEMs
Based upon last 4 quarters.
Note: new product Cost Of Sale include R&D costs

OEM	Description
United Technologies	Obtains 29% of revenues from other-than-new-products, but 45% of its gross margin profits
Caterpillar	Obtains 7% of revenue from its financing subsidiary, but it generates 24% of its gross margin profits. Coupled with its service parts sales, which it does not segment in its 10K, it is estimated that Cat derives well over 50% of its gross margin profits from other-than-new-product sales
Xerox	Obtains 55% of revenue from other-than-new-product sales, but 70% of its gross margin profits

OEM PRODUCT-SERVICES REVIEW

OPI Research

15 Sectors Of Capital Good OEMs Were Reviewed For The Last 4 Quarters Comparing Median Gross Profit Margin ($[(\text{Revenue}-\text{COS})/\text{Revenue}]$) Of New Products Versus All Other Revenues

New Product Offerings	All Other Offerings (Service parts, financing, field service, etc)
25% Gross Margin As A % Of Revenue (Inclusive of R&D/product development)	39% Gross Margin As A % Of Revenue (R&D/product development not included due to immaterial costs)
77% Of Total OEM Revenue	23% Of Total OEM Revenue
68% Of Total OEM Gross Margins	32% Of Total OEM Gross Margins
<p>Note: a small minority of OEMs segment their new product sales from all other revenues. The results of this research should not be viewed as being comprehensive, but given our past work with OEMs, the findings appear to be reasonably accurate. OEMs who do not segment their sales, usually have a higher % of their revenues derived from new product sales. Our estimate is that the "average" OEM generates closer to 85% of its revenues from new product sales, but less than 70% of their profits.</p>	
<p>Conclusion: When OEMs evolve their business focus from that of build-and-sell to product-services, gross profit margins are materially improved.</p>	

Contact OPI to help you:

- Develop a detailed study of the actual and potential market size of Product-Services
- Assist in crafting highly profitable new Product-Services offerings
- Assist in organizing for the delivery of Product-Services
- Re-initialize the service parts distribution planning system
- Assess the operational efficiency and effectiveness of the Product-Services enterprise
- Assist in financial modeling a Product-Services enterprise
- Educate your enterprise through 2- day in-house workshops:
- Solution selling of Product-Services
- Crafting of pay-per-output-of-value programs

For further info go to: www.oemservices.org/services.htm

OPI Events

October 28 & 29, 2004

Seminar: How To Market Not-New Service Parts To Maintainers Of Capital Goods
Las Vegas, Nevada

October 30 & 31, 2004

Event Sponsor: Marketing Remanufactured Aftermarket Products
BigR Show Education Symposium
Las Vegas, Nevada

November 1 & 2, 2004

Seminar: How To Craft Performance Based OEM Product-Services
Las Vegas, Nevada

For further info go to:
www.oemservices.org/educational_programs.htm

Whitepapers (Free PDF downloads)

What Are OEM Product-Services?

www.oemservices.org/pdf_files/WhatAreOEMproductservices.pdf

OEM Use of Channel Partners to Deliver Product-Services: Current Status and Market Trends

www.oemservices.org/pdf_files/channels1.pdf

Remanufacturing: The Next Great Opportunity for Boosting U.S. Productivity

www.oemservices.org/pdf_files/IUbusinessHorizonsRemanufacturing.pdf

Why Classify Service Parts by Condition & Configuration?

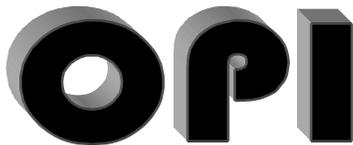
www.oemservices.org/pdf_files/ccc.pdf

Business Strategies for Capital Goods OEMs to Support the Service Parts Requirements of an Out-of-Production Product Line

www.oemservices.org/pdf_files/OOP.pdf

This newsletter is available as a PDF file
www.oemservices.org/newsletters.htm

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Attachment 5

**Commerciality Study
Otis Elevator**

**AIA PSC PPP Tiger Team
FAR Part 12 Commerciality Study
8/1/2005 Teleconference with Otis Elevator**

Participants: Mary Nadalny (Otis), Ed Will (Boeing), Bob Dickie (Parker), Ron Hayward (BAE)

Mary shared details of the commercial business model employed by Otis for the support and service of their elevators. Counters are installed on all Otis-maintained elevators that record significant events. "Start" cycles are primary life recording/usage events, *analogous to DoD onboard PDHM and engine life recorders*. Recurring site visit/elevator inspection schedules for Otis maintenance personnel are tailored to the number of "starts" recorded by the counters on the elevators.

Elevator sensors on the elevator controller unit are tied in to building phone lines and enable Otis personnel to query the elevator's sensor records remotely. These sensors are fairly sophisticated and can detect and record over 300 different fault codes in their memory that can be accessed via phone line modem.

This Otis system is called REM (Remote Elevator Monitoring), and REM conducts continuous fault monitoring, recording and notification. In the event of a major system failure (e.g., passenger stranded between floors, etc.), the REM will automatically dial into the Otis 1-800 line for immediate service center dispatch of the nearest available technician. Otis technicians also use the remote access capability to inspect REM data and troubleshoot systems. *Otis's sensors and REM systems are a commercial application of DoD's Sense and Respond Logistics concept.*

Otis also employs a system called OMMS (Otis Maintenance Management System) in the execution of their condition-based maintenance system. The OMMS counts significant events like starts, and also employs intelligence in determining pro-active maintenance activities and life-limiting some components (removal before failure) to ensure optimal elevator reliability and availability, (and Otis customer satisfaction and revenue). OMMS examines numerous external factors to optimize their maintenance investment decision, e.g., if the elevator is the only elevator in the building or daily usage is predictably more or less than average (for example, a hospital operating on a 24/7 schedule vs. an office building operating on a 5 day 9 to 5 schedule) the OMMS will modify the condition-based maintenance schedule for the system. *The OMMS system is completely analogous to the DoD's RCM (Reliability-Centered Maintenance) program.*

Elevator maintenance is a competitive business, and Otis offers flexible and extensible O&M (Operations & Maintenance) contracts, but a fact of interest to this group is that Otis always seeks at least a 5 year term for their O&M agreements- interesting to this group because *this position is consistent with our Defense Industry position that longer-term contracts are needed to induce the contractor to invest with a contract timeline sufficient to realize an acceptable ROI (Return On Investment).*

Terms and conditions on Otis O&M contracts are *similar to defense PBL contracts*, with unscheduled maintenance and their condition-based maintenance always covered, and general maintenance service (e.g., lubrication) available. Everything but intentional misuse and abuse is covered under Otis' O&M agreements.

Otis' pricing for their O&M contracts can be provided under FFP (Firm Fixed Price) conditions or under a "number of cycles" construct that is *completely analogous to one of OSD's Top 5 PBL metrics - a Cost Per Unit Of Usage arrangement* - although within DoD the usage more likely be "time on wing", "tread miles", "engine starts", etc.

In constructing their O&M agreements Otis demonstrates an impressive command of the factors that can adversely or positively affect the profitability and competitiveness of their offerings, and they analyze the equipment, the application, the number of stops (floors), the anticipated usage, and even the distance of the system from their nearest technician's locale. *The OSD analogy is the BCA (Business Case Analysis) that the services conduct in determining the true lifecycle cost of maintaining their equipment.*

Conclusions:

- Otis is an industry leader in a very competitive commoditized service business environment.
- Otis is successful because;
 - o they are committed to continuous improvement,
 - o they invest in innovation,
 - o they partner with their customers to develop win/win commercial O&M contracts that employ incentives that encourage Otis to maximize "system up" time by investing,
 - o they leverage catalogue pricing to make themselves easy to do business with,
 - o and they employ contracting periods of performance sufficient for Otis to realize the ROI from their investments.

Attachment 6

**Comparison of DOD PBL to Commercial Aviation MRO
By Edward L. Will
Boeing Integrated Defense Systems**



Comparison of DOD PBL to Commercial Aviation MRO

By Edward L. Will

Director of Acquisition Policy & e-Business

Boeing Integrated Defense Systems

Dec 2004

DOD PBL – Commercial MRO

- The Department of Defense has launched an aggressive program to revamp its logistics enterprise
 - One key facet is Performance Based Logistics
 - DOD policy encourages use of FAR Part 12, Commercial contracting, as a PBL acquisition strategy
- This summary will assess Commercial Aviation Maintenance, Repair and Overhaul
 - Analogies to DOD PBL objectives
 - Lessons learned, benchmarks & best business practices

Commercial Aviation MRO

- Scheduled checks of the airframe, engines, landing gears, components and cabin interiors, ranging from a brief preflight check to a D-check – an overhaul lasting up to six weeks for the complete aircraft;
- Repair & modification programs including engineering services;
- Cabin completion and life-cycle aircraft services for the fast-growing VIP aircraft market; and
- Combinations of these different MRO Services, which add up to total care packages like United Services' Total Support, SR Technics' Total Care or the Lufthansa Technik Total Technical Service TTS ®

– Source: Business Briefing: Global Purchasing & Supply Chain Strategies, 2004, NEW DEVELOPMENTS IN PURCHASING AND SUPPLY CHAIN STRATEGIES FOR THE AVIATION INDUSTRY by Dr. Jorg Rissiek & Joachim Kressel

Commercial MRO Contracting Examples

- TBD – *need BCA CAS input*
 - Spares ordering
 - Short term repairs, modifications and support
 - Total life cycle support contracts
 - Length of contract
 - Payment terms (e.g., “\$ per operating hour”)
 - Scope
 - Other unique provisions ...

Military Aircraft MRO

Wake-up call to a silent revolution?

By Manuel Magalhaes, EADS Programme Manager

“Two central concepts are emerging. First, adopting separate procurement approaches for large and smaller MRO programmes and for commodity and other low risk service provision. Second, MoDs want to adopt a through-life approach to programmes covering both aircraft acquisition and in-service support cost reductions.

“The global trend is fueled also in part by the need for MoDs cost reductions, lack of funding, political pressures to create more public private partnerships (PPP) between governmental and private companies as well as the increasing mobility of deployed forces all over the world.”

“Outsourced maintenance ... seems to be changing from isolated Time & Material contracts to more integrated MRO services and solutions. In this respect the military client is becoming more inclined to follow the same path as many airlines have done and still do ... Assured Availability and Power by the Hour (PBTH).

Examples

- FAR Part 12 has already been used extensively for military MRO related contracts, ranging from components and subsystems, up to full depot maintenance and logistics support
 - APU's
 - Engines
 - C-32 and C-40
 - KC-135 PDM
 - KC-10 CLS

DOD Policy

- FAR Part 12 is the preferred PBL contract acquisition method
- Commercial derivative aircraft, engines and COTS subsystems and components are clear areas of application
- PBL scope parallels commercial aviation MRO marketplace
 - Service ... of a type ... that is commercially based
- Issues:
 - FAA certified repair facilities?
 - Commercial vs. military specifications and standards?
 - Determining price reasonableness through either competition or market survey & analysis

Recommendation: Have DPAP issue a policy determination that recognizes the inherent commerciality of MRO-type efforts, making military aircraft and systems candidates for FAR Part 12

MRO Market

- 2002 Market Study and Forecast
- 2003 Update
- 2004 Forecasts for World, North America and Europe

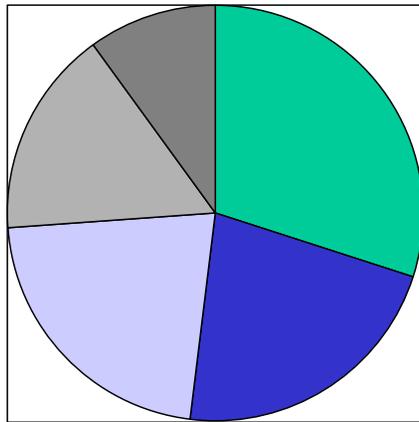
Commercial MRO Market Size

- A 2002 MRO market totaling \$37.8 billion
- A \$4.4 billion decline driven by 9/11/01
- Recovery to 2000-2001 levels by 2004
- 3 to 6% annual growth varying by region
- 2007 market of \$44.8 to \$50.8 billion, depending on economic scenarios
- Above average growth in Asia-Pacific region

– Source: Strand Associates, Inc. issued Apr 10, 2002

Other MRO Market Forecast

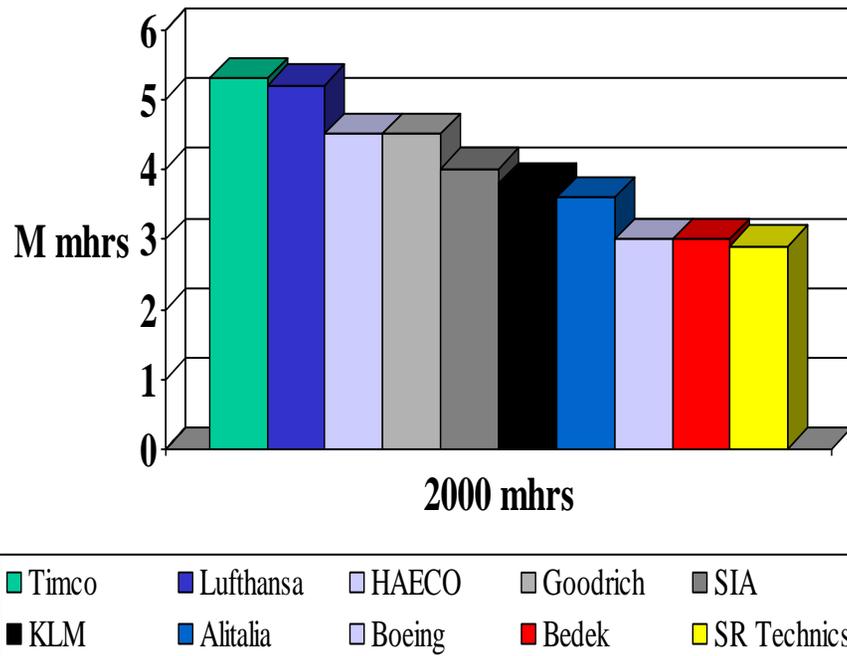
2002 MRO Market - \$34B



- \$34B in 2002 is a decline of \$2.0-2.5B since 2000
- Expect 5.3% compounded average growth rate (CAGR) from 2002 to 2012
- The active air transport fleet will expand from 15,200 today to 23,785 by 2012
- Commercial MRO will grow to \$56.9 billion by 2012
 - Aero Strategy Management Consulting, July 2002

MRO Market Characteristics

Airframe MRO 2000



- In North America, about 75% of the MRO services are performed by the airlines
 - American, Delta, United & Northwest
 - Independent maintenance companies hold about 15% of the market and OEM's hold 10%
- The leading global supplier of MRO service, including both airframe & engines, is Lufthansa with \$1.6B, followed by Air France with \$1.3B in 2000.

Source: Frost & Sullivan Aug 2002

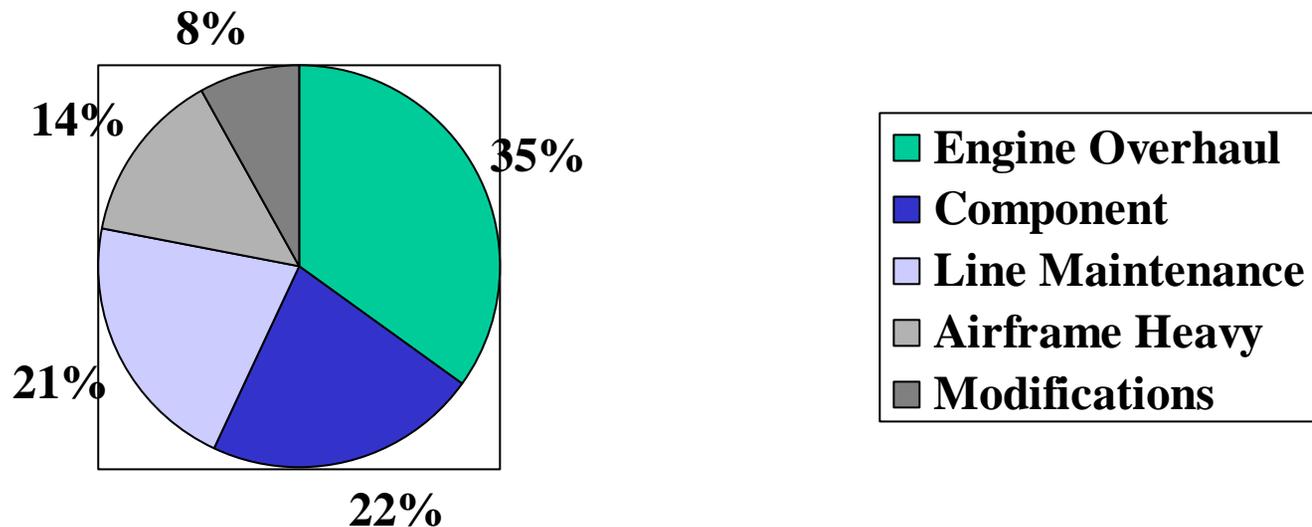
Commerciality of Performance Contracting Market Survey

2003 World Market Forecast

- The 2002 MRO market of \$37.8B declined 11.6% from 2001
 - Significant increase in grounded aircraft. Between Sep 2001 and Jan 2002, parked aircraft increased from 649 to 1,310 (102%)
 - Reduced aircraft utilization and elimination of most discretionary maintenance spending
- There were 15,583 active jet aircraft in Jan 2003
 - Source: BACK Aviation Solutions and Strand Assoc. Inc. 2003

2003 Commercial MRO Market

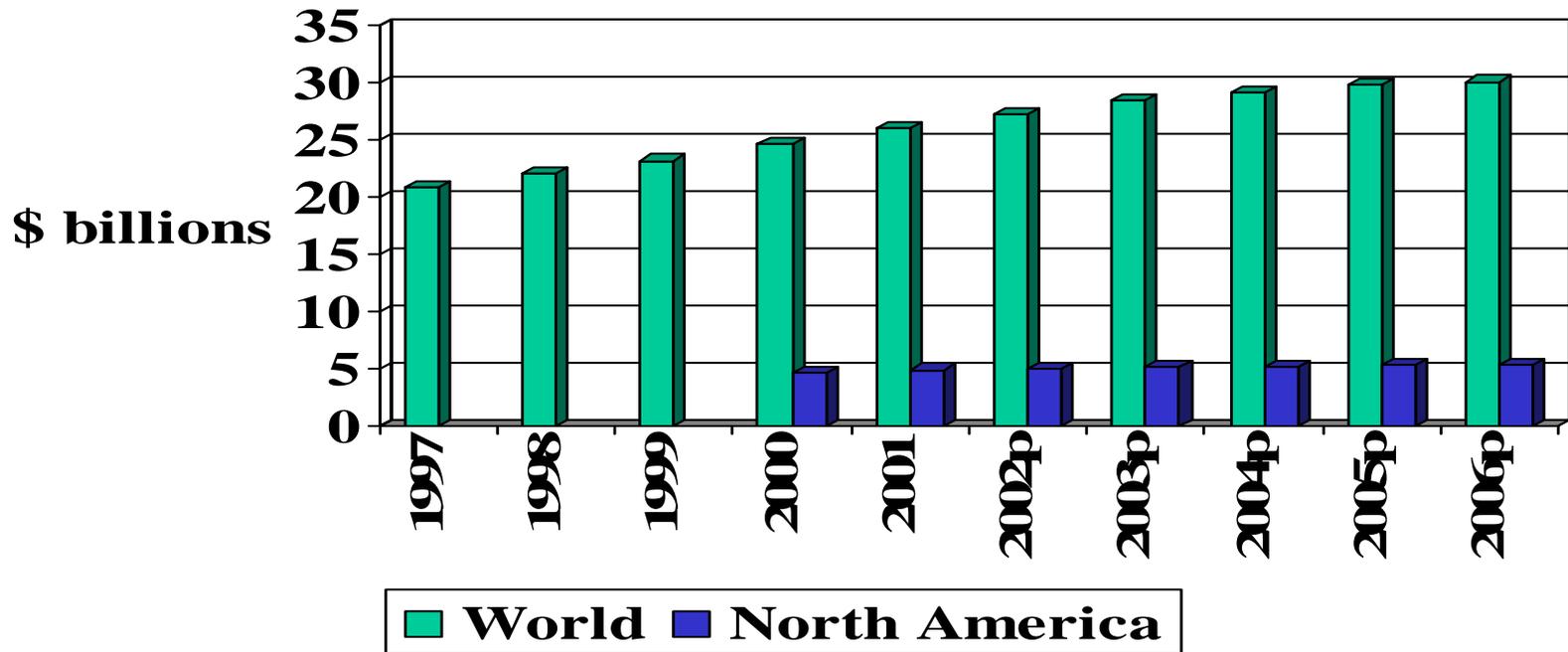
\$35.8 Billion



Source: COMMERCIAL AERO-ENGINE MRO
OUTLOOK - A NEW DAWN? Engine Yearbook 2005

World MRO Market

MRO Industry Growth & Projections

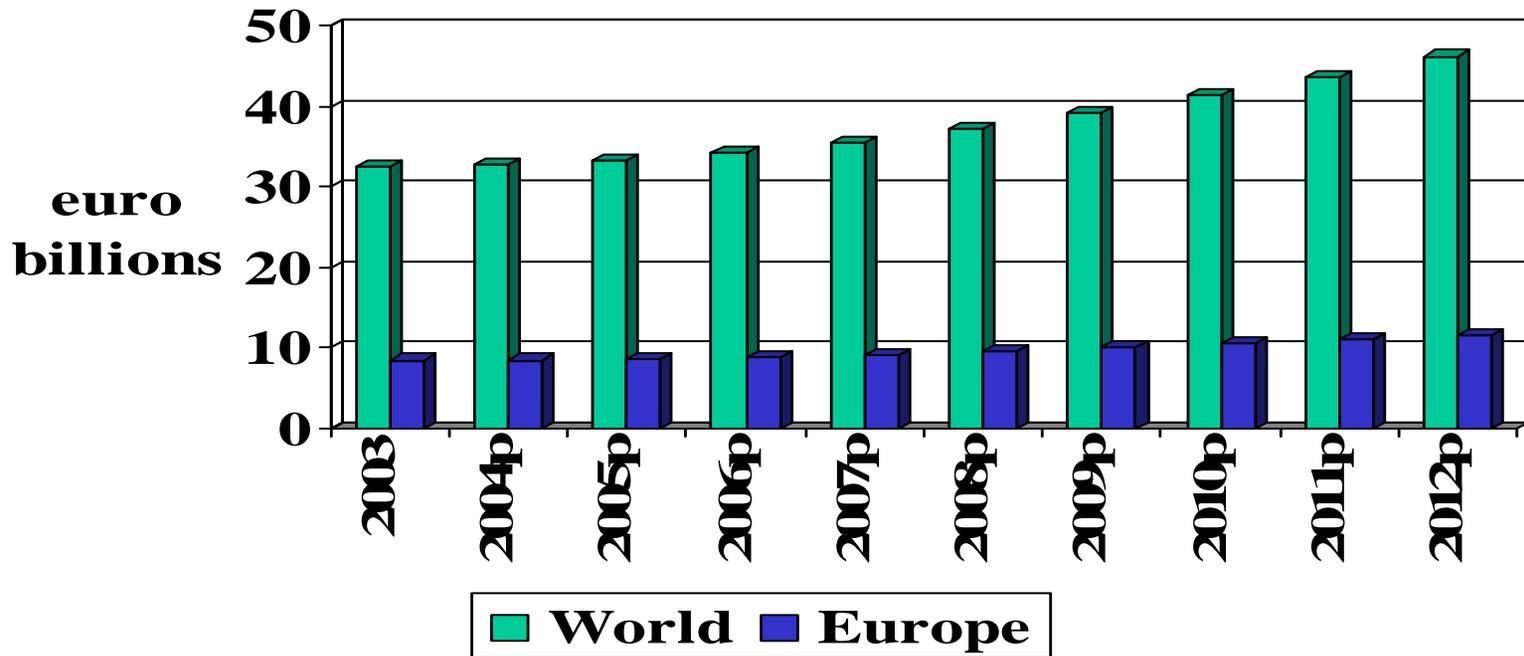


Source: Frost & Sullivan Aug 2002

Commerciality of Performance Contracting Market Survey

Updated World MRO Market

MRO Industry Growth & Projections



Source: Frost & Sullivan March 2004

Commerciality of Performance Contracting Market Survey

European Market

- European commercial MRO Market is EUR 8.5 billion, forecast to grow to EUR 11.5 billion by 2012
- Shift toward IT-based integrated information, process management and logistics systems is also anticipated to boost the overall capability and general reliability of MRO services.
- “Maintenance providers are being challenged to fulfill flexible short-term contracts and long-term service packages to grasp the benefit of the general tendency towards outsourcing. In particular, MRO providers who are able to provide total service packages ... should be able to gain maintenance contracts from the booming low-cost carrier sector. MRO business models of diversification include increasing horizontal integration through globalization and greater vertical integration through adding services at all levels of the supply chain.” – Manuel Magalhaes, Frost & Sullivan
- High performance in crucial areas such as turn-around time and quality, flexibility and technical capability in offered total service solutions as well as reduced costs.
 - Source: OUTSOURCING AND CONSOLIDATING TRENDS COMPEL COMMERCIAL MRO PROVIDERS TO RETHINK STRATEGIC PROCESS, London, Business Wire, 29 Jan 2004

Market Observations and Emerging Best Practices

Boeing Commercial Aviation Services

- [Global Customer Support](#): Boeing has developed a worldwide infrastructure to support airline schedules, resolve technical difficulties, provide quick access to technical information and deliver vital products and services when and where they're needed.
- [Spares and Logistics Support](#): Boeing operates the aviation industry's most comprehensive spare-parts sales and distribution network, maintaining inventory for about 500,000 different types of parts to support the worldwide fleet.
- [Maintenance and Engineering Services](#): Commercial Aviation Services develops, manages and delivers the vast amount of technical information needed for fleet maintenance and engineering support.
- [Fleet Enhancements and Modifications](#): Commercial Aviation Services can help airlines modify aircraft configurations, enhance fleet performance and improve cabin amenities.
- [Flight Operations Support](#): Commercial Aviation Services provides full support for airline flight operations, including innovative information-management solutions and a global training network.

MyBoeingFleet.com

Currently, ***MyBoeingFleet.com*** offers registered users access to volumes of technical data, including:

- Engineering Drawings
- Maintenance Documents
- PART Page (Spare parts online ordering system)
- Products Standards
- Flight Operations
- FLEET TEAM Digest and Resolution Process (tracking and prioritizing resolution of in-service issues)
- Spares Provisioning Services
- Data and Services Catalog
- Fleet Reliability Statistics (Fleet Inservice Reports)
- Boeing Digital Profile Drawings
- Technical Media Tracking
- Online and e-mail notices of new service bulletins by airplane model

MRO Market Segmentation

- **Airframe Heavy Maintenance** - Maintenance that is too complex or time consuming for being performed as Line Maintenance. This is basically C- and D-checks.
- **Conversion & Modification** - Airframe conversions, avionics, in-flight entertainment retrofits & interior modifications
- **Engine Overhaul** - Engine maintenance, repair, overhaul, parts & accessories
- **Component Maintenance** - Regular check, maintenance and test of component, and component logistics to airlines, hangers and shops of MRO companies
- **Line Maintenance** - Short cyclic and frequent maintenance to aircraft at airport stations – pre-flight and daily checks, including A, B and overnight checks.

Source: Frost & Sullivan March 2004

Commerciality of Performance Contracting Market Survey

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