

Department of Defense (DoD) Commercial-Off-the-Shelf (COTS) Pricing Analysis

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ABSTRACT

The Naval Center for Cost Analysis (NCCA) partnered with the Department of Defense (DoD) Enterprise Software Initiative (ESI) to periodically receive commercial-off-the-shelf (COTS) software orders with the intent of improving COTS software cost estimating. As of today, more than 250,000 orders from the Army, Navy, Marine Corps, Air Force, and other federal entities have been recorded. Together, these represent over six billion dollars in sales.

Respective prices for COTS software orders are filtered by product descriptions, which are categorized as licensed products, maintenance and support efforts, or services. In this way, NCCA can create distributions as a means of verifying the reasonableness of COTS software prices and for establishing ranges of uncertainty.

This paper will focus on NCCA's analytical efforts, significant results and findings, and areas of future study.

KEYWORDS

COTS, end user agency or service, vendor, reseller, licensed product, maintenance and support, service

1.0 INTRODUCTION

NCCA's research and analysis have revealed notable findings such as the existence of price fluctuations across multiple end users (e.g., the Armed Services) as well as within a single entity. In addition, there appears to be a consistent relationship between the price of a licensed product and the price of its accompanying maintenance and support effort. DoD ESI also appears to offer better savings than other COTS software providers, including the General Services Administration (GSA) and commercial vendors.

2.0 PAST EFFORT

2.1 What is the DoD ESI?

As stated in the article titled, *DoD Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts*, "The DoD ESI is a joint Information Technology (IT) Strategic Sourcing Initiative of the DoD Chief Information Officer (CIO). Now in its 17th year, with a successful record of collaboration among the DoD Components, ESI seeks to reduce the cost and risk of acquiring commercial software. The ESI's joint team of experts – typically Software Product Managers (SPMs) and Contracting Officers (KO) from the three Military Departments and the Defense Information Systems Agency – consolidate requirements and negotiate with commercial software publishers, hardware sellers, and IT service providers. ESI offers vetted terms and conditions (T&C) and reduced pricing compared to GSA's IT schedule. Given that one of NCCA's missions is to improve the accuracy, credibility, and completeness of independent cost estimates, ESI data is a rich resource for analyst use in comparing commercial software prices."

2.2 Consolidated Database Development

As mentioned in the article previously cited, "In 2014, the SPMs began the development and sustainment of a relational Structured Query Language (SQL) database. Its purpose was to help manage Enterprise Software Agreements (ESAs) and produce business intelligence on software purchased through ESI. At six-month intervals, this growing database and its contents

are shared with NCCA. The consolidated purchase price-paid database covers price history for dozens of software publishers, hundreds of COTS titles, thousands of transactions, and billions of dollars as collected and entered into the SQL database.”

3.0 PRESENT EFFORT

3.1 Database Snapshot

As of May 19, 2015, the database consists of 254,122 COTS software orders. These data points represent 17 end user agencies or services, 38 vendors, and 47 resellers. To clarify, the vendor (or publisher) is the Original Equipment Manufacturer (OEM), such as Microsoft or Oracle, which owns the intellectual property (IP). The reseller is the vendor’s sales channel that is awarded to sell the products under a blanket purchase agreement (BPA). There is a benefit to associating the purchasing to a reseller. Vendors may not necessarily sell directly; therefore, price benchmarking can be conducted between vendors’ sales channels.

3.2 Normalization

With the NCCA Joint Inflation Calculator (JIC), prices have been normalized to base year 2016 using the raw indices of Other Procurement, Navy (OPN). Because the prices have been negotiated for each of the years of the contract’s period of performance, outlays have not been applied. Prices represent actual expenditures.

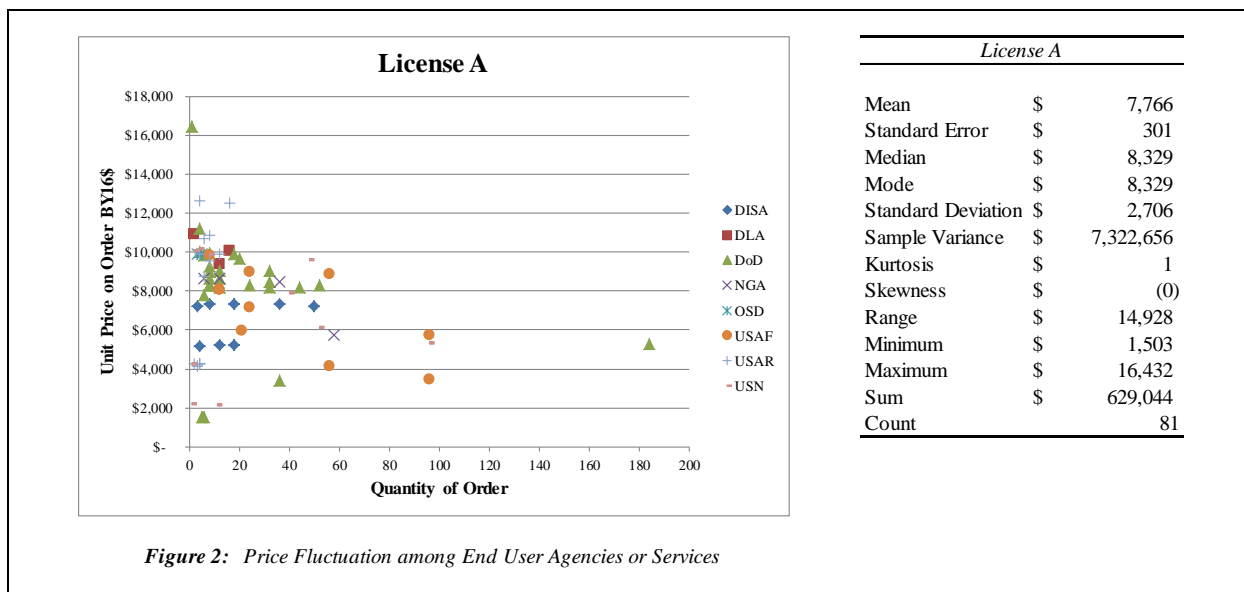
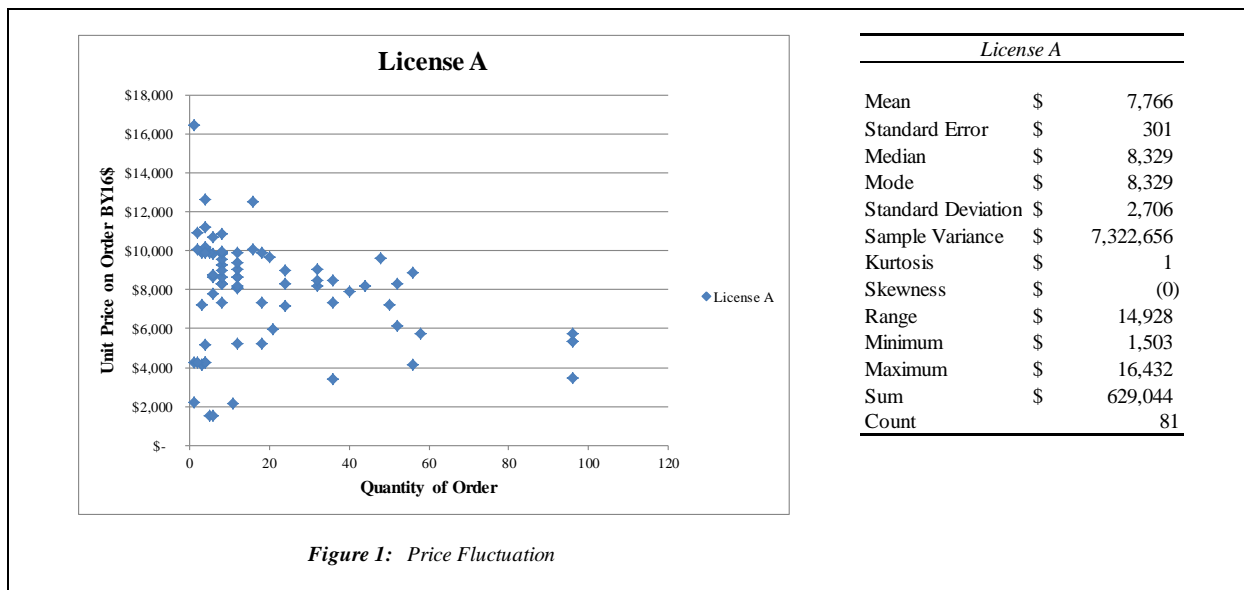
3.3 Product Description Categories

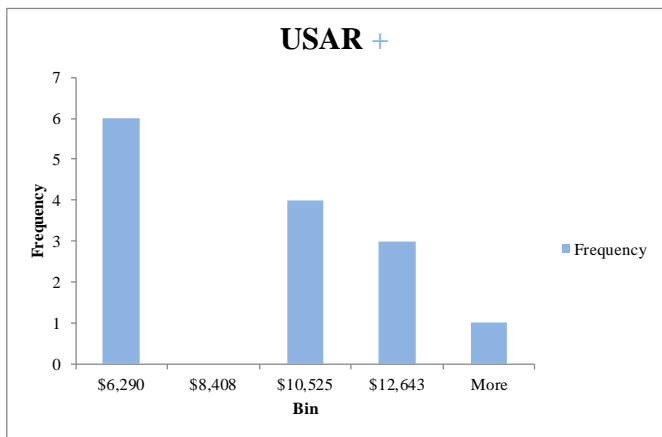
In sifting through the COTS software orders, prices have been filtered by product description. Each product description was categorized as a licensed product, maintenance and support effort, or a service. The DoD ESI defines a license as a set of rights granted by a publisher to a buyer for use of the publisher’s software. Licenses may be purchased as either perpetual or as an annual subscription. Maintenance and support is known as a standard vendor offering that entitles a customer to ongoing development and delivery of software bug fixes and product upgrades. A service is defined as expertise from a vendor that enables an organization to develop, manage, or optimize their system; a vendor may offer additional personnel for training, consulting, etc.

3.4 Price Fluctuation

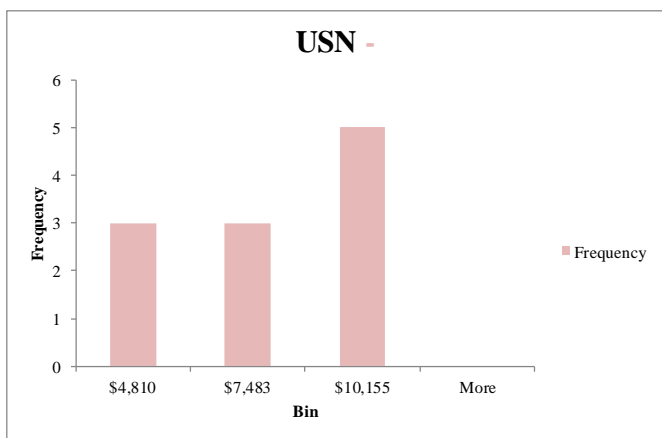
NCCA’s research and analysis fixated on a particular licensed product of a particular vendor. For example, “Vendor A” has 19,215 data points, and of these, 186 refer to a particular product, “Product A.” Furthermore, 122 of these “Vendor A, Product A” data points fall under the category, “licensed product.” Not all of these licensed product data points are usable: Eight are without a unit price on order and one appears questionable due to an abnormally high unit price on order. Finally, “Product A” has two license types: “License A” and “License B.” Of the 113 usable data points, 81 are considered “License A.” The two license types are differentiated by how the software will be used by the licensee.

Consider *Figure 1*. The image illustrates the “Vendor A, Product A, License A” data points. Now consider *Figure 2*. The image depicts the variation in prices among multiple end user agencies or services. More specifically, in *Figure 3*, the fluctuation in prices is revealed within a single end user agency or service.





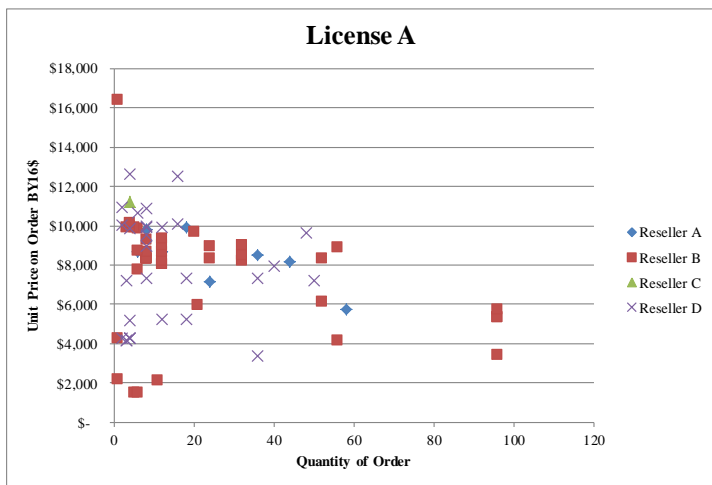
Bin	Frequency	
\$ 6,290	6	43%
\$ 8,408	0	0%
\$ 10,525	4	29%
\$ 12,643	3	21%
More	1	7%



Bin	Frequency	
\$ 4,810	3	27%
\$ 7,483	3	27%
\$ 10,155	5	45%
More	0	0%

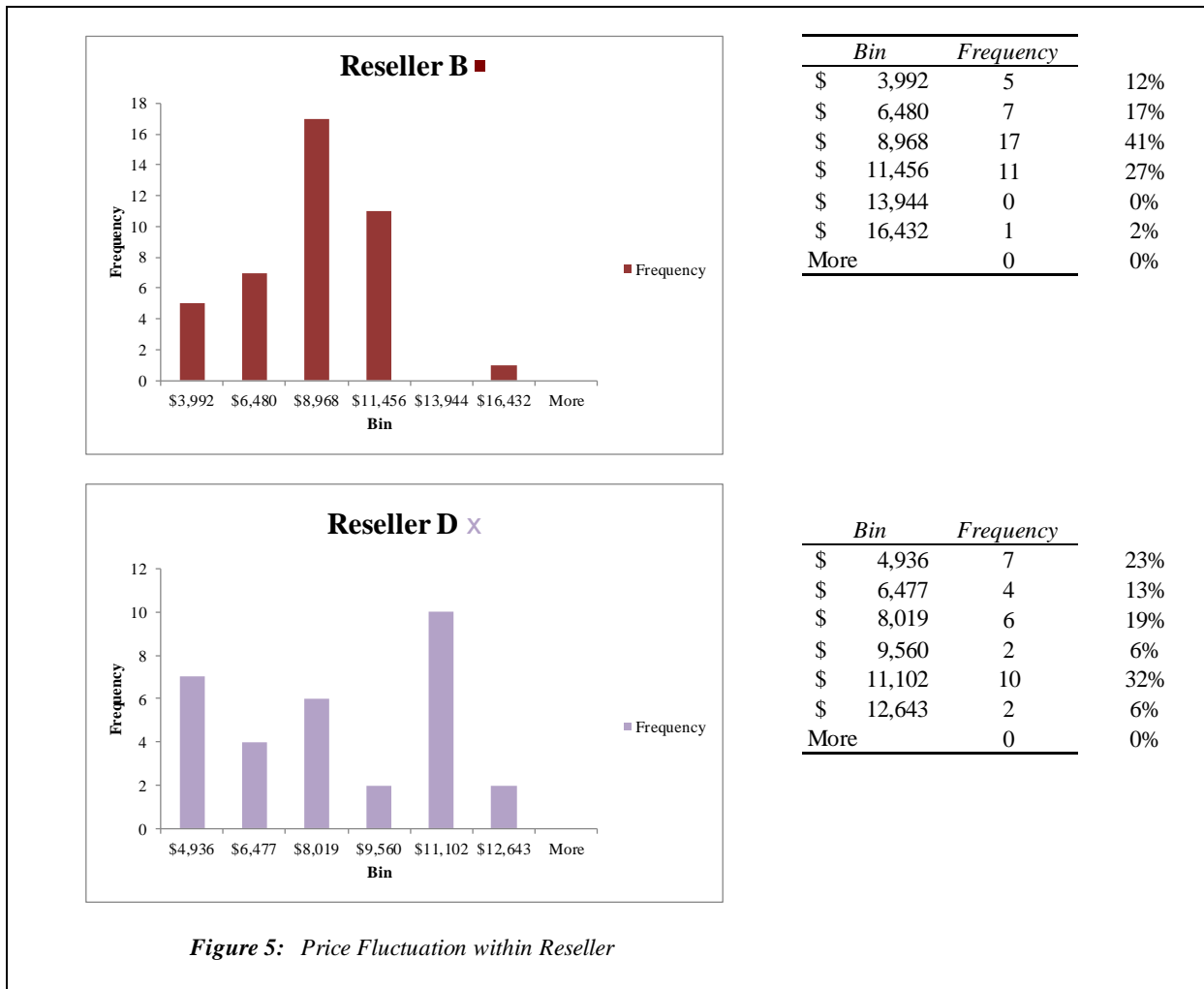
Figure 3: Price Fluctuation within End User Agency or Service

Price fluctuation occurs among multiple resellers and within a single reseller as well. Figure 4 and Figure 5 are analogous to Figure 2 and Figure 3, respectively.



License A		
Mean	\$	7,766
Standard Error	\$	301
Median	\$	8,329
Mode	\$	8,329
Standard Deviation	\$	2,706
Sample Variance	\$	7,322,656
Kurtosis	\$	1
Skewness	\$	(0)
Range	\$	14,928
Minimum	\$	1,503
Maximum	\$	16,432
Sum	\$	629,044
Count		81

Figure 4: Price Fluctuation among Resellers



3.5 Maintenance and Support

As mentioned previously, maintenance and support refers to a set of services a publisher can sell to a customer for the ongoing development and delivery of software bug fixes and product upgrades. NCCA’s research and analysis shows a consistent relationship between the price of maintenance and support and the price of a licensed product. Consider *Figure 6*. The image reveals that 18% to 24% of the price of a licensed product is equal to the price of its associated annual maintenance and support. The ratio is consistent across various end user agencies or services, vendors, resellers, licensed products, and license types. The finding also holds true across sources (e.g., DoD ESI, GSA, and the vendor). GSA’s prices show that 22% of the price of a licensed product is equal to the price of annual maintenance and support. The same relationship can be seen in prices provided by the vendor. See *Figure 7*.

Vendor Name	Reseller Name	End User Agency or Service	Product Description	Category	Quantity of Order	Unit Price on Order BY16\$	Total Price on Order BY16\$	Price of M&S* Price of LP**
Vendor A	Reseller D	USAR	Product A, License A	Licensed Product	16	\$ 12,511	\$ 200,171	18%
				Maintenance and Support	16	\$ 2,252	\$ 36,031	
Vendor A	Reseller D	USAR	Product A, License B	Licensed Product	50	\$ 214	\$ 10,678	18%
				Maintenance and Support	50	\$ 38	\$ 1,922	
Vendor A	Reseller C	USAR	Product A, License B	Licensed Product	100	\$ 229	\$ 22,863	22%
				Maintenance and Support	100	\$ 51	\$ 5,055	
Vendor A	Reseller D	USN	Product A, License A	Licensed Product	8	\$ 9,919	\$ 79,349	24%
				Maintenance and Support	8	\$ 2,361	\$ 18,890	

*Maintenance and Support
**Licensed Product

Vendor Name	Reseller Name	End User Agency or Service	Product Description	Category	Quantity of Order	Unit Price on Order BY16\$	Total Price on Order BY16\$	Price of M&S Price of LP
Vendor B	Reseller E	USN	Product B	Licensed Product	160	\$ 814	\$ 130,288	22%
				Maintenance and Support	160	\$ 179	\$ 28,663	
Vendor B	Reseller E	DLA	Product C	Licensed Product	138	\$ 3,419	\$ 471,867	22%
				Maintenance and Support	138	\$ 752	\$ 103,811	

Vendor Name	Reseller Name	End User Agency or Service	Product Description	Category	Quantity of Order	Unit Price on Order BY16\$	Total Price on Order BY16\$	Price of M&S Price of LP
Vendor C	Reseller F	USN	Product D	Licensed Product	10	\$ 8,443	\$ 84,433	20%
				Maintenance and Support	10	\$ 1,688	\$ 16,884	

Figure 6: Maintenance and Support

GSA's Price	Vendor Name	Reseller Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16\$	Total Price on Order BY16\$	Price of M&S Price of LP
		Vendor A	Reseller D	Product A, License B	Licensed Product	50	\$ 269	\$ 13,432
				Maintenance and Support	50	\$ 59	\$ 2,955	

Vendor's Price	Vendor Name	Product Description	Category	Quantity of Order	Unit Price on Order BY16\$	Total Price on Order BY16\$	Price of M&S Price of LP
	Vendor A	Product A, License A	Licensed Product	1	\$ 23,000	\$ 23,000	22%
			Maintenance and Support	1	\$ 5,060	\$ 5,060	
	Vendor A	Product A, License B	Licensed Product	25	\$ 460	\$ 11,500	22%
			Maintenance and Support	25	\$ 101	\$ 2,530	
	Vendor A	Product A, License B	Licensed Product	50	\$ 437	\$ 21,850	22%
		Maintenance and Support	50	\$ 96	\$ 4,807		

Figure 7: Maintenance and Support Across Sources

3.6 Price Comparison

Figure 7 not only shows the consistent relationship between the price of a licensed product and the price of its associated maintenance and support, but the difference in prices amongst DoD ESI, GSA, and the vendor. Consider Figure 8 where each source's order quantity is equivalent. A quote from this particular vendor is a great deal more expensive than those prices found in DoD ESI's database.

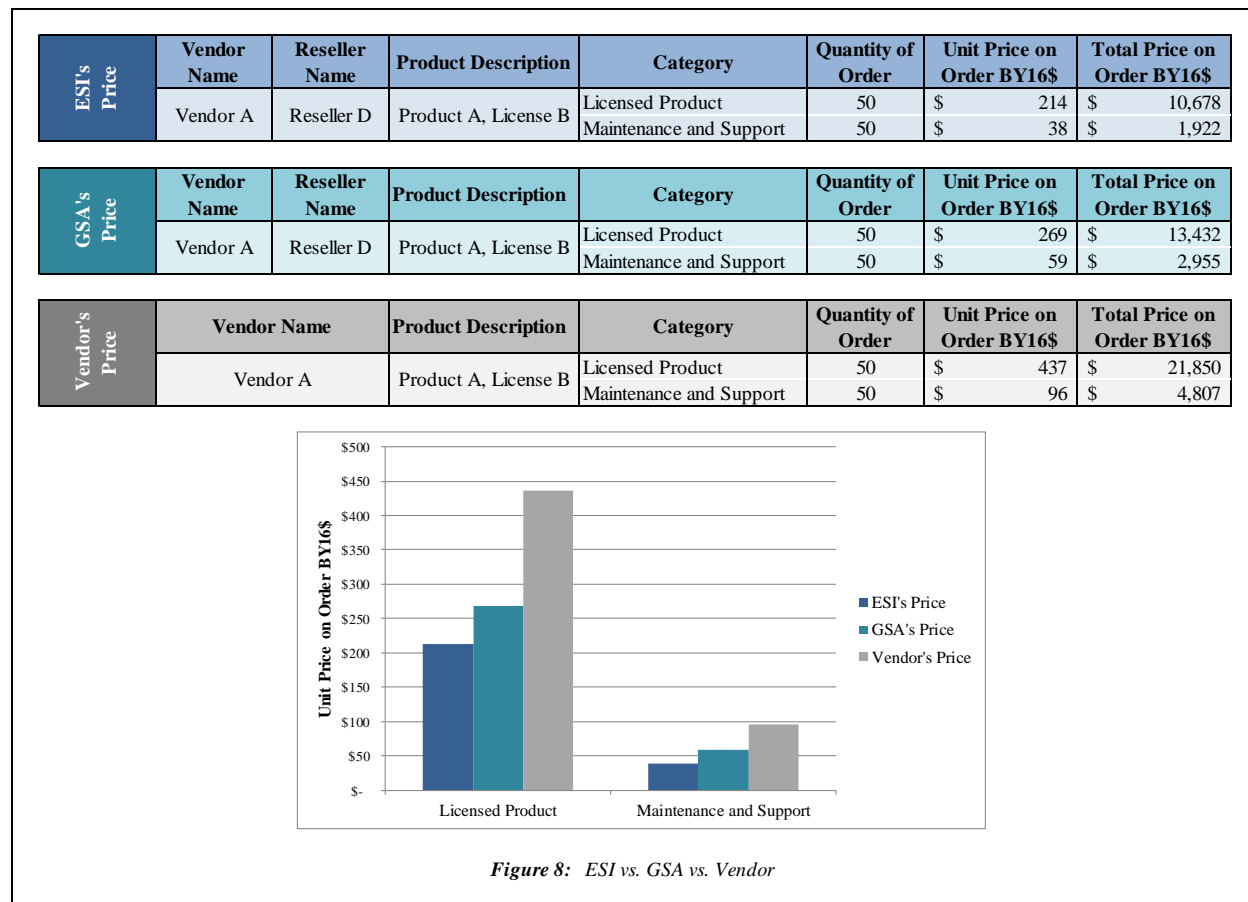


Figure 8: ESI vs. GSA vs. Vendor

4.0 FUTURE EFFORT

Along with each COTS software order are terms and conditions under which a contract is established. They include requirements and expectations on both the part of the seller and the buyer. NCCA and DoD ESI discussed how to establish a relationship between the price of an order and its T&C. Such T&C include warranty clauses, transfer rights, third-party software, self-audit rights, click-wrap licenses, automatic renewals, termination rights, governing law, order of precedence, installation restrictions, and virtualization. DoD ESI is currently implementing a database change to indicate which T&C apply to each COTS software order.

NCCA also plans to expand its research and analysis to multiple vendors and licensed products and use this research and analysis to inform future cost assessments and cost estimates for COTS products covered by DoD ESI.

Reference

Anderson, Ian. Groce, Floyd. McMullan, Dan. Wallshein, Dr. Corinne. "DoD Historical Purchase Prices Database: An Unprecedented Tool for Software Buyers and Cost Analysts." *Armed Forces Comptroller Volume 61, Number 1* 8 January 2016: 22 – 27.