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Optimizing Computing Power

Computing Power Continues to Proliferate Rapidly. Companies Must Now Bring The Cost of Adding "More Power" Under Control.

By Alan B. Bibergall

Moore's Law, which was first introduced in 1965 and theorized that computing power per unit cost would double every 18 months, has been largely and consistently validated for some 40 years.

Companies of every size and shape have jumped on Moore's bandwagon, investing in equipment that is more powerful, much smaller and less expensive than the stuff they previously bought. Couldn't afford not to, right? Can't get left behind.

Well, sort of. While companies ought to take advantage of technology advancements, they also need to adopt a more comprehensive, systematic, financially based decision model. Decisions need to be made—not on the comparative cost, speed and size of a new technology versus an older technology—but rather on the total cost of ownership under various scenarios. And that requires looking at more than just *what to buy*; it means figuring out *when to buy* and *how to buy*. Companies must identify that point in time (the technology line intersect—Exhibit 1) when an existing infrastructure should be replaced by smaller, more powerful and less costly replacement technology. If they do it right, they will optimize the computing power of their data center.

Reading Between The Lines

Exhibit 1 plots the value curves of existing (ETV) and replacement (RTV) technology scenarios. The "value" axis indicates the value of the respective infrastructure at specific points in time. The red line representing new infrastructure shows a negative value in the first 15 months. That does not mean that the technology isn't wonderful; it means that because the existing technology is still working efficiently, an incremental investment in new infrastructure within the first 15 months would be inefficient. The company would have a negative return on that new investment. The value of the existing technology is more beneficial in months 1-21. At month 21, technology replacement should begin. That means that the planning for the replacement must commence at month 15-18, depending on the company's planning protocols.

The optimal time to replace is month 31, where the gap between new and existing technology is the greatest. Beyond month 31, investment in replacement technology, while still positive, is not optimized.

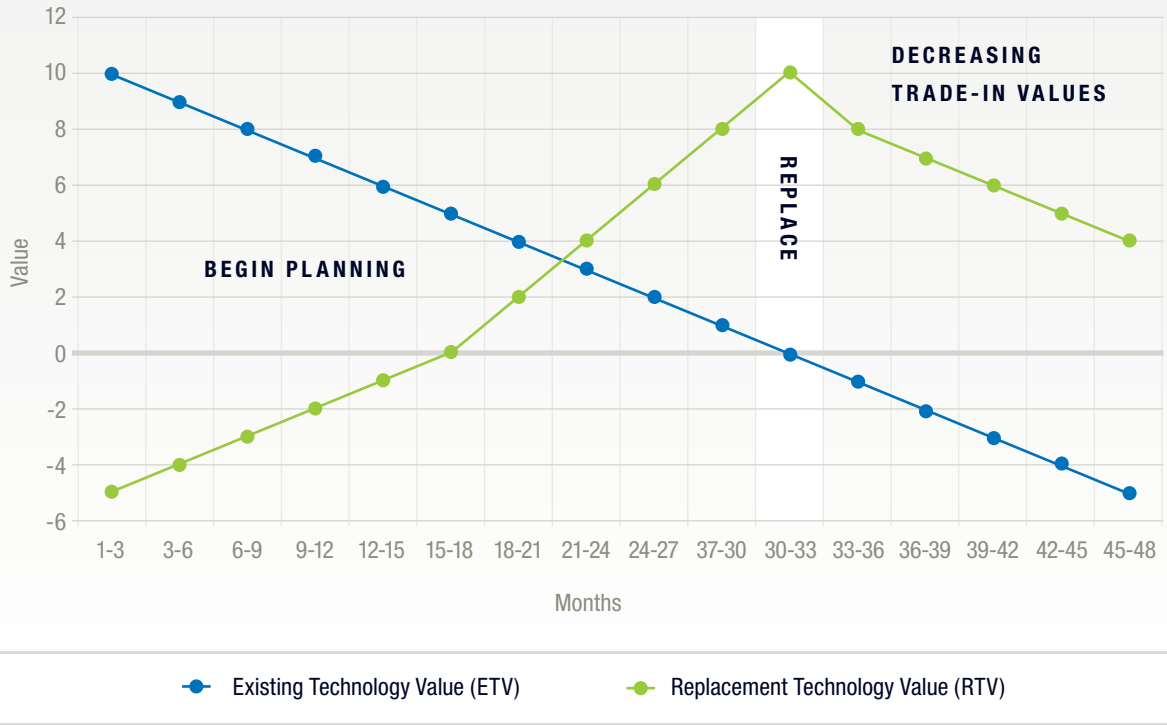
Components of Value: Power, Size and Cost

The value of both existing and replacement infrastructure is a function of their respective power, size and cost. Power is measured by M Value or processing capacity (e.g. single core versus dual core microprocessors). Size refers to the rack space and energy requirements, or RU. Cost has three pieces to it: the price of the equipment, the anticipated maintenance costs, and the trade-in value of the equipment.

Existing Technology Value (ETV) = M Value + Space + Power + maintenance

Replacement Technology Value (RTV) = M Value + Space + Power + maintenance – trade-in value

EXHIBIT 1: CHARTING THE TECHNOLOGY LIFECYCLE



General Characteristics of ETV and RTV

While every company's situation is different, general characteristics related to old and new technologies exist.

EXHIBIT 2: COMPARING CHARACTERISTICS OF OLD AND NEW TECHNOLOGIES

ETV

- Relative computing capability (M value) of existing technology decreases over time.
- Relative space requirements (RU) of existing technology are larger than space requirements of potential replacements. Additional rack space and/or floor space is utilized for net new adds to the data center
- Existing larger servers require more power and greater cooling requirements over time.
- 2nd and 3rd round maintenance costs increase substantially to a point where the 3-year maintenance cost savings alone can justify the replacement of aging technology.

RTV

- New equipment cost is usually less than one-half the original equipment cost.
- Computing power (M value) is greater, and in a smaller form factor (RU).
- Targeted replacement units typically require less power.
- Three-year maintenance costs on replacement technologies are significantly less expensive relative to older equipment.
- Incremental net new adds to the data center can most often time be placed in rack vacancies resulting from well-planned consolidation.

Simple Process, Major Impact

The process is fundamental and simple, with only three steps: Inventory the existing data center, identify suitable replacement units, and finally, do the math.

STEP 1
Inventory The Existing Data Center

- Model type
- Host name (if available)
- # processors
- RAM
- System M value
- RU
- Project maintenance costs for next 3 years

STEP 2
Identify Suitable Replacement Units

- Identify replacement units with = > M value
- Identify replacement units with = < RU
- Project next 3 year maintenance costs of replacement units
- Calculate trade in values of existing technologies

STEP 3
Do The Math

- Project 3 year business as usual costs (ETV)
- Project 3 year RTV costs
- Review financing options (buy vs. lease)

Exhibit 3 illustrates the process. Here is an actual analysis done to one of the data centers of a major financial services company. If the company executes the replacement strategy effectively, they will optimize their computing power: they will have more powerful technology, it will take up less space and use less power, and it will save them $381,000.

EXHIBIT 3: DO THE MATH (DATA CENTER, MAJOR FINANCIAL SERVICES COMPANY)

System Model	"M" Value	RU	3 Year Maintenace Cost	Replacement	Replacement "M" Value	RU	Total Net Price and 3 Year Maintenance
E3500	17100	15	$21,287.04	V440	18700	4	16069.555
E3500	25200	15	$27,171.75	V440	35000	4	20207.728
E3500	17100	15	$21,287.04	V440	18700	4	15371.455
E4500	25600	8	$41,568.24	V440	35000	4	20207.728
E3500	8700	15	$17,833.17	V440	18700	4	14620.855
E4500	33100	8	$41,568.24	V440	35000	4	18844.108
E3500	8700	15	$17,833.17	V440	18700	4	13029.565
E4500	25200	8	$35,683.53	V440	35000	4	17876.428
E3500	19600	15	$27,171.75	V440	35000	4	17876.428
E4500	19600	8	$35,683.53	V440	35000	4	17876.428
E3500	25200	15	$27,171.75	V440	35000	4	20207.728
E3500	25200	15	$27,171.75	V440	35000	4	20207.728
E4500	17100	8	$29,798.82	V440	18700	4	15371.455
E4500	25600	8	$41,568.24	V440	35000	4	20207.728
E6500	62500	38	$58,892.70	V890	72500	17	59074.03
E3500	17100	15	$21,287.04	V440	18700	4	14620.855
E3500	25200	15	$27,171.75	V440	35000	4	20207.728
E3500	33100	15	$34,455.00	V440	35000	4	20207.728
E6500	48300	38	$52,146.00	V890	77500	17	59074.03
E10K	164,900	38	$438,000.00				
Domain	25600	0		V490	39300	5	28892.35
Domain	25600	0					
Domain	62500	0		V890	95000	24	59074.03
Domain	25600	0		V490	39300	5	28892.35
Domain	25600	0		V490	39300	5	28892.35
	809,000	**327**	**$1,044,750.51**		**860,100**	**141**	**$566,910.37**

Comparative Analysis

M Value of existing data center	809,000	RU of replacement units	141	Estimated gross cost savings	$477,840
M Value of replacement units	860,100	RU reduction	186	Estimated data migration costs[1]	($96,6000)
M Value Increase	51,100	ETV Cost	$1,044,750	Estimated net cost savings	$381,240
RU of existing infrastructure	327	RTV Cost	$566,910		

[1] *23 applications X 24 hours/app X $175 professional services rate*

Although technology advocates feel compelled to behave according to Moore's Law, companies need to add a financial management corollary to the law in order to optimize their computing power. With the right mindset and transition plan, companies can adopt contemporary technology and make their financial managers a whole lot happier.

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