

---

# Software as a Service: A Primer on SaaS Metrics & Benchmarks

December 2017

## SHEA & COMPANY

### **Boston**

200 Clarendon Street, Floor 25  
Boston, MA 02116

Peter M. Falvey  
Managing Director  
617.896.2251  
pfalvey@shea-co.com

Michael H.M. Shea  
Managing Director  
617.896.2255  
mshea@shea-co.com

Jeffrey G. Cook  
Principal  
617.896.2252  
jcook@shea-co.com

Brad E. McCarthy  
Principal  
617.896.2245  
bmccarthy@shea-co.com

Christopher J. Pingpank  
Principal  
617.896.2218  
cpingpank@shea-co.com

### **San Francisco**

601 Montgomery Street, Suite 2010  
San Francisco, CA 94111

Michael S. Barker  
Managing Director  
415.762.8101  
mbarker@shea-co.com

Misha Cvetkovic  
Vice President  
415.762.8104  
mcvetkovic@shea-co.com

# Shea & Company Overview

## People ■ Industry Expertise ■ Process Excellence

1

Firm focused exclusively on enterprise software

2

Offices in Boston and San Francisco

16

Professionals focused on the software industry

15+

Years of experience amongst our senior bankers

>60

Transactions completed representing billions of dollars in value

### Mergers & Acquisitions

- Sell-side and buy-side M&A advisory
- Divestitures
- Restructuring

### Private Placements & Capital Raising

- Late-stage venture, growth equity and buyouts
- Recapitalizations
- IPO advisory

### Corporate Strategy

- Corporate development advisory
- Balance sheet and capital structure review
- Fairness opinions



has received a significant investment from



Shea & Company served as the exclusive financial advisor to Gurobi Optimization



a portfolio company of



has been acquired by



Shea & Company served as the exclusive financial advisor to Perforce and Summit Partners

## Superior Outcomes

Shea & Company has advised on important transactions representing billions of dollars in value across the strategic acquirer and financial investor landscape with Clients in the U.S. as well as Canada, Europe and Israel



a portfolio company of



has received a strategic investment from



Shea & Company served as the exclusive financial advisor to MRI Software and GI Partners



a portfolio company of



has been acquired by




Shea & Company served as the exclusive financial advisor to SecureAuth and Toba Capital



has been acquired by



Shea & Company served as the exclusive financial advisor to ClearSlide



has been acquired by



Shea & Company served as the exclusive financial advisor to KDS




an affiliate of




has been acquired by



Shea & Company served as the exclusive financial advisor to Double-Take, Vision Solutions and Clearlake Capital



has acquired



Shea & Company served as the exclusive financial advisor to Vista Equity Partners



has received an investment from



Shea & Company served as the exclusive placement agent to OutSystems



a portfolio company of



has been acquired by




Shea & Company served as the exclusive financial advisor to Sovos Compliance and Vista Equity Partners




has been acquired by



Shea & Company served as the exclusive financial advisor to Secure Islands



has been acquired by



Shea & Company served as the exclusive financial advisor to LastPass



has been acquired by



Shea & Company served as the exclusive financial advisor to HP



a portfolio company of



has been acquired by

Shea & Company served as the exclusive financial advisor to Granicus



has been acquired by




Shea & Company served as the exclusive financial advisor to Bronto




has been acquired by




Shea & Company served as the exclusive financial advisor to Lacoon



has received an investment from




Shea & Company served as the exclusive financial advisor to Bomgar



NASDAQ:PSWJ

has been acquired by



Shea & Company served as the exclusive financial advisor to Pervasive

# Executive Summary: The Importance of Unit Economics

When we work with our software clients, a large part of the focus of preparation and buyer diligence is centered around unit economics. Understanding each metric explains a different facet of a business, but looking at unit economics as a whole can yield valuable insights into a business' ability to scale, achieve profitability and its long-term capital needs

## Commentary

### Inputs for Analysis of Unit Economics

- Not surprisingly, we view the components of life time value (retention rates, sales efficiency, gross margin and ARPA) as the building blocks of any recurring revenue business
  - Each of these metrics explains a different facet of a business (e.g. retention for how mission critical a product is and how loyal customers are, sales efficiency for how well the go-to-market engine is working) and it can be instructive to benchmark against other businesses
  - However, it can be difficult to consider any SaaS metric in isolation. While there is a wide universe of very valuable benchmarking data for key metrics, the reality is that each business is unique, and requires a holistic view of all metrics for appropriate context

### Output: Unit Economic Analysis

- We have found that looking at unit economics holistically is the best way to understand a business and can inform what the long-term profitability of a business can look like, how a business can scale and its long term capital needs
  - We rely on conventional, accepted metrics like customer lifetime value and payback periods, but also try to understand what happens to unit economics as a business starts investing heavily in growth
  - In practice, we have found that supplementing conventional metrics with business-specific analyses is important to account for the unique aspects of any business

## Key Metrics

### Inputs to Unit Economic Analysis

I. Retention Rates

II. Sales Efficiency / CAC

III. Gross Margin & Cost to Serve

IV. Average Revenue per Account

V. Lifetime Value

VI. Customer Payback and Profitability

VII. Scalability

VIII. High Retention & Sales Efficiency

# I. Retention Rates: Key Metrics and Benchmarks

We view retention measures as the single most important metric among all SaaS metrics, with gross \$, net \$ and customer retention metrics providing different perspectives on the health of the customer base

## Overview of Retention Metrics

### Gross \$ Retention Rate

- A conservative measurement of recurring revenue retention, calculating on an annualized basis the rate at which a given dollar of revenue is retained from year to year, without credit for upsells
- Includes deductions for cancellations, reductions and price cuts (most conservative methodology), without adding new sales or upsells, other than price increases for the same revenue cohort

$$\text{Gross \$ Retention \%} = 1 - \frac{(\$ \text{ACV Cancelled} + \$ \text{ACV Downsell})^n}{\$ \text{Total ACV}^{n-1}}$$

### Net \$ Retention Rate

- A measure of the overall change in the base of recurring revenue from one year to the next, including upsell, downsell (both inclusive of price changes), and cancellations
- Net \$ retention is the most common reported retention metric by public companies

$$\text{Net \$ Retention \%} = 1 + \frac{(\$ \text{ACV Upsell} - \$ \text{ACV Cancelled} - \$ \text{ACV Downsell})^n}{\$ \text{Total ACV}^{n-1}}$$

### Customer Retention Rate

- A measure of the % of individual customers or accounts retained in a given year
- Customer retention rate is also used to calculate the implied lifetime for use in LTV analysis

$$\text{Customer Retention \%} = 1 - \frac{\text{Customers Lost}^n}{\text{Total Customers}^{n-1}}$$

$$\text{Customer Lifetime (Years)} = \frac{1}{(1 - \text{Customer Retention \%})} \text{ or } \frac{1}{\text{Customer Churn \%}}$$

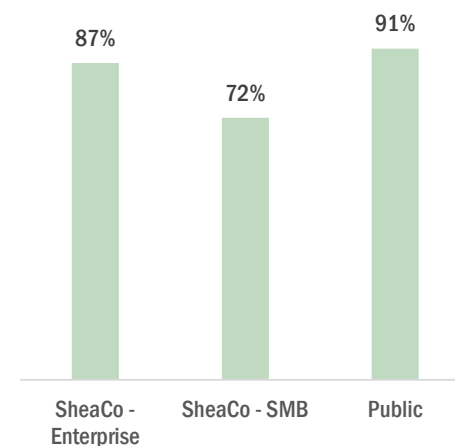
### Retention Rates vs. Renewal Rates

- For businesses with an average customer contract term of 1+ years, calculating all retention rates based only on the contracts up for renewal is a more accurate measure of retention. Example:

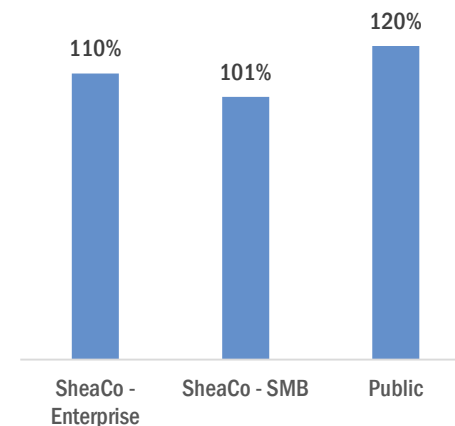
$$\text{Gross \$ Renewal \%} = 1 - \frac{(\$ \text{ACV Cancelled} + \$ \text{ACV Downsell})^n}{\$ \text{Total ACV up for Renewal}^n}$$

## Benchmarks

### Gross \$ Benchmarks



### Net \$ Benchmarks



Enterprise and SMB benchmarks from Shea & Company internal data

# I. Retention Rates: Example Calculation from an ACV & Customer Waterfall

## Example Calculation of Gross \$ and Net \$ Retention

### Customer Waterfall, ACV

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100	\$ 139
(+) New ACV Added	5	6	7	8	9	10	11	12	26	42
(+) Upsell ACV	5	6	7	8	9	10	11	12	26	42
(-) Downsell ACV	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(5)	(8)
(-) Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Ending ACV	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 207	\$ 139	\$ 207
Beginning Customers	120	121	124	128	134	141	150	160	120	134
(+) New	5	7	9	11	13	15	17	19	32	64
(-) Lost	(4)	(4)	(5)	(5)	(6)	(6)	(7)	(8)	(18)	(27)
Ending Customers	121	124	128	134	141	150	160	171	134	171

### Gross \$ Retention

Downsell ACV	\$ (1)	\$ (1)	\$ (1)	\$ (2)	\$ (2)	\$ (2)	\$ (2)	\$ (2)	\$ (5)	\$ (8)
Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Total Downsell & Cancel	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(4)	(13)	(16)
Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100	\$ 139
Quarterly Downsell & Cancel Rate	(3%)	(3%)	(3%)	(3%)	(3%)	(3%)	(2%)	(2%)	-	-
Annualized Rate (Quarterly x4)	(12%)	(11%)	(10%)	(13%)	(12%)	(10%)	(9%)	(9%)	(13%)	(12%)
Gross \$ Retention (1 - Annualized Churn Rate)	88%	89%	90%	87%	88%	90%	91%	91%	87%	88%

### Net \$ Retention

Upsell ACV	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 11	\$ 12	\$ 26	\$ 42
Downsell ACV	\$ (1)	\$ (1)	\$ (1)	\$ (2)	\$ (2)	\$ (2)	\$ (2)	\$ (2)	(5)	(8)
Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Total Upsell, Downsell & Cancel	2	3	4	4	5	6	7	8	13	26
Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100	\$ 139
Quarterly Upsell, Downsell & Cancel Rate	2%	3%	3%	3%	4%	4%	4%	4%	-	-
Annualized Rate (Quarterly x4)	8%	11%	14%	13%	14%	16%	17%	17%	13%	19%
Net \$ Retention (1 - Annualized Churn Rate)	108%	111%	114%	113%	114%	116%	117%	117%	113%	119%

### 1 Gross \$ Retention

- Gross \$ retention only factors in downsell (reductions in prior year spend) and cancellations

### 2 Net \$ Retention

- Net \$ retention factors in the total change in the existing customer base, and includes upsell, downsell, and cancellations

- Upsell/downsell typically includes positive/negative change in usage (e.g. seats), modules and functionality, as well as in price

### 3 Quarterly vs Annual Figures

- Annualized quarterly figures are useful to look at for historical trend analysis, though can be susceptible to fluctuations from seasonality

- Annual rates are calculated using the summation of the quarterly changes in amount as compared to the beginning value

# I. Retention Rates: Example Calculation from an ACV & Customer Waterfall cont.

## Example Calculation of Customer Retention

### Customer Waterfall, ACV

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
	Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100
(+) New ACV Added	5	6	7	8	9	10	11	12	26	42
(+) Upsell ACV	5	6	7	8	9	10	11	12	26	42
(-) Downsell ACV	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(5)	(8)
(-) Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Ending ACV	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 207	\$ 139	\$ 207
Beginning Customers	120	121	124	128	134	141	150	160	120	134
(+) New	5	7	9	11	13	15	17	19	32	64
(-) Lost	(4)	(4)	(5)	(5)	(6)	(6)	(7)	(8)	(18)	(27)
Ending Customers	121	124	128	134	141	150	160	171	134	171






























### Customer Retention

Customers Lost	(4)	(4)	(5)	(5)	(6)	(6)	(7)	(8)	(18)	(27)
Beginning Customers	120	121	124	128	134	141	150	160	120	134
Quarterly Cancel Rate	(3%)	(3%)	(4%)	(4%)	(4%)	(4%)	(5%)	(5%)	-	-
Annualized Rate (Quarterly x4)	(13%)	(13%)	(16%)	(16%)	(18%)	(17%)	(19%)	(20%)	(15%)	(20%)
Customer Retention (1 - Annualized Cancel Rate)	87%	87%	84%	84%	82%	83%	81%	80%	85%	80%
Implied Lifetime (1 / Annualized Cancel Rate)	7.5 yrs	7.6 yrs	6.2 yrs	6.4 yrs	5.6 yrs	5.9 yrs	5.4 yrs	5.0 yrs	6.7 yrs	5.0 yrs

### 4 Customer Retention











- Customer churn simply includes the number of lost customers in a given period, divided by the number of customers at the beginning of a period
- For some businesses (especially high velocity businesses with shorter lifetimes, or where customers on pilots are factored into an ACV waterfall), using an average of the beginning and ending customer counts in the denominator may be more appropriate
- Finally, for purposes of calculating LTV, the implied lifetime (expressed in years) is simply 1 divided by the annual cancel rate

# I. Retention Rates: Public Company Disclosures

Public Company Retention Disclosures								
Company	Source	Type	Calendar Year			YOY % Change		
			2014	2015	2016	Δ 2015	Δ 2016	2-Year Trend
 <b>alteryx</b>	10-K	Net \$	123%	122%	135%	(1%)	11%	
<b>APPDYNAMICS</b>	S-1	Net \$	121%	134%	123%	11%	(8%)	
 <b>Appian</b>	S-1	Net \$	107%	128%	112%	20%	(13%)	
 <b>BLACKLINE</b>	S-1	Net \$	118%	120%	116%	2%	(3%)	
 <b>box</b>	10-K	Net \$	126%	117%	115%	(7%)	(2%)	
 <b>cloudera</b>	S-1	Net \$	146%	130%	143%	(11%)	10%	
 <b>everbridge</b>	10-K	Net \$	111%	112%	116%	1%	4%	
 <b>HubSpot</b>	10-K	Net \$	99%	99%	93%	1%	(7%)	
 <b>mimecast</b>	10-K	Net \$	107%	109%	111%	2%	2%	
 <b>MINDBODY</b> <small>LOVE YOUR BUSINESS</small>	10-K	Net \$	109%	113%	108%	4%	(4%)	
 <b>MuleSoft</b>	S-1	Net \$	110%	121%	117%	10%	(3%)	
 <b>New Relic.</b>	10-K	Net \$	132%	118%	133%	(10%)	12%	
 <b>okta</b>	S-1	Net \$	129%	120%	123%	(7%)	3%	
 <b>SecureWorks</b>	10-K	Net \$	96%	108%	98%	13%	(9%)	
 <b>talend</b>	10-K	Net \$	124%	114%	123%	(8%)	8%	

Note: Public companies included in the benchmarking data are those SaaS businesses that consistently report specific retention data (and not via a qualitative reference)

# I. Retention Rates: Public Company Disclosures cont.

Public Company Retention Disclosures								
Company	Source	Type	Calendar Year			YOY % Change		
			2014	2015	2016	Δ 2015	Δ 2016	2-Year Trend
 twilio	10-K	Net \$	153%	155%	161%	1%	4%	
 veeva	10-K	Net \$	138%	125%	127%	(9%)	2%	
 zendesk	10-K	Net \$	nm	123%	115%	nm	(7%)	
 brightcove	10-K	Gross \$	95%	95%	96%	-	1%	
 Cornerstone ON DEMAND Empowering People	10-K	Gross \$	94%	95%	95%	1%	-	
 LogMeIn	10-K	Gross \$	80%	80%	75%	-	(6%)	
 servicenow	10-K	Gross \$	97%	98%	98%	1%	-	
 bazaarvoice	10-K	Customer	84%	84%	80%	(0%)	(5%)	
 CARBONITE	10-K	Customer	83%	84%	86%	1%	2%	
 Ultimate SOFTWARE	10-K	Customer	96%	97%	97%	1%	-	
<b>Group Medians</b>								
Net \$ Median			121%	120%	117%	(1%)	(3%)	
Gross \$ Median			94%	95%	96%	1%	1%	
Customer Median			84%	84%	86%	-	2%	

Note: Public companies included in the benchmarking data are those SaaS businesses that consistently report specific retention data (and not via a qualitative reference)



## II. Sales Efficiency & CAC: Key Metrics

Cost to acquire (CAC) generally has the most subjectivity in its calculation and needs to be tailored to account for the nuances of each business' sales model and sales cycles

### Overview of Sales Efficiency Metrics

#### ■ Cost to Acquire (CAC)

- A measure of how much it costs to acquire a new customer. In its most basic form, CAC is simply calculated as total S&M expenses divided by the # of new customers in a given period

- $$CAC = \frac{\$ \text{ Total Sales \& Marketing Expenses}^n}{\# \text{ of New Customers Added}^n}$$

- The reality is that the actual calculation for CAC needs to be tailored to the specifics of a given business, its sales model and sales cycles. We have also found that it is instructive to segment CAC ratios for both new customer acquisition and existing customer expansion

- **Adjustments for Sales Cycles & Hiring:** For growing businesses with long sales cycles, we have found that using “in period” metrics (as above) tends to understate sales efficiency given many of these businesses are investing in S&M ahead of growth and have unproductive spend as reps ramp to productivity. In these cases, offsetting the total S&M expense by the typical sales cycle provides a more accurate pictures. An example:

- $$CAC = \frac{\$ \text{ Total Sales \& Marketing Expenses}^{n-x}}{\# \text{ of New Customers Added}^n}$$
 ← “X” should be the length of an average sale cycle. Assuming a 2 quarter sales cycle, a two-period offset would be appropriate

- **Adjustments for New & Existing Customer Acquisition:** We also find it instructive to segment acquisition costs for between new and expansion revenue to get a complete picture of sales efficiency, and have found that it is best to express expansion revenue on a dollar (not customer) basis: An example on an “in period” basis – the implied ratio describes how much \$ S&M is required to generate a new \$ of ACV

- $$\$ \text{ CAC (New Customer Acquisition Only)} = \frac{\$ \text{ Total Sales \& Marketing Expense, New Customer Acq. Only}^n}{\$ \text{ New ACV Bookings}^n}$$

- $$\$ \text{ CAC (Customer Expansion Only)} = \frac{\$ \text{ Total Sales \& Marketing Expense, Existing Customer Expansion Only}^n}{\$ \text{ Upsell ACV Bookings}^n}$$

- There is typically some estimation required to segment activities between new and expansion given shared resources (e.g. the cost of a sales rep that is compensated for both landing new customers and upselling existing), but these resources typically include marketing \$, quota carrying reps, etc. for new customers, and account management and some customer support for expansion activities

- Unsurprisingly, \$ CAC for expansion activities tends to be lower as selling into the existing base is much cheaper acquisition cost

#### ■ Magic Number

- A “quick and dirty” (though still useful) estimate of sales efficiency using reported revenue metrics, and is useful for benchmarking against public companies

- $$\text{Magic Number} = \frac{\$ \text{ Total Revenue}^n - \$ \text{ Total Revenue}^{n-1}}{\$ \text{ Total S\&M}^n}$$

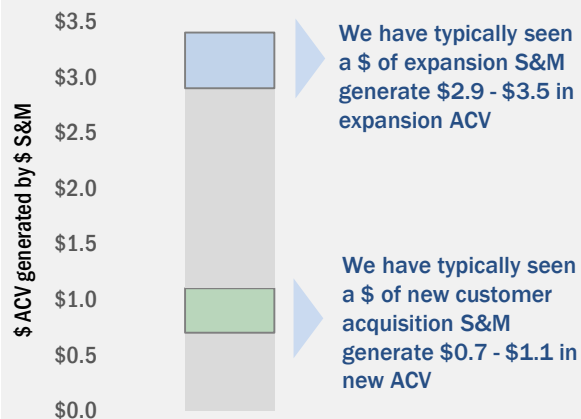
## II. Sales Efficiency & CAC: Benchmarks & Our Observations

CAC is generally hard to compare across companies given the difference in calculation methodology and sales model. That said, there are a few rules of thumb based on sales model that we have observed in our work with SaaS businesses

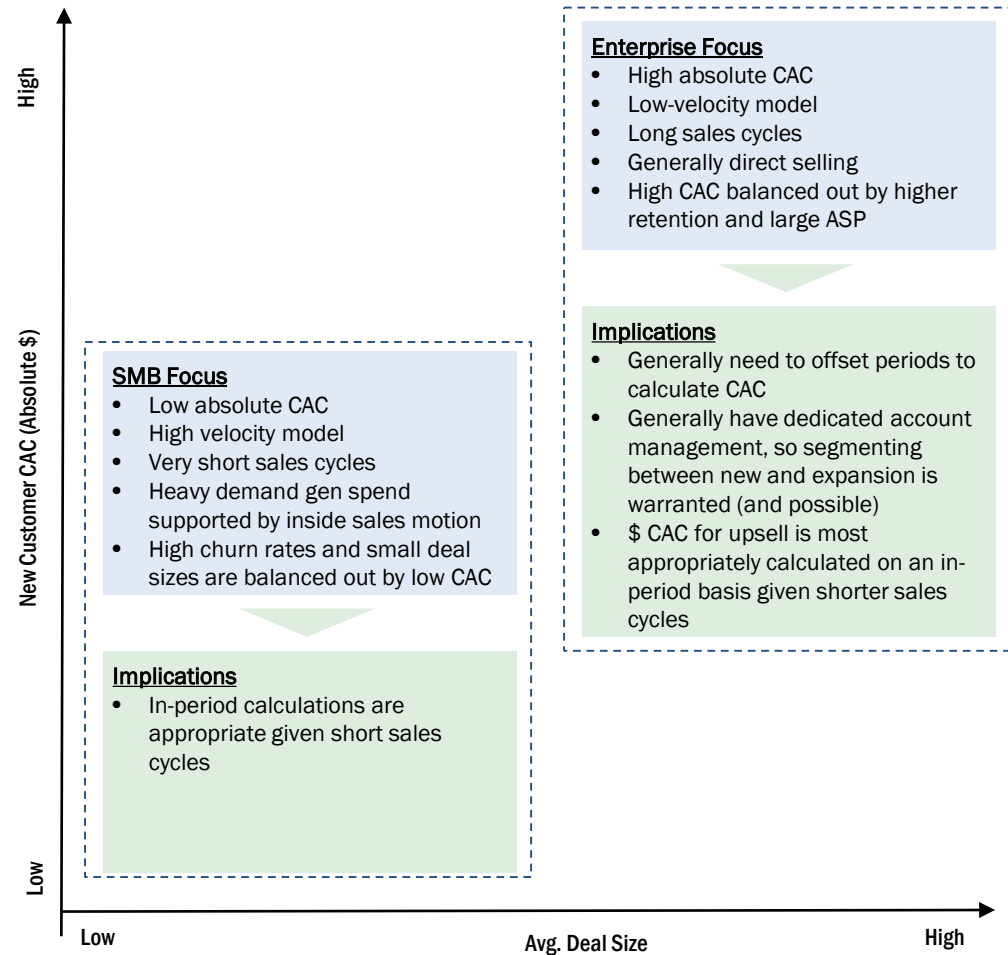
### Commentary

- Some generalizations on CAC and sales efficiency:
  - Enterprise-focused vendors tend to have more adjustments to CAC given long sales cycles
  - In-period metrics are generally appropriate for high-velocity SMB models with short sales cycles and internet distribution models
  - On an absolute basis, the CAC of enterprise vendors is significantly higher than those focused on small businesses
  - A \$ of ACV from a new customer is typically 2.5x more expensive than a \$ of new ACV from an existing customer

### Shea & Company Observations of \$ CAC



### Rules of Thumb for Different Sales Models



## II. Sales Efficiency & CAC: Example Calculation

### Example Calculation of CAC for New Customers

#### ACV Waterfall

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100	139
(+) New ACV Added	5	6	7	8	9	10	11	12	26	42
(+) Upsell ACV	5	6	7	8	9	10	11	12	26	42
(-) Downsell ACV	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(5)	(8)
(-) Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Ending ACV	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 207	\$ 139	\$ 207

#### S&M Expense Components

Marketing	\$ 2	\$ 3	\$ 4	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 14	\$ 30
Direct Sales	6	8	9	11	12	14	15	17	34	58
Account Management	2	2	3	3	4	4	5	5	10	18
Total S&M Expense	\$ 10	\$ 13	\$ 16	\$ 19	\$ 22	\$ 25	\$ 28	\$ 31	\$ 58	\$ 106

#### New Customers Added

	5	7	9	11	13	15	17	19	32	64
--	---	---	---	----	----	----	----	----	----	----

#### CAC: New Customers Only (In-Period)

Marketing	\$ 2	\$ 3	\$ 4	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 14	\$ 30
Direct Sales	6	8	9	11	12	14	15	17	34	58
Total S&M Expense, New Customers	\$ 8	\$ 11	\$ 13	\$ 16	\$ 18	\$ 21	\$ 23	\$ 26	\$ 48	\$ 88

#### New Customers Added

	5	7	9	11	13	15	17	19	32	64
--	---	---	---	----	----	----	----	----	----	----

\$ New ACV Added	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 11	\$ 12	\$ 26	\$ 42
------------------	------	------	------	------	------	-------	-------	-------	-------	-------

CAC (S&M / New Customers Added)	\$ 1.6	\$ 1.6	\$ 1.4	\$ 1.5	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.5	\$ 1.4
\$ CAC (\$ S&M / \$ New ACV Added)	\$ 1.6	\$ 1.8	\$ 1.9	\$ 2.0	\$ 2.0	\$ 2.1	\$ 2.1	\$ 2.2	\$ 1.8	\$ 2.1

#### CAC: New Customers Only (Offset, to Account for a 6-Month Sale Cycle)

Marketing, N-2			\$ 2	\$ 3	\$ 4	\$ 5	\$ 6	\$ 7		\$ 22
Direct Sales, N-2			6	8	9	11	12	14		46
Total S&M Expense, New Customers			\$ 8	\$ 11	\$ 13	\$ 16	\$ 18	\$ 21		\$ 68

#### New Customers Added

	5	7	9	11	13	15	17	19	32	64
--	---	---	---	----	----	----	----	----	----	----

\$ New ACV Added	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 11	\$ 12	\$ 26	\$ 42
------------------	------	------	------	------	------	-------	-------	-------	-------	-------

CAC (S&M / New Customers Added)			\$ 0.9	\$ 1.0	\$ 1.0	\$ 1.1	\$ 1.1	\$ 1.1	\$ 1.1	\$ 1.1
\$ CAC (\$ S&M / \$ New ACV Added)			\$ 1.1	\$ 1.4	\$ 1.4	\$ 1.6	\$ 1.6	\$ 1.8	\$ 1.6	\$ 1.6

### 1 Accounting for Sales Cycles

- In the example below, offsetting for a longer sales cycle changes the view of sales efficiency considerably
- The implied output is that it cost \$1.6 to acquire a new customer, and \$1.6 to generate \$1 of new ACV (in the top example), and it cost \$0.9 to acquire a new customer and \$1.1 to generate \$1 of new ACV in the offset example below

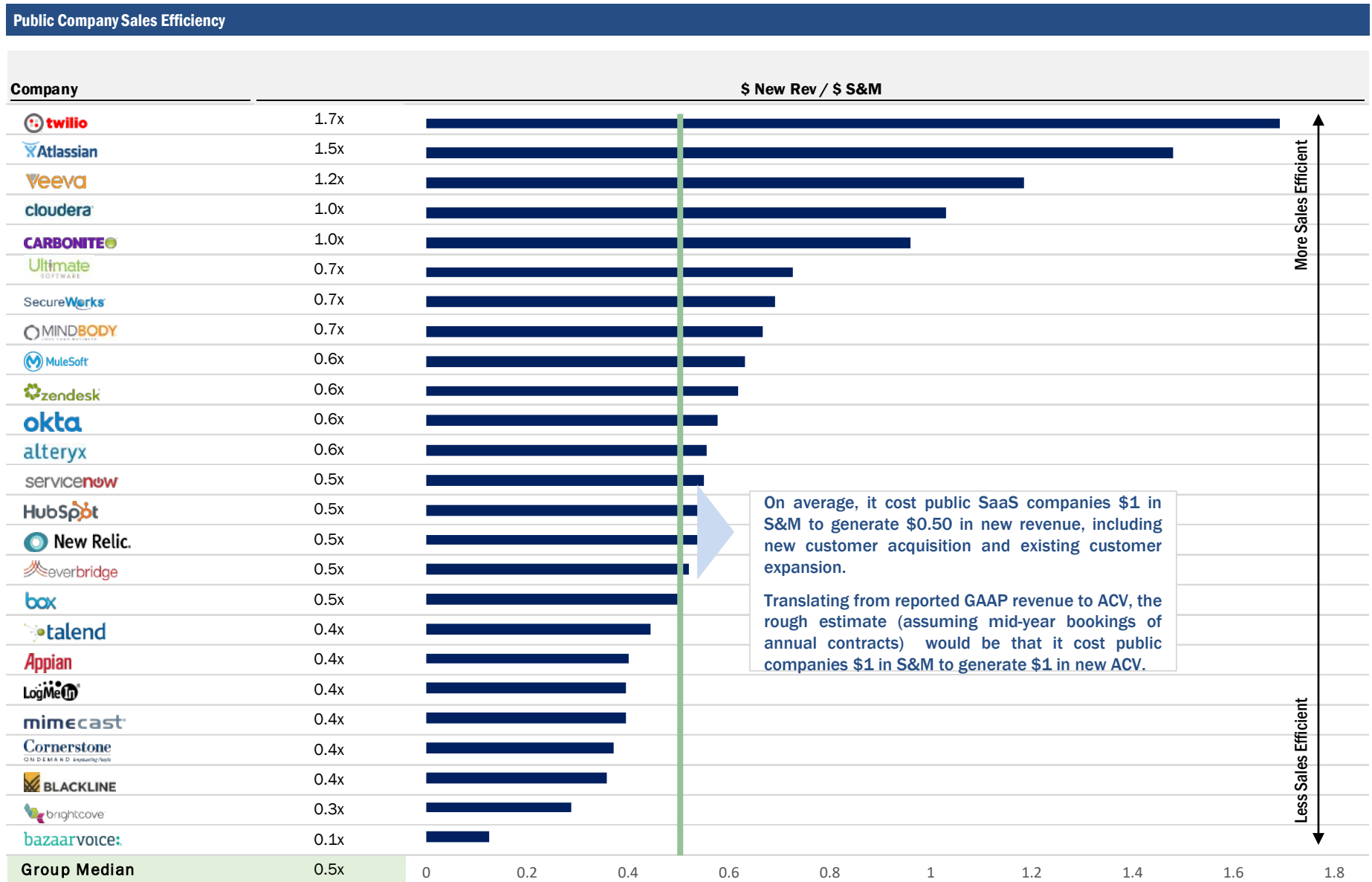
### 2 Calculating Annual Figures

- Annual figures provide a more consistent view of CAC – quarterly figures are susceptible to significant fluctuations because of seasonality
- In this example calculation, the annual S&M expense used for CAC would be the sum of Q3 – Q6 given the two quarter offset for a 6 month sale cycle

### 3 \$ New ACV / # of New Customers

- Regardless if there is an offset in S&M expense for sales cycles, the # of customers and the \$ of new ACV used in the calculation of CAC should always be that which is acquired within the period

## II. Sales Efficiency & CAC: Public Company Benchmarks



### III. Gross Margin & Cost to Serve: Key Metrics & Benchmarks

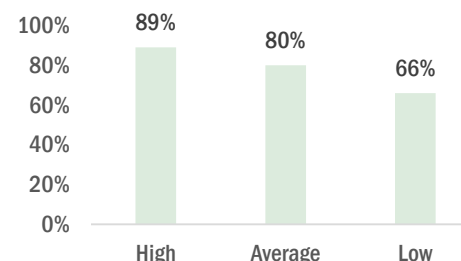
Gross margin for unit economic analysis can vary slightly from the traditional accounting definition and should include both the direct costs of product delivery as well as the personnel costs of supporting / servicing a customer

#### Overview of Gross Margin

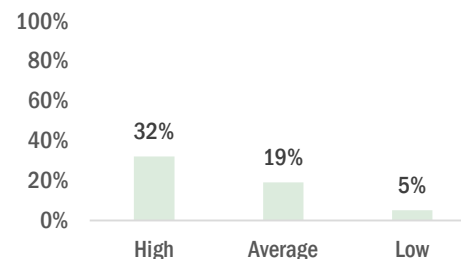
- Below are typical costs of sale for a recurring revenue business and our view of the typical treatment for what is included / excluded for calculation of ongoing cost to serve
  - Delivery costs: Costs for the actual delivery of the software, typically including 3<sup>rd</sup> party hosting (e.g. AWS) or data center costs, database costs, etc.
  - License fees: Costs for any embedded 3<sup>rd</sup> party services or software used in the product
  - Implementation costs: Costs of any service personnel required to implement the product and get the customer “live”
  - Support / Customer Care / Account Management: Cost of personnel providing ongoing support and troubleshooting. Occasionally, we see businesses take a hybrid approach to customer care / support, where responsibilities of the organization include both support as well as upselling. Where this arrangement exists, it is appropriate to estimate what % of time is spent on support vs. sales activities and only use the \$ for support in the gross margin calculation (the % spent on selling should factor into the CAC calculation)
  - Payment fees: Fees paid to 3<sup>rd</sup> party payment processors, bank fees, etc. There is no consistent application of payment fees (we have seen companies treat this as G&A), but a more conservative approach is to include this in gross margin
  - Revenue Sharing Arrangements: Although GAAP may require any referral or revenue sharing fees paid to 3<sup>rd</sup> party channel partners be classified as a “cost of sale,” we find this is more appropriate to be factored into the calculation of CAC and not be included in gross margin
  
- Gross margin is calculated simply as follows:
  - $\$ \text{Gross Profit} = \$ \text{Total Revenue}^n - \text{Total COGS (adjusted per the commentary above)}^n$
  - $\text{Gross Margin \%} = \frac{\$ \text{Gross Profit}^n}{\$ \text{Total Revenue}^n}$

#### Benchmarks from Public SaaS Companies

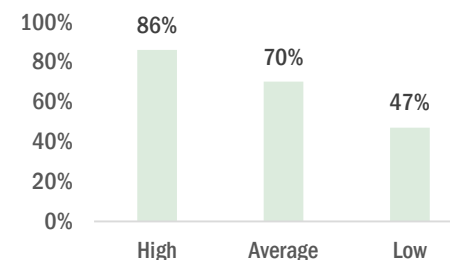
##### Subscription / Recurring Revenue Margin



##### Professional Services Margin



##### Blended Gross Margin %



# III. Gross Margin & Cost to Serve: Example Calculation

## Example Calculation

### Example Gross Margin Calculation

	Financials	Accounting	Unit Economics
<b>Revenue</b>			
Subscription Revenue	\$ 90	\$ 90	\$ 90
Service Revenue	10	10	10
Total Revenue	\$ 100	\$ 100	\$ 100
<b>Cost of Goods Sold</b>			
<u>Hosting Costs</u>			
3rd Party Hosting	1 8	8	8
Data Center Costs	2	2	2
Total Hosting Costs	\$ 10	\$ 10	\$ 10
<u>License Fees</u>			
3rd Party Embedded Apps	2 1	1	1
Data Costs	2	2	2
Total License Fees	\$ 3	\$ 3	\$ 3
<u>Personnel Costs</u>			
Cost of Services Rendered	3 7	7	7
Customer Care / Support / Account Management	2	-	2
Total Personnel Costs	\$ 9	\$ 7	\$ 9
<u>Payment Fees</u>			
Payment Processing	4 3	-	3
Bank Fees	1	-	1
Total Payment Fees	\$ 4	\$ -	\$ 4
<u>Referral Fees to Channel Partners</u>			
Revenue Share Agreements	5 3	3	-
Total COGS	\$ 29	\$ 23	\$ 26
Gross Profit		\$ 77.0	\$ 74.0
% Gross Margin		77%	74%

#### 1 Hosting Costs

- Hosting costs are straightforward and should always be included in the calculation of gross margin

#### 2 License Fees

- Any fees paid to 3<sup>rd</sup> party for software or data services embedded in delivery of the product should be included in gross margin

#### 3 Personnel Costs

- Cost of services rendered should always be included in gross margin, particularly if service revenue is being recognized separately
- A “grey area” exists with regard to customer care / account management (we have seen it captured both “above the line” and “below the line”), but best practices would be to include the ongoing \$ cost of supporting customers as a cost of goods sold and factor any \$ focused on upselling existing clients into the CAC calculation

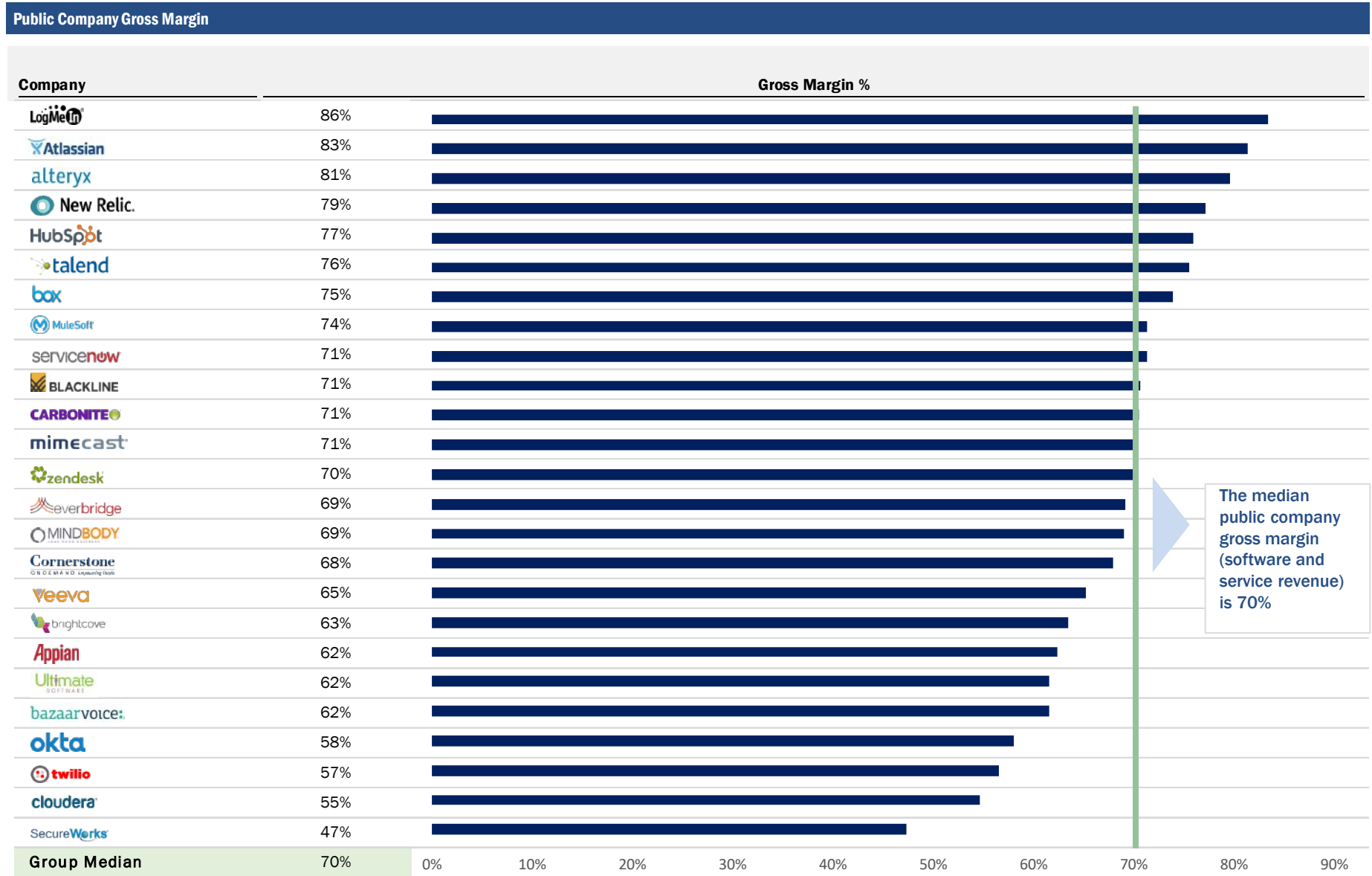
#### 4 Payment Fees

- Similarly, we have seen businesses treat payment processing fees in different manners; best practices (and a conservative approach) would be to include these costs as a cost of goods sold

#### 5 Fees Paid to Channel Partners

- Accounting rules generally prescribe that costs of revenue sharing agreements be captured in cost of goods sold, though we believe this should be included in the calculation of CAC since it is a revenue-generating cost

### III. Gross Margin & Cost to Serve: Public Company Benchmarks



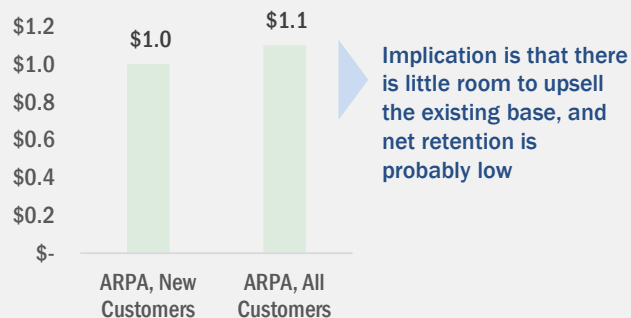
## IV. Average Revenue per Account: Key Metrics

Average revenue per account (ARPA) is simply how much each customer spends on an annual basis; we have found that looking at ARPA for both new customers and total customers is instructive

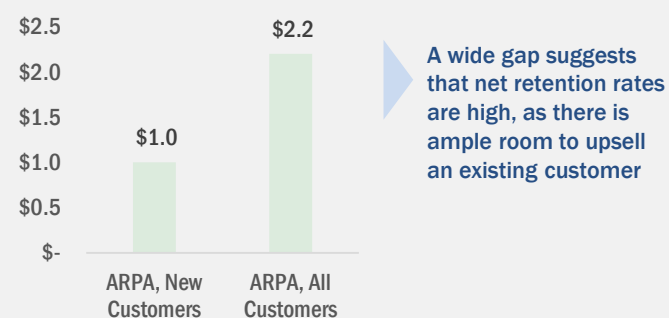
### Overview of ARPA Metrics

- In general, we have found that ARPA is the metric that is the hardest (and least useful) to compare across companies, but it is imperative for understanding the lifetime value of a customer
  - That said, we have found that benchmarking against close competitors or within industries has value, but ultimately that data is hard to find in a private company setting. Further, public companies tend not to report ARPA and infrequently disclose total customer counts such that ARPA could be tracked
- ARPA for New Customers
  - A measure of how much each newly acquired customers spends on an annual basis
  - $ARPA, \text{New Customers} = \frac{\$ \text{Total New ACV}^n}{\# \text{ of New Customers Added}^n}$
- ARPA for All Customers
  - A measure, across the entire customer base, of how much a customer spends on an annual basis
  - $ARPA, \text{All Customers} = \frac{\$ \text{Total ACV}^n}{\text{Total} \# \text{ of Customers}^n}$
- Difference between ARPA for New and Total Customers
  - One trend we like to see is a wide gap between ARPA for new customers and all customers, with the implication being that the wider the gap, the higher the implied net retention / upsell rate

Example 1: ARPA Variance for New Customers and Total Customers is Small



Example 2: ARPA Variance for New Customers and Total Customers is Large





## IV. Average Revenue per Account: Example Calculation

### Example Calculation of CAC for New Customers

#### ACV \* Customer Waterfall

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
	Beginning ACV	\$ 100	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 100
(+) New ACV Added	5	6	7	8	9	10	11	12	26	42
(+) Upsell ACV	5	6	7	8	9	10	11	12	26	42
(-) Downsell ACV	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(5)	(8)
(-) Cancelled ACV	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(8)	(8)
Ending ACV	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 207	\$ 139	\$ 207
Beginning Customers	120	121	124	128	134	141	150	160	120	134
(+) New	5	7	9	11	13	15	17	19	32	64
(-) Lost	(4)	(4)	(5)	(5)	(6)	(6)	(7)	(8)	(18)	(27)
Ending Customers	121	124	128	134	141	150	160	171	134	171

#### ARPA, New Customers

New ACV Added	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$ 10	\$ 11	\$ 12	\$ 26	\$ 42
New Customers Added	5	7	9	11	13	15	17	19	32	64
ARPA, New Customers	\$ 1.0	\$ 0.9	\$ 0.8	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.6	\$ 0.6	\$ 0.8	\$ 0.7

#### ARPA, All Customers

Ending Total ACV	\$ 107	\$ 116	\$ 127	\$ 139	\$ 153	\$ 169	\$ 187	\$ 207	\$ 139	\$ 207
Ending Total Customers	121	124	128	134	141	150	160	171	134	171
ARPA, All Customers	\$ 0.9	\$ 0.9	\$ 1.0	\$ 1.0	\$ 1.1	\$ 1.1	\$ 1.2	\$ 1.2	\$ 1.0	\$ 1.2

#### 1 New Customer ARPA

- New customer ARPA is calculated simply as the \$ of new ACV added in a period, divided by the # of new customers added in a period

#### 2 Existing Customer ARPA

- Existing customer ARPA is calculated as the ending \$ total ACV in a period, divided by the ending # of total customers in that period

# V. Putting it All Together: Lifetime Value and LTV : CAC

Lifetime Value and LTV : CAC are often-cited metrics since they provide a holistic view of all the components of unit economics. It is also the most useful variable in comparing SaaS businesses across size, sales models and industries

## Overview of LTV

### Lifetime Value

- Lifetime value is the total undiscounted cash flow that a customer will generate over its lifetime
- $LTV = \frac{ARPA \times \text{Gross Margin \%}}{\text{Customer Churn Rate}}$  *or*  $ARPA \times \text{Gross Margin \%} \times \text{Implied Customer Lifetime (Yrs)}$
- For ARPA, we have found that using the ARPA from all customers is an appropriate though aggressive method; using ARPA for new customers only is a more conservative measure though would understate the value of businesses with high net retention rates
- While potentially onerous, the most accurate way to calculate the lifetime value of a customer is to analyze customer cohorts and build a multi year customer cash flow model

### Lifetime Value to CAC Ratio

- Lifetime value to CAC is calculated as the lifetime value of a customer divided by CAC
- $LTV : CAC = \frac{LTV}{CAC}$

## Lifetime Value & LTV : CAC

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
ARPA, All Customers	\$ 0.9	\$ 0.9	\$ 1.0	\$ 1.0	\$ 1.1	\$ 1.1	\$ 1.2	\$ 1.2	\$ 1.0	\$ 1.2
x Gross Margin %	74%	74%	74%	74%	74%	74%	74%	74%	74%	74%
Annual Customer Contribution \$	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.8	\$ 0.8	\$ 0.8	\$ 0.9	\$ 0.9	\$ 0.8	\$ 0.9
Customer Churn Rate	87%	87%	84%	84%	82%	83%	81%	80%	85%	80%
Implied Lifetime (Years)	7.5 yrs	7.6 yrs	6.2 yrs	6.4 yrs	5.6 yrs	5.9 yrs	5.4 yrs	5.0 yrs	6.7 yrs	5.0 yrs
Lifetime Value (ARPA x GM % x Lifetime)	\$ 4.9	\$ 5.2	\$ 4.6	\$ 4.9	\$ 4.5	\$ 4.9	\$ 4.6	\$ 4.5	\$ 5.1	\$ 4.4
CAC (S&M / New Customers Added)	\$ 1.6	\$ 1.6	\$ 1.4	\$ 1.5	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.5	\$ 1.4
LTV : CAC Ratio (LTV / CAC)	3.1x	3.3x	3.2x	3.4x	3.2x	3.5x	3.4x	3.3x	3.4x	3.2x

## 1 Lifetime Value & LTV : CAC

- Lifetime value is calculated as  $ARPA \times \text{Gross Margin \%} \times \text{Implied Customer Lifetime}$
- In this example, LTV increases over time due to growing ARPA and declining CAC, offsetting moderate declines in retention
- The LTV : CAC ratio is useful on both a quarterly and annual basis, though quarterly ratios may be skewed due to seasonality (mainly due to higher CAC in lower sales quarters and lower CAC in higher sales quarters)

# V. Why does LTV : CAC Matter? Implications of a High and Low Ratio

It's frequently cited that a 3x LTV : CAC ratio is necessary for a viable SaaS business; forecasting out a few LTV : CAC scenarios to \$100MM in ACV shows a dramatic variance in capital consumption

## Example of 3x LTV Company

### 3x LTV : CAC

	3x LTV : CAC
ARPA	\$ 1.5
Gross Margin	70%
Customer Churn	15%
Lifetime	6.7 yrs
LTV	\$ 7.0
CAC	\$ 2.3
LTV : CAC	3.0x

Total Funding Required to \$100MM,  
Excluding G&A and R&D Expenses \$ (46.8)

	\$5 ACV	\$20 ACV	\$50 ACV	\$100 ACV
Beginning ACV	\$ 1.0	\$ 5.0	\$ 20.0	\$ 50.0
New ACV Added	4.2	15.8	33.0	57.5
ACV Lost	(0.2)	(0.8)	(3.0)	(7.5)
Ending ACV	\$ 5.0	\$ 20.0	\$ 50.0	\$ 100.0
Customers Acquired	2.8	10.5	22.0	38.3

### P&L Snapshot (Assumes all Customers Acquired on Day 1 of Year)

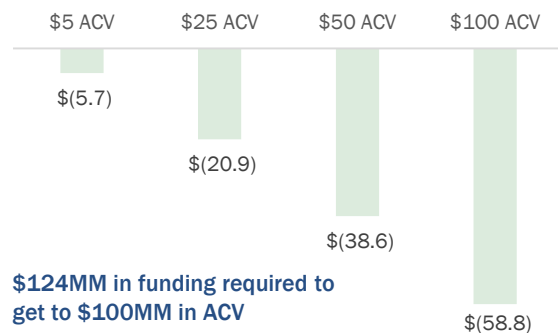
	\$ 5.0	\$ 20.0	\$ 50.0	\$ 100.0
Revenue	\$ 5.0	\$ 20.0	\$ 50.0	\$ 100.0
x Gross Margin %	70%	70%	70%	70%
Customer Contribution Margin	\$ 3.5	\$ 14.0	\$ 35.0	\$ 70.0
S&M Spend (# Cust Acq x CAC)	(6.4)	(24.2)	(50.6)	(88.2)
Capital Consumption (excl R&D, G&A)	\$ (2.9)	\$ (10.2)	\$ (15.6)	\$ (18.2)

### LTV : CAC in Practice

- The example at left forecasts out a business with an LTV : CAC ratio of 3x from \$5MM in ACV to \$100MM in ACV
- For simplicity, we have assumed all customers are acquired on Day 1 of each year
- The scenarios below highlight the capital needs (before any R&D and G&A expenses) required to get to \$100MM in ACV at varying LTV : CAC ratios

## Capital Consumption at Various LTV : CAC Ratios to \$100MM ACV

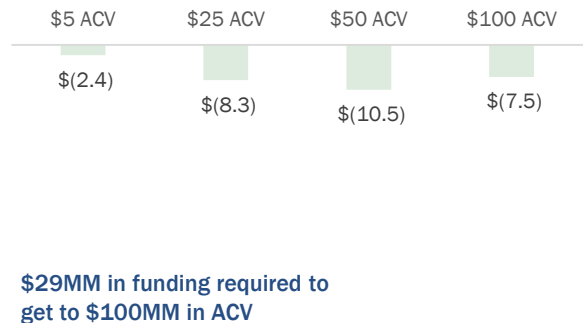
### 2x LTV : CAC



### 3x LTV : CAC



### 5x LTV : CAC



## VI. Customer Payback and Profitability

Another useful (and common) analysis that is important in understanding a business' ability to achieve profitability are customer payback periods

### LTV Calculation

#### ■ Gross Margin Payback Period

- Gross margin payback period is a measure of how many months it takes for a customer to payback CAC and become profitable. Since it is best described in months, we start by calculating MRR per customer simply as follows:

- $Monthly\ Recurring\ Revenue\ (MRR) = \frac{ARPA}{12}$

- $Gross\ Margin\ Payback\ Period\ (Months) = \frac{CAC}{MRR \times Gross\ Margin\ \%}$

### Gross Margin Payback Period

	Quarterly Results								Annual	
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Year 1	Year 2
	ARPA, All Customers	\$ 0.88	\$ 0.94	\$ 0.99	\$ 1.04	\$ 1.09	\$ 1.13	\$ 1.17	\$ 1.21	\$ 1.04
MRR (ARPA / 12)	\$ 0.07	\$ 0.08	\$ 0.08	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.10	\$ 0.10	\$ 0.09	\$ 0.10
x Gross Margin %	74%	74%	74%	74%	74%	74%	74%	74%	74%	74%
Monthly Customer Contribution \$	\$ 0.05	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.06	\$ 0.07
CAC (S&M / New Customers Added)	\$ 1.60	\$ 1.6	\$ 1.4	\$ 1.5	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.4	\$ 1.5	\$ 1.4
Monthly Customer Contribution \$	\$ 0.05	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.06	\$ 0.07
Gross Margin Payback, Months (CAC / MRR)	29 mos	27 mos	24 mos	23 mos	21 mos	20 mos	19 mos	18 mos	23 mos	18 mos

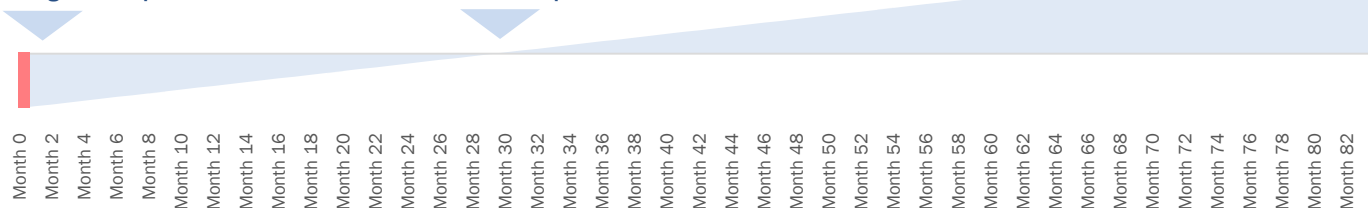
### Customer Payback

- Customer payback is calculated as the CAC in a period divided by the monthly contribution margin (or MRR x Gross Margin %)
- We have typically seen payback period in the range of 12 to 24 months

### Illustration of Cumulative Customer Cash Flow Profile

Initial outlay for CAC in Month 0 is a negative impact on cash flow

Customer "pays back" CAC and becomes profitable in Month 29



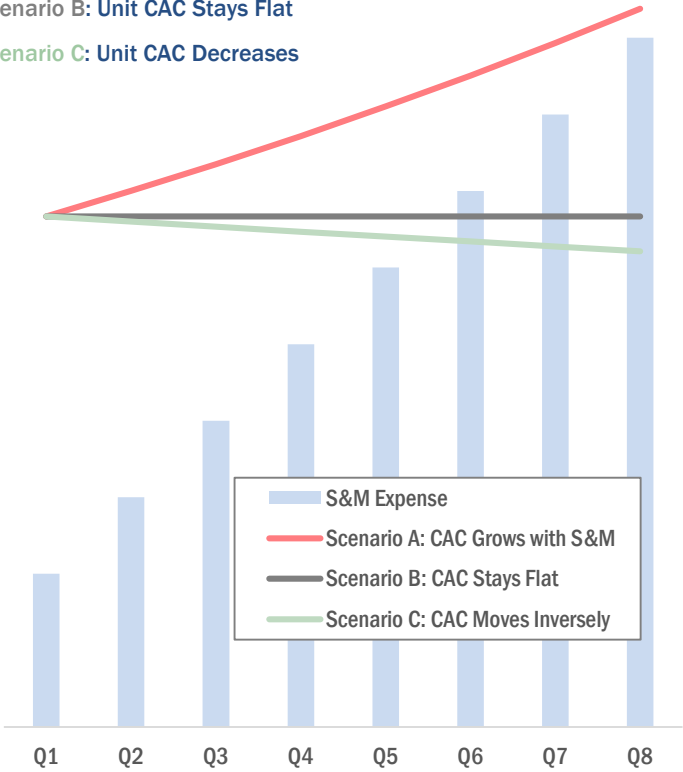
# VII. Scalability: The Relationship Between CAC & S&M Provides a Window into Scalability

For growth businesses, one of the key items we look for is how metrics behave in periods of aggressive growth; we primarily focus on the rate of growth of unit CAC relative to the rate of growth of total S&M expense, as CAC is by far the most sensitive variable in businesses ramping S&M spend, and has the ability to up-end what are solid unit economics

### Relationship of S&M Expense to CAC

**Example:** A business has started to aggressively increase S&M spend and has a solid LTV : CAC ratio as it starts investing

- Scenario A: Unit CAC Grows with S&M
- Scenario B: Unit CAC Stays Flat
- Scenario C: Unit CAC Decreases



### Commentary

Holding all other variables constant (retention, ARPU, gross margin) the business with the growing unit CAC shows an inability to scale efficiently, with LTV declining over time

Scenario	LTV : CAC Q1	LTV : CAC Q8	Implication
A: CAC Grows with S&M	4.4x	3.2x	<ul style="list-style-type: none"> <li>▪ CAC has historically increased in step with S&amp;M spending, and continuing to invest in S&amp;M will push down the LTV : CAC ratio</li> <li>▪ The implication is that the business will likely not be able to scale, and increasing S&amp;M will extend payback periods and the path to profitability, putting the business on a capital treadmill</li> </ul>
B: CAC Stays Flat	4.4x	4.4x	<ul style="list-style-type: none"> <li>• CAC has remained flat, showing that unit economics are holding through period of aggressive growth</li> </ul>
C: CAC Decreases	4.4x	4.8x	<ul style="list-style-type: none"> <li>• CAC has decreased alongside spending in S&amp;M, showing strong demand from the market and an ability of the business to get new S&amp;M resources productive quickly</li> </ul>

# VIII. Retention & Sales Efficiency: A Lynchpin for Profitability & Efficient Growth

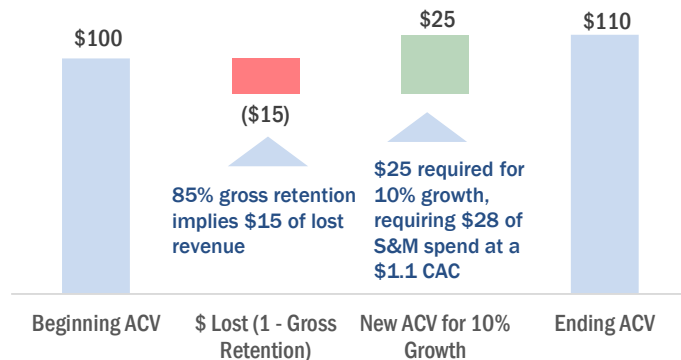
Among all businesses, the most valuable are those that combine high retention and high sales efficiency, which creates an environment for significant profitability or highly efficient growth

## High Retention & Sales Efficiency Matrix

Implied Sales and Marketing Expense for a Business Growing 10% a Year

Gross \$ Retention	\$ CAC: S&M Expense per \$1 New Revenue					
	\$ 0.7	\$ 0.9	\$ 1.1	\$ 1.3	\$ 1.5	\$ 1.7
100%	7%	9%	11%	13%	15%	17%
95%	11%	14%	17%	20%	23%	26%
90%	14%	18%	22%	26%	30%	34%
85%	18%	23%	28%	33%	38%	43%
80%	21%	27%	33%	39%	45%	51%
75%	25%	32%	39%	46%	53%	60%
70%	28%	36%	44%	52%	60%	68%
65%	32%	41%	50%	59%	68%	77%
60%	35%	45%	55%	65%	75%	85%

Example Calculation of 10% Growth: Gross Retention of 85%, \$ CAC of \$1.1



## Relationship of S&M Expense to CAC

Example P&L

	Scen A	Scen B	Scen C	Scen D
\$ CAC	\$ 1.70	\$ 1.30	\$ 1.10	\$ 0.70
Gross Retention	65%	75%	85%	95%
<u>Common Size Income Statement</u>				
Revenue	100%	100%	100%	100%
yoy growth	10%	10%	10%	10%
Cost of Goods Sold	26%	26%	26%	26%
Gross Margin	74%	74%	74%	74%
Operating Expenses				
Sales & Marketing	77%	46%	28%	11%
Research & Development	20%	20%	20%	20%
General & Administrative	10%	10%	10%	10%
EBITDA %	(33%)	(2%)	17%	34%

Assuming 10% annual growth, a business with 65% gross retention and a \$ CAC of \$1.70 would require S&M expense of 77%, leading to negative EBITDA margins of (33%)

Conversely, a business with 95% gross retention and a \$ CAC of \$0.70 would require S&M expense of 10%, creating a highly profitable business with 34% EBITDA margins

**People ▪ Industry Expertise ▪ Process Excellence**

---

# **SHEA & COMPANY, LLC**

---

**Boston**

**San Francisco**

Shea & Company, LLC provides independent financial advice on mergers, acquisitions, financial restructurings, private capital raising and similar corporate finance matters. Shea & Company is not a retail broker-dealer. The firm does not conduct underwriting activities, provide research or analyst reports or solicit or carry accounts for, or offer or sell securities products to retail customers. Shea & Company is regulated by the Financial Industry Regulatory Authority, Inc. ("FINRA") as a FINRA Member Firm. The information and services provided in this presentation are not provided to and may not be used by any person or entity in any jurisdiction where the provision or use thereof would be contrary to applicable laws, rules or regulations of any governmental authority or regulatory or self-regulatory organization or where Shea & Company is not authorized to provide such information or services.