A Brief Note

This document contains two papers related to correcting the massive inefficiencies in third party marketing operations in the mail channel. They are "White Paper 1: Identifying and Extracting Hidden Profits in the Mail Channel Summary" (beginning on page 2) and "White Paper 2: Identifying and Extracting Hidden Profits in the Mail Channel" (beginning on page 6). The first document is a condensed version of the second document and aimed at non-technically oriented decision makers. The second is a detailed discussion of many technical aspects of the CDS business solution to third party marketing operations within the mail channel and is primarily aimed at specialists in finance and technology. Regardless of which document pertains to you or what topics are being discussed, we suggest you never lose sight of the main messages of these documents:

- There are massive (multi-million dollar) unrealized profit opportunities in the mail channel
- These unrealized profits translate into multi-hundred million dollar capital value shortfalls

Also always keep in mind the core arguments of the CDS comprehensive solution:

- Current pricing practices destroy profit opportunities
- CDS pricing practices totally eliminate that profit destruction
- CDS software efficiently "mines" these newly available multi-million dollar profits

Beyond the main messages and core arguments, everything else is just detail.

White Paper 1: Identifying and Extracting Hidden Profits in the Mail Channel Summary

Critical Decision Systems claims that there are substantial unrealized profits in third party marketing (3PM) operations in the mail channel. Our research, based on conservative financial assumptions, indicates that these unrealized profits can, for larger mass mailers, run from 1 to 2 million dollars per month. Profit shortfalls of this magnitude can easily translate into 750 million dollars of unrealized capital value. Our view is that, at some point, appropriate stewards of shareholder value will vet our claims and determine that:
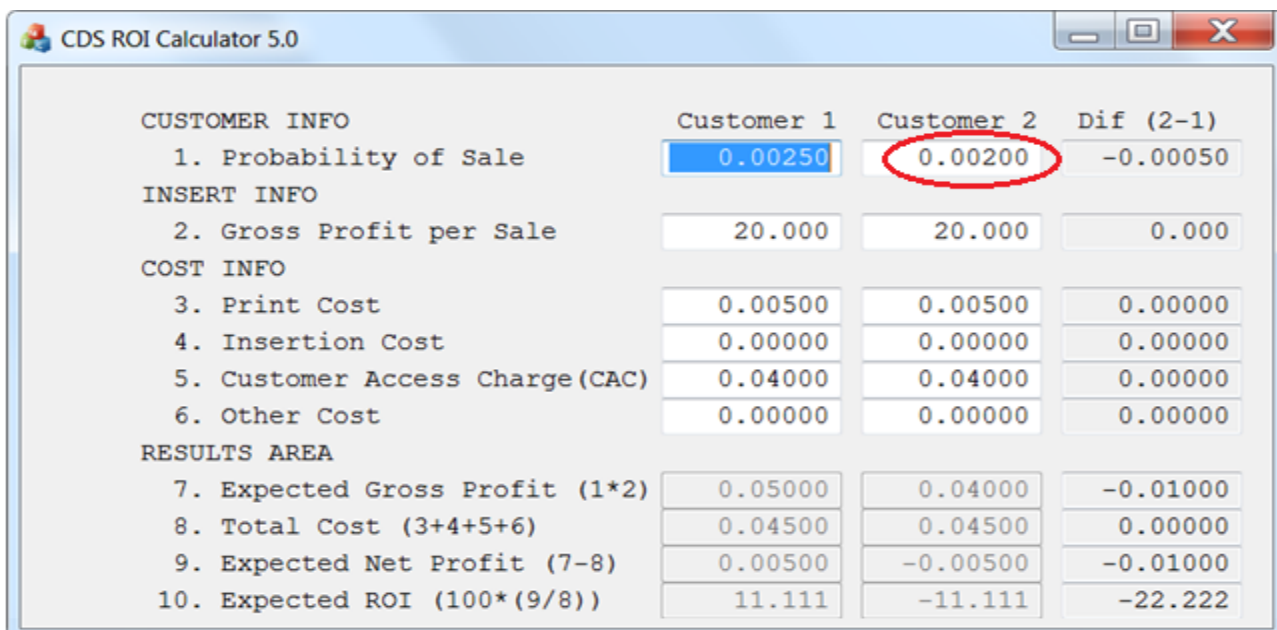
- this lost profit and capital value is real
- this lost profit is capable of funding a great deal of corporate improvement, and
- the inefficiencies in their 3PM operations must be corrected

Our solution also applies to mailers with monthly mailing volumes as low as 500K.

The white paper below, primarily written from a detailed technical perspective for economists and financial analysts, lays out a description of the CDS business solution for 3PM operations and the basis for our claims of multi-million dollar improvements for a large number of firms. For non-technically oriented managers, we hope that this short summary of the CDS mail channel solution for 3PM operations will spur the requisite due diligence needed for them to profit from the CDS solution as a strategic partner. The three pillars of the CDS business solution are:

- 3PM pricing systematically mis-classifies profitable marketing opportunities as un-profitable
- with better pricing, there should be virtually no un-marketed surplus weight - ever!
- with better pricing, profit mining software generate multi-million incremental profits

These three points are developed concisely below. First, we examine the claim of 3PM pricing mis-classifying profit opportunities. Industry norms employ "Fixed Pricing" wherein a marketer negotiates with a mass mailer to pay a given amount ($.04 say) for every one of its inserts that are placed in the mass mailer's customer mail piece. The financials of two potential recipients for the marketer's insert are given below:

CDS ROI Calculator 5.0

	Customer 1	Customer 2	Dif (2-1)
CUSTOMER INFO			
1. Probability of Sale	0.00250	0.00200	-0.00050
INSERT INFO			
2. Gross Profit per Sale	20.000	20.000	0.000
COST INFO			
3. Print Cost	0.00500	0.00500	0.00000
4. Insertion Cost	0.00000	0.00000	0.00000
5. Customer Access Charge (CAC)	0.04000	0.04000	0.00000
6. Other Cost	0.00000	0.00000	0.00000
RESULTS AREA			
7. Expected Gross Profit (1*2)	0.05000	0.04000	-0.01000
8. Total Cost (3+4+5+6)	0.04500	0.04500	0.00000
9. Expected Net Profit (7-8)	0.00500	-0.00500	-0.01000
10. Expected ROI (100*(9/8))	11.111	-11.111	-22.222

As one would expect, some customers are more likely to respond than others as indicated by the Probability of Sale (POS) figure. For Customer 1 the POS is 0.0025 (a 1 in 400 chance of a sale) and Customer 2 the POS is 0.0020 (a 1 in 500 chance). Straightforward calculations of the Expected Net Profits (line 9) show the expectation that marketing to customers like Customer 1 is profitable but the expectation of marketing to customers like Customer 2 is not. So under Fixed Pricing the marketer's rational response is to only permit its inserts to go to customers like Customer 1. This results in just 1 expected profit opportunity for the marketer and just 1 profit opportunity for the mass mailer (by charging the marketer for including its insert.

Now suppose that the channel owner employs a "Variable Pricing" model. Under VP, there are no fixed prices. Rather, the marketer chooses an ROI for its campaign (11.11%, say, 1$ of profit for every 9$ spent) and pro-rates its offer (in term of Customer Access Charges) to the mass mailer based on the customer's individual POS. Continuing with our example, we see that the Customer Access Charge for Customer 2, based on his lower POS, is set lower to ($0.0310):

CDS ROI Calculator 5.0

CUSTOMER INFO	Customer 1	Customer 2	Dif (2-1)
1. Probability of Sale	0.00250	0.00200	-0.00050
INSERT INFO			
2. Gross Profit per Sale	20.000	20.000	0.000
COST INFO			
3. Print Cost	0.00500	0.00500	0.00000
4. Insertion Cost	0.00000	0.00000	0.00000
5. Customer Access Charge (CAC)	0.04000	0.03100	-0.00900
6. Other Cost	0.00000	0.00000	0.00000
RESULTS AREA			
7. Expected Gross Profit (1*2)	0.05000	0.04000	-0.01000
8. Total Cost (3+4+5+6)	0.04500	0.03600	-0.00900
9. Expected Net Profit (7-8)	0.00500	0.00400	-0.00100
10. Expected ROI (100*(9/8))	11.111	11.111	0.000

Given the CAC adjustment, there are now two profit opportunities for both the mass mailer and the marketer where, heretofore, there had only been one. A general move to Variable Pricing is a pre-requiste towards developing the full profitability and capital value of the corporate asset of a mail channel. We contend that this is direct proof of that Fixed Pricing mis-classifies profitable marketing as un-profitable. Under FP, Customer 2 is not a profit opportunity for either the marketer or the channel owner. Under Variable Pricing it is now an additional profit opportunity for both the marketer and the mass mailer.

It is inarguable that Fixed Pricing mis-classifies profitable marketing opportunities as unprofitable. However, in order for this to be of interest to managers such as chief corporate financial officers and chief strategy officers (both of whom we presume capable of finding some use for the multi-hundred million infusion of capital value available purely through elimination of operational inefficiency instead of the alternative of commercial borrowing) we need show that this mis-classification is both massive and correctable. The following grid proves our second assertion: that with the implementation of Variable Pricing unused surplus weight should virtually disappear.

POS \\ Gross Profit	$1.00	$2.00	$3.00	$4.00	$5.00	$10.00	$15.00	$20.00	$30.00	$50.00	$75.00	$100.00	$125.00	$150.00	$175.00	$200.00
0.005 PrintCost																
0.001	-0.0040	-0.0030	-0.0020	-0.0010	0.0000	0.0050	0.0100	0.0150	0.0250	0.0450	0.0700	0.0950	0.1200	0.1450	0.1700	0.1950
0.002	-0.0030	-0.0010	0.0010	0.0030	0.0050	0.0150	0.0250	0.0350	0.0550	0.0950	0.1450	0.1950	0.2450	0.2950	0.3450	0.3950
0.003	-0.0020	0.0010	0.0040	0.0070	0.0100	0.0250	0.0400	0.0550	0.0850	0.1450	0.2200	0.2950	0.3700	0.4450	0.5200	0.5950
0.004	-0.0010	0.0030	0.0070	0.0110	0.0150	0.0350	0.0550	0.0750	0.1150	0.1950	0.2950	0.3950	0.4950	0.5950	0.6950	0.7950
0.005	0.0000	0.0050	0.0100	0.0150	0.0200	0.0450	0.0700	0.0950	0.1450	0.2450	0.3700	0.4950	0.6200	0.7450	0.8700	0.9950
0.006	0.0010	0.0070	0.0130	0.0190	0.0250	0.0550	0.0850	0.1150	0.1750	0.2950	0.4450	0.5950	0.7450	0.8950	1.0450	1.1950
0.007	0.0020	0.0090	0.0160	0.0230	0.0300	0.0650	0.1000	0.1350	0.2050	0.3450	0.5200	0.6950	0.8700	1.0450	1.2200	1.3950
0.008	0.0030	0.0110	0.0190	0.0270	0.0350	0.0750	0.1150	0.1550	0.2350	0.3950	0.5950	0.7950	0.9950	1.1950	1.3950	1.5950
0.009	0.0040	0.0130	0.0220	0.0310	0.0400	0.0850	0.1300	0.1750	0.2650	0.4450	0.6700	0.8950	1.1200	1.3450	1.5700	1.7950
0.010	0.0050	0.0150	0.0250	0.0350	0.0450	0.0950	0.1450	0.1950	0.2950	0.4950	0.7450	0.9950	1.2450	1.4950	1.7450	1.9950
0.011	0.0060	0.0170	0.0280	0.0390	0.0500	0.1050	0.1600	0.2150	0.3250	0.5450	0.8200	1.0950	1.3700	1.6450	1.9200	2.1950
0.012	0.0070	0.0190	0.0310	0.0430	0.0550	0.1150	0.1750	0.2350	0.3550	0.5950	0.8950	1.1950	1.4950	1.7950	2.0950	2.3950
0.013	0.0080	0.0210	0.0340	0.0470	0.0600	0.1250	0.1900	0.2550	0.3850	0.6450	0.9700	1.2950	1.6200	1.9450	2.2700	2.5950
0.014	0.0090	0.0230	0.0370	0.0510	0.0650	0.1350	0.2050	0.2750	0.4150	0.6950	1.0450	1.3950	1.7450	2.0950	2.4450	2.7950
0.015	0.0100	0.0250	0.0400	0.0550	0.0700	0.1450	0.2200	0.2950	0.4450	0.7450	1.1200	1.4950	1.8700	2.2450	2.6200	2.9950
0.016	0.0110	0.0270	0.0430	0.0590	0.0750	0.1550	0.2350	0.3150	0.4750	0.7950	1.1950	1.5950	1.9950	2.3950	2.7950	3.1950
0.017	0.0120	0.0290	0.0460	0.0630	0.0800	0.1650	0.2500	0.3350	0.5050	0.8450	1.2700	1.6950	2.1200	2.5450	2.9700	3.3950
0.018	0.0130	0.0310	0.0490	0.0670	0.0850	0.1750	0.2650	0.3550	0.5350	0.8950	1.3450	1.7950	2.2450	2.6950	3.1450	3.5950
0.019	0.0140	0.0330	0.0520	0.0710	0.0900	0.1850	0.2800	0.3750	0.5650	0.9450	1.4200	1.8950	2.3700	2.8450	3.3200	3.7950
0.020	0.0150	0.0350	0.0550	0.0750	0.0950	0.1950	0.2950	0.3950	0.5950	0.9950	1.4950	1.9950	2.4950	2.9950	3.4950	3.9950

The implication of Variable Pricing is that every marketer insert to customer combination should be considered for possibility of execution by the mass mailer if the Expected Net Profit for the marketer is greater than 0. Stated another way, if the Expected Gross Profit (the product of Gross Profit times the (customer specific) Probability of Sale) exceeds the print cost of a marketer insert then the inclusion of that insert to a given customer should be an option for the mass mailer since it is beneficial to all parties.

The above grid displays the POS down the left column, the Gross Profits along the top row, and the insert print cost in the upper left corner. The POS range from 0.001 (1 chance in 1000) to 0.020 (1 chance in 50), the Gross Profits range from 1$ to 200$. The grid simply computes the Expected Net Profits given the POS, Gross Profits, and insert cost. The picture is clear, under Variable Pricing virtually every combination of these 3 key components yields a profitable expectation that should be considered by the mass mailer for execution. As a result, there should be virtually no significant unused surplus weigh for mass mailers employing VP.

To this point, we have shown that current pricing practices needlessly mis-characterize profitable marketing opportunities as unprofitable and that correcting the poor pricing transforms virtually all marketer insert – customer combinations into profitable marketing opportunities there should be no significant unused weight in mass mailer mailings. Our final objective is to show that substantial incremental profits from 3PM operations can be generated once Variable Pricing has been implemented. To do that we developed relatively sophisticated "profit mining" software to operate in an environment wherein there are large numbers of potential marketer insert – customer combinations to choose from exist. The software iteratively seeks higher profits using the following sequence of steps:

- develop a set of test inserts (one insert per feeder) it thinks will increase profit the most
- determine the test incremental profit (by "cannibalizing" customers with prior assignments)
- determine if test incremental profit is greater than incremental cost (the "set up" charge)
  - if so, update marketer insert – customer assignments and run another test iteration
  - if not, stop searching for higher profits – leave customer insert assignments as is

A snapshot of the software appears below after exhausting further profit opportunities after 9 iterations (set ups):

As of November 2019, we have a library of over 800 test case in which we vary:

- # of customers
- # of inserts competing for inclusion
- # of feeder stations per machine
- set up costs
- average revenue per gram (correlation between insert weight and revenue)

The above run was one of our larger test cases wherein there were 1.5M customers with 150 possible inserts vying for inclusion in the mass mailer's mailings. The two graphs in upper left hand corner are of the most importance. They depict that the algorithm was able to generate an average of over $0.11 for every customer mailed while only incurring 9 set up charges and that the day's profit from 3PM operations was close to $160K. While analyzing actual client data is preferred, we believe the rough estimate of 11 cents per mail recipient capable of receiving marketing inserts provides managers with a conservative ballpark figure of where they could be. Our contention is that no 3PM operations are achieving anywhere near this level of performance.

Kindly visit our website (critisys.com) for further information on our initiatives in the mail channel or contact jimeright@critisys.com for any and all questions.

1. Overview

Critical Decision Systems (critisys.com) has performed extensive clinical research and development into many aspects of Third Party Marketing (3PM) operations in the mail channel. The monthly mailings of credit card companies to their cardholders provide a good example of these 3PM operations. In addition to sending their cardholders account balance and transaction details, the credit card companies might also include 3PM in the form of "inserts". Inserts are relatively small printed media that market/advertise goods or services to the card holders.

Our research concludes, as we lay out in below, that these 3PM operations could generate significant profits beyond what they are now generating on the order of 10s of millions of dollars per year for many credit card companies and similarly sized mass mailers. This, in turn, translates into potential increases in capital value that can easily rise to 500 million dollars and much higher. Further, the analysis indicates that a healthy portion of the profit increases will be achieved through reductions in operating costs. This implies that no capital investment decisions are needed. The budget already exists to fund the transitions to the demonstrably superior 3PM business processes we outline. Existing budget merely has to be reallocated away from under-performing business processes to demonstrably superior ones.

2. The Economic Foundation of Third Party Marketing in the Mail Channel

The economic rationale for including such 3PM "messaging" is straightforward. The vast majority of monthly mailings by credit card companies consist of:

- an outgoing envelope
- a return envelope
- a single transactions detail page

The combined weight of these items is typically well below the one ounce allowed by the postal rates so credit card companies can add a number of inserts to the mailings without incurring additional postal costs. The credit card companies charge marketers for the privilege of including their marketing/advertising messages in the mail piece and, thus, create a profit stream for themselves through the sale of this "surplus weight". Marketers benefit because, on the whole, total profits from the sales in response to the inserts exceed the total expenses in the form of "customer access charges" (payments) to the credit card companies and the costs of printing the inserts in a channel where sales rates are low.

For brevity we will be using a number of abbreviations throughout document:

- 3PM: Third Party Marketer/Marketing
- MC: Mail Channel
- MCO: Mail Channel Owner
- POS: Probability of Sale
- FP: Fixed Pricing
- VP: Variable Pricing
- AP: Assignment Process
- CAC: Customer Access Charge
- ENP: Expected Net Profit
- EROI: Expected Return on Investment
- KPI: Key Performance Indicator

3. The 3PM Problem in the Mail Channel

Open up any newspaper or magazine. You will not find any blank space on any page such as depicted to the right. Instead every square inch of the page (the "channel") is occupied by one of two things:

- content
- marketing/advertising

Turn on any television station. You will not find any sustained instances of blank screens or test patterns on the television screen such as depicted to the right. Neither will you find any instances of "dead air" silence on a radio station. Instead every second of transmission capacity (the "channel") is occupied by one of two things:

- content
- marketing/advertising

Spend some time surfing the internet. you will not find any blank areas on your screen such as shown on the right. Instead every square inch of screen space (the "channel") is filled with one of two things:

- content
- marketing/advertising

We can only conclude that the above channel managers realize that every unit of capacity, regardless of the channel, has economic value and that failing to fill it is waste and inefficiency with deleterious financial consequences. However, they do more than just realize it. They take effective action to see that any spare capacity is virtually filled in its entirety.

Now examine the utilization of weight in a credit card (or similar) company's billing/3PM operations. You will find the allocation of weight (the "channel") within the postal weight limits falls into three, not two, major categories:

- content
- marketing/advertising
- nothing - waste/inefficiency

We considered two explanations. Either the mail channel is unique among communication channels in that large swaths of its capacity are not economically valuable or the business processes that manage that capacity are in dire need of change. The former proposition, worse than simply defying common sense, fails to hold up under the relatively standard financial analysis we performed.

4. Explaining the Root Cause of 3PM Inefficiency in the Mail Channel

The CDS research and development into 3PM in the mail channel employs rigorous, detailed modeling, simulation, and financial analysis and starts by a detailed examination of the single, "atomistic" act of a 3PM paying an MCO (such as a credit card company or similar mass mailer) to have its insert included in the mail piece of an MCO mail recipient (such as a credit card holder). Towards that end, we have developed a small app that identifies all components of that act in what we assume to be a self-explanatory manner:

CDS ROI Calculator 5.0

	Customer 1
CUSTOMER INFO	
1. Probability of Sale	0.00250
INSERT INFO	
2. Gross Profit per Sale	20.000
COST INFO	
3. Print Cost	0.00500
4. Insertion Cost	0.00000
5. Customer Access Charge (CAC)	0.04000
6. Other Cost	0.00000
RESULTS AREA	
7. Expected Gross Profit (1*2)	0.05000
8. Total Cost (3+4+5+6)	0.04500
9. Expected Net Profit (7-8)	0.00500
10. Expected ROI (100*(9/8))	11.111

# of Custs: ● One ○ Two

Direction: ● Forward ○ Backward

Calculate   Exit

In the above configuration, the 3PM assesses paying the MCO $0.04 (CAC) to include its insert in the MCO mail piece to a specific recipient. If this proves to be a "positive marketing bet" in the sense that the EROI (line item 10) is greater that some target EROI then the 3PM would make an offer to the MCO for inclusion of its insert.

Line items 1 through 6 are the "transaction characteristics" and line items 7 through 10 are the "transaction results" or expected KPI should the transaction take place. In this case the EROI is above 11% and we can assume the 3PM wants the insert inclusion to take place.

Now contrast the above mail recipient (customer) with a second mail recipient:

CDS ROI Calculator 5.0			
CUSTOMER INFO	Customer 1	Customer 2	Dif (2-1)
1. Probability of Sale	0.00250	0.00200	-0.00050
INSERT INFO			
2. Gross Profit per Sale	20.000	20.000	0.000
COST INFO			
3. Print Cost	0.00500	0.00500	0.00000
4. Insertion Cost	0.00000	0.00000	0.00000
5. Customer Access Charge (CAC)	0.04000	0.04000	0.00000
6. Other Cost	0.00000	0.00000	0.00000
RESULTS AREA			
7. Expected Gross Profit (1*2)	0.05000	0.04000	-0.01000
8. Total Cost (3+4+5+6)	0.04500	0.04500	0.00000
9. Expected Net Profit (7-8)	0.00500	-0.00500	-0.01000
10. Expected ROI (100*(9/8))	11.111	-11.111	-22.222

# of Custs: One, ● Two
Direction: ● Forward, Backward
Calculate
Exit

Every line item affecting the financial results of the second recipient (customer) is identical to that of the first recipient (customer) except for the POS (line item 1). The transaction results indicate, based on EROI, that this is money losing proposition for the 3PM and it would not proffer an offer to the MCO.

As it stands now, there is only one mail recipient (customer) that presents a profit opportunity for the both the 3PM and the MCO. We cut to the chase. In a wide variety of markets, even those far removed from 3PM in billing operations, managers instinctively realize that if sales are underperforming, especially in markets for perishable goods and services (which is exactly what unused weight in a mailing is), transaction prices have to be lowered. While, MCO management might feel comfortable guessing what such a price would be for the second mail recipient (customer), a more sophisticated solution would be to employ mathematics to "back out" an EROI equalizing CAC for the second recipient as shown below:

CDS ROI Calculator 5.0

CUSTOMER INFO	Customer 1	Customer 2	Dif (2-1)
1. Probability of Sale	0.00250	0.00200	-0.00050
INSERT INFO			
2. Gross Profit per Sale	20.000	20.000	0.000
COST INFO			
3. Print Cost	0.00500	0.00500	0.00000
4. Insertion Cost	0.00000	0.00000	0.00000
5. Customer Access Charge (CAC)	0.04000	0.03100	-0.00900
6. Other Cost	0.00000	0.00000	0.00000
RESULTS AREA			
7. Expected Gross Profit (1*2)	0.05000	0.04000	-0.01000
8. Total Cost (3+4+5+6)	0.04500	0.03600	-0.00900
9. Expected Net Profit (7-8)	0.00500	0.00400	-0.00100
10. Expected ROI (100*(9/8))	11.111	11.111	0.000

# of Custs: One, ● Two
Direction: Forward, ● Backward

Calculate   Exit

In this case, the app was set to "Backward" direction, the target EROI was set to 11.111% (the same as for Customer 1), and the line item allowed to vary to meet the new EROI target was the CAC. This produced an EROI equalizing CAC (price) of $0.031.

We introduce the term "Variable Pricing" (VP) to describe the process wherein recipient specific POS are used, in conjunction with all the other transaction characteristics, to "back out" EROI equalizing prices (CAC). POS are the only transaction details that vary from recipient to recipient for any given 3PM insert.

It ought to be immediately apparent that, compared to the first scenario with its Fixed Pricing (FP) scenario, the corrective, waste eliminating VP scenario creates a "win-win" situation for both the 3PM and the MCO. Under the FP scenario there was only one profitable opportunity for buyer and seller. Under the VP scenario there are two.

VP increases number of profitable marketing bets in the mail channel by converting almost all MCO mail recipients that FP arbitrarily and erroneously classifies as unprofitable into profitable ones. Further, VP does so in a way the 3PM will find as financially palatable as its current marketing practices. On average, the dollars returned for every dollar spent on marketing to these newly marketed recipients will be identical to that achieved from the limited number of recipients traditionally marketed under FP. This yields purely incremental profits for all.

We immediately turned our attention to how extensive the opportunities for profit not being pursued under FP might be. A simple table strongly suggest that virtually all the marketing opportunities in the mail channel are profitable under VP and, thus, unused surplus weight in the mail channel should not exist. The grid below delineates various POS down the rows and various Gross Profits (GP) across the columns under the columns assuming that print cost (PC) for an insert are one half of a cent ($0.005). Except for a small section of the table in the upper left hand corner that simultaneously exhibits extremely low POS and extremely low GP, every combination of POS and GP appears with Expected Profits in excess of the PC for an insert:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	0.005	PrintCost															
2		$1.00	$2.00	$3.00	$4.00	$5.00	$10.00	$15.00	$20.00	$30.00	$50.00	$75.00	$100.00	$125.00	$150.00	$175.00	$200.00
3	0.001	-0.0040	-0.0030	-0.0020	-0.0010	0.0000	0.0050	0.0100	0.0150	0.0250	0.0450	0.0700	0.0950	0.1200	0.1450	0.1700	0.1950
4	0.002	-0.0030	-0.0010	0.0010	0.0030	0.0050	0.0150	0.0250	0.0350	0.0550	0.0950	0.1450	0.1950	0.2450	0.2950	0.3450	0.3950
5	0.003	-0.0020	0.0010	0.0040	0.0070	0.0100	0.0250	0.0400	0.0550	0.0850	0.1450	0.2200	0.2950	0.3700	0.4450	0.5200	0.5950
6	0.004	-0.0010	0.0030	0.0070	0.0110	0.0150	0.0350	0.0550	0.0750	0.1150	0.1950	0.2950	0.3950	0.4950	0.5950	0.6950	0.7950
7	0.005	0.0000	0.0050	0.0100	0.0150	0.0200	0.0450	0.0700	0.0950	0.1450	0.2450	0.3700	0.4950	0.6200	0.7450	0.8700	0.9950
8	0.006	0.0010	0.0070	0.0130	0.0190	0.0250	0.0550	0.0850	0.1150	0.1750	0.2950	0.4450	0.5950	0.7450	0.8950	1.0450	1.1950
9	0.007	0.0020	0.0090	0.0160	0.0230	0.0300	0.0650	0.1000	0.1350	0.2050	0.3450	0.5200	0.6950	0.8700	1.0450	1.2200	1.3950
10	0.008	0.0030	0.0110	0.0190	0.0270	0.0350	0.0750	0.1150	0.1550	0.2350	0.3950	0.5950	0.7950	0.9950	1.1950	1.3950	1.5950
11	0.009	0.0040	0.0130	0.0220	0.0310	0.0400	0.0850	0.1300	0.1750	0.2650	0.4450	0.6700	0.8950	1.1200	1.3450	1.5700	1.7950
12	0.010	0.0050	0.0150	0.0250	0.0350	0.0450	0.0950	0.1450	0.1950	0.2950	0.4950	0.7450	0.9950	1.2450	1.4950	1.7450	1.9950
13	0.011	0.0060	0.0170	0.0280	0.0390	0.0500	0.1050	0.1600	0.2150	0.3250	0.5450	0.8200	1.0950	1.3700	1.6450	1.9200	2.1950
14	0.012	0.0070	0.0190	0.0310	0.0430	0.0550	0.1150	0.1750	0.2350	0.3550	0.5950	0.8950	1.1950	1.4950	1.7950	2.0950	2.3950
15	0.013	0.0080	0.0210	0.0340	0.0470	0.0600	0.1250	0.1900	0.2550	0.3850	0.6450	0.9700	1.2950	1.6200	1.9450	2.2700	2.5950
16	0.014	0.0090	0.0230	0.0370	0.0510	0.0650	0.1350	0.2050	0.2750	0.4150	0.6950	1.0450	1.3950	1.7450	2.0950	2.4450	2.7950
17	0.015	0.0100	0.0250	0.0400	0.0550	0.0700	0.1450	0.2200	0.2950	0.4450	0.7450	1.1200	1.4950	1.8700	2.2450	2.6200	2.9950
18	0.016	0.0110	0.0270	0.0430	0.0590	0.0750	0.1550	0.2350	0.3150	0.4750	0.7950	1.1950	1.5950	1.9950	2.3950	2.7950	3.1950
19	0.017	0.0120	0.0290	0.0460	0.0630	0.0800	0.1650	0.2500	0.3350	0.5050	0.8450	1.2700	1.6950	2.1200	2.5450	2.9700	3.3950
20	0.018	0.0130	0.0310	0.0490	0.0670	0.0850	0.1750	0.2650	0.3550	0.5350	0.8950	1.3450	1.7950	2.2450	2.6950	3.1450	3.5950
21	0.019	0.0140	0.0330	0.0520	0.0710	0.0900	0.1850	0.2800	0.3750	0.5650	0.9450	1.4200	1.8950	2.3700	2.8450	3.3200	3.7950
22	0.020	0.0150	0.0350	0.0550	0.0750	0.0950	0.1950	0.2950	0.3950	0.5950	0.9950	1.4950	1.9950	2.4950	2.9950	3.4950	3.9950

The message is clear: these new profit opportunities for both the 3PM and MCO are nearly universal and should be executed whenever possible instead of doing nothing. We will attempt to quantify the amount of incremental profit attainable immediately from a change in 3PM business processes in the remainder of this document.

5. The Solution to 3PM Inefficiency in the Mail Channel

Systematic implementation of VP is the solution to the systematic failure of FP to recognize the true profit potential of recipient-insert pairs (RIP). Increasing the number of profitable marketing bets at the "atomistic" level is essential for increasing the profits from 3PM mail channel operations in the aggregate for both 3PM and MCO. However, MCO should be much more interested in eliminating the waste since their potential increases in profits are much higher than that of any single 3PM. This document will lay out the case that MCO profit increases can easily be in the range of 10s of millions of dollars per year and that MCO increases in the capital value can easily be in the range of mid to high 100s of millions of dollars.

Implementation of VP is a necessary change to current 3PM business processes using FP. However, it is not sufficient, in and of itself, to capture the significantly higher profits CDS research indicates exist in the mail channel. The second requirement for increasing profit in and capital value of the mail channel is effective decisioning software. Given implementation of VP, a mass mailer would face an environment in which a large number of 3PM inserts all would be competing for inclusion into each and every recipient's mail piece. Our larger test cases posited

an MCO with a daily mailing schedule of 1.5 million recipients and a body of 200 3PM seeking inclusion of their inserts into those 1.5 million mail pieces. Since VP transforms virtually all mail recipients into profitable and EROI equalizing opportunities there would be close to 300 million recipient-insert pairs (RIP) from which to choose. In this environment the MCO problem distills to a single issue:

- which RIPs does it choose to maximize profit and capital value? - i.e. "who gets what?"

Our assessment is that maximizing profit is virtually impossible under current 3PM operations. The main reason for the difficulty is that while the potential revenue of executing a RIP (including an insert in a recipient's mail piece) is known exactly from either the VP "back out" calculation or the FP specification, the cost of executing any RIP is virtually not knowable from this information alone. As a result, cost-benefit analysis essential for profit optimization, cannot be determined at the "atomistic" level.

Cost structures under current 3PM operations are complex and defy easy explanation. Ultimately, these costs are a complex function of the "Assignment Process" (AP) that essentially does determine "who gets what". Our AP will be discussed in a later section describing the "profit mining" software integral to the CDS alternative business process for 3PM operations. But the key point is that the CDS sophisticated decisioning software and the tactical approach it employs is far more profitable than what can be achieved by humans or current decisioning algorithms making these complex decisions. The software provides the second and last requirement for increasing profits in and capital value of the mail channel. It also slashes 3PM operating costs seen in current operations.

In order to build the business case for the alternative business process for 3PM operations CDS has developed we rely on two proofs of concept via models and simulations to demonstrate that:

- recipient specific determinants of Probabilities of Sales (POS) can be estimated accurately
- the optimizing software can extract the substantially higher profit at lower cost

These two concepts are described, developed, and simulated in the sections below.

6. Estimating the Determinants of Probability of Sale

Very little improvement in the financial performance of 3PM operations can take place without leveraging the strengths of the mail channel and analytical tools like statistical regression. We assume that the reader of this section has a working knowledge of statistical regression. If not, assume that statistical regression is a mathematical process that can identify the causal factors and their relative impact on the key requirement for VP: accurate recipient specific POS. Statistical regression is the best data science has to offer in support of decisioning processes required to remove the massive inefficiency in the mail channel and will be demonstrated below.

One of the competitive advantages the mail channel has over other communications channels used for 3PM operations is the extensive knowledge readily available to analysts about the recipients (individuals and/or households) that receive the mail communications. Information on specific credit card holders and households, for example, can often take the form of amalgamations of data from different sources such as census data, personal information from

initial card applications, Nielsen data, credit bureau metrics, membership in professional organizations, and so on, in addition to the purchasing history of the card user. This data can provide a wealth of information that provides insight into the determinants (causes) of differential POS that drive the VP calculations fundamental to capturing the incremental profits and capital value in the mail channel that CDS claims is not currently achieved.

We develop a very simple illustrative example on how mail recipient information and statistical regression can be used to estimate the POS required to drive recipient specific VP calculations. We posit that differences in the POS of mail recipients for the good or service offered through an insert is a function of three characteristics:

- gender: possible values {0,1}
- marital status: possible values {0,1}
- monthly income ($K): possible values {1,2 ...,12}

We have developed a small app (shown below) that allows the user to enter:

- theoretical differential impacts on POS of the above recipient characteristics
- key transaction details that allow for computation of recipient specific VP, and
- number of customers (recipients) to analyze

In this instance, the app processed the inputs in the following manner:

- it generated approximately 1M recipients with equal distributions across:
  - gender [gender 1 has higher POS by 0.002]
  - marital status [marital status 1 has higher POS by 0.004]
  - monthly income [POS higher by 0.0005 for every 1K of monthly income]
  - so, there are 48 possible POS (2*2*12)

- it spun a random generator to simulate the sales success and wrote results to a file
  - e.g.: if recipient has gender = 0, marital status = 1, and monthly income 6K then
  - POS = 0 * 0.002 + 1 * 0.004 + 6 * 0.0005 = 0.004 + 0.003 = 0.007
- so, if the random number (between 0 and 1) < 0.007 then sale = 1, else sale = 1
- the app then read the sales data from the file, and ran statistical regression on the simulated sales file to estimate the general POS differentials of the recipient demographics:

Factor	theoretical value	estimated value	dif	%dif
Gender	0.00200	0.001986	-0.000014	-0.7%
marital status	0.00400	0.003970	-0.000100	-0.8%
monthly income	0.00050	0.000481	-0.000019	-3.8%

Up to this point the app has estimated the coefficients to apply to each individual mail recipient's characteristic information to provide an estimate of the recipient's POS to drive the VP process. The estimated coefficients appear reassuringly close to the true, underlying theoretical values but this is not yet proof of concept. That is provided by the app using the estimations of the true, but unknowable, estimates on a fresh set of mail recipients with no sales history.

So, in the final step of the app, sales were simulated again on the fresh set of approximately 1 million recipients with payments (CAC) to the MCO determined by the VP process using the estimated recipient specific POS and the desired ROI (ROI* = 0.10) of the 3PM. Summary results of the simulated marketing plan based on CAC calculations "backed out" by the VP process are displayed. The results show KPI as expected and desired:

- sales by gender, marital status, and monthly income values all increase as values increase
- ROI by gender and marital status differ in the 'right' way roughly by their theoretical values
- ROI by monthly income bands all hover near the desired ROI* of 0.10

Repeated simulations yield similar results. In our view, this is compelling clinical evidence that the VP process will accomplish exactly what it was designed to do and deserves to be vetted in real life situations:

- expand the sheer number of profitable marketing bets existing in the mail channel
- exhibit ROI comparable sales in all recipient segments (with different POS)

The second of these points (best illustrated by the lower right chart) should stand out as proof of the increased profit potential VP can bring about. ROI appears relatively equally in all recipient income bands as predicted by VP. Many of these recipient segments would not have been marketed under FP and, thus, would not produce any profit for either the 3PM or the MCO. With wholesale transitioning to VP by large numbers of 3PM we maintain that demand will exist for virtually all surplus weight in the mail channel. MCO management cannot hope to eliminate the waste of unused surplus weight without incorporating VP that creates near universal demand (many times over) for that surplus weight.

These profit increases only become possible through VP custom tailoring recipient specific CAC to the recipient specific estimated POS. Pricing in this manner is relatively standard practice in the insurance industry wherein "there is no such thing as a bad risk - only a bad premium". We see no reason why it will fail for 3PM operations in the mail channel. Regardless, it is easily testable hypothesis in a non-intrusive manner under current 3PM operations due to the large amount of unused weight that currently exists.

7. Realizing the Full Potential of the Mail Channel

Assuming a transition to VP calculations for all potential recipient-insert pairs (RIP) has taken place, robust decisioning software, the second and last requirement for realizing the full potential of 3PM operations in the mail channel, will extract the significant additional profits that exist in the mail channel and do so at significantly absolutely lower (not relatively lower) operating costs. We were extremely confident prior to testing via simulation that VP would significantly increase revenue by removing the arbitrary obstacles FP creates. However, we had no feel for what would happen on the cost side. Towards that end we were more than pleasantly surprised that testing revealed significant (maybe even drastic) reductions in absolute operating costs. These absolute reductions were obtained in addition to the significant absolute increases in revenues due to VP.

The importance of this finding is that transitioning to VP and the CDS alternative 3PM business process is not a decision that has to compete for budget allocation against other capital investment decisions. Rather, it is a straightforward decision to remove waste and inefficiency within current operating budgets to fund both the transition to the CDS 3PM business process and to increase funding available for those other capital improvements.

A short discussion of the key cost components in 3PM operations is in order before we lay out the workings of the CDS decisioning software. There are two main ways that 3PM operations incur costs for MCO:

- set up charges (SUC)
- pre-sorting charges (PSC)

Mail machines that ultimately construct outgoing mail pieces and include 3PM inserts in the mailings typically have a small number of bins, 10 say, attached to them. (Re)Filling the bins with some set of 3PM inserts is called a "set up" (SU) and the MCO incurs a "set up charge" (SUC)- in the range of a few hundred dollars every time the bins are refilled with inserts. Once the bins are filled, mail pieces can be constructed using "selective insertion" wherein specific recipients get some or none of the inserts in the bins. For credit card companies the amount of surplus weight available in a recipient mail piece typically limits the number of inserts that will fit under the weight constraint to 4 or 5.

The AP pre-determines "who gets what" so that, as an example, if the bins were initially filled with inserts I-01 through I-10, then the only recipients that could be processed under the SU are those whom the AP assigned some combination of the inserts I-01 through I-10. If the AP assigned I-11 to some recipient, even just one, then the MCO would require another SU and SUC in which I-11 inserts would have to occupy one of the bins in order to process that recipient.

U.S. postal regulations allow for discounts on postage for large mailings that are delivered to the postal system sorted in a way that reduces the need for the postal system to perform sorting operations. MCO 3PM operations generally process recipients in a way that does not and cannot process recipients in the order that takes the greatest advantage the pre-sorting discounts. MCO are more likely to contract with "pre-sorting" (since it takes place before submission to the postal service) firms that accomplish this task for the MCO in exchange for a share of the postage discounts realized.

We originally envisioned a detailed discussion in this document to explain how current AP generate much more SU and, thus, incur much more SUC and PSC than that of the CDS alternative process. We have decided to exclude it because the test cases yield easily verifiable results that SU and associated expenses decrease significantly under the CDS alternative business process. That verification is unassailable and can be accomplished by a short program by any of a number of software packages. Put another way, we could spend hours explaining why the current AP are inefficient rather than spend a few minutes explaining why the CDS process is efficient later in the document. Suffice it to say that these key costs are a very complex functions of the AP decisions. Our view is that current AP within 3PM operations are "disjoint" in that there is a fundamental and costly lack of integration between the revenue side actions and cost side consequences.   The CDS business process, in contrast, tightly integrates revenue and cost concerns.

We can now outline the CDS alternative process for 3PM operations that increases profits and decreases costs. With the transition to VP, virtually all recipients are revenue opportunities for both 3PM and MPO. Distilled to its essence, every 3PM insert has a "scored" file consisting of:

- a recipient ID (such as an account number) and
- the POS of the insert for that recipient

Conceptually, a "scored" file for some 3PM insert would look something like this:

Customer ID	POS (Probability of Sale)
C0000001	0.0039845
C0000002	0.0019777
...	...
C1500000	0.0027311

We stress again that this is a high level description CDS-OPTIM processing. Refinements to this basic conceptual file in the CDS solution have additional "switches" and overrides that would allow operational managers to accomplish tasks such as:

- preventing a particular RIP from being executed
- forcing a particular RIP to be executed
- giving a particular RIP a better chance of execution by making its CAC a secondary concern
- overriding the VP offer price (CAC) with offer prices based on different business logic
- and many other

The task for the MCO is to employ an AP that maximizes profits for daily mailings. The schematic below depicts how CDS-OPTIM imports the "scored" files for all 3PM inserts potentially usable by the MCO in a daily production run. CDS-OPTIM also imports necessary information on the inserts (e.g. weight of the insert and 3PM desired ROI to use in VP calculations) and recipient/customer (e.g. information needed to calculate the amount of "surplus weight" such as number of statement pages). The system simply uses the imported information to calculate recipient specific CAC via VP "on the fly". CDS-OPTIM then calls upon its AP to determine "who gets what". Those assignments and associated revenue appear as the output file delineated by recipient/customer ID and SU.
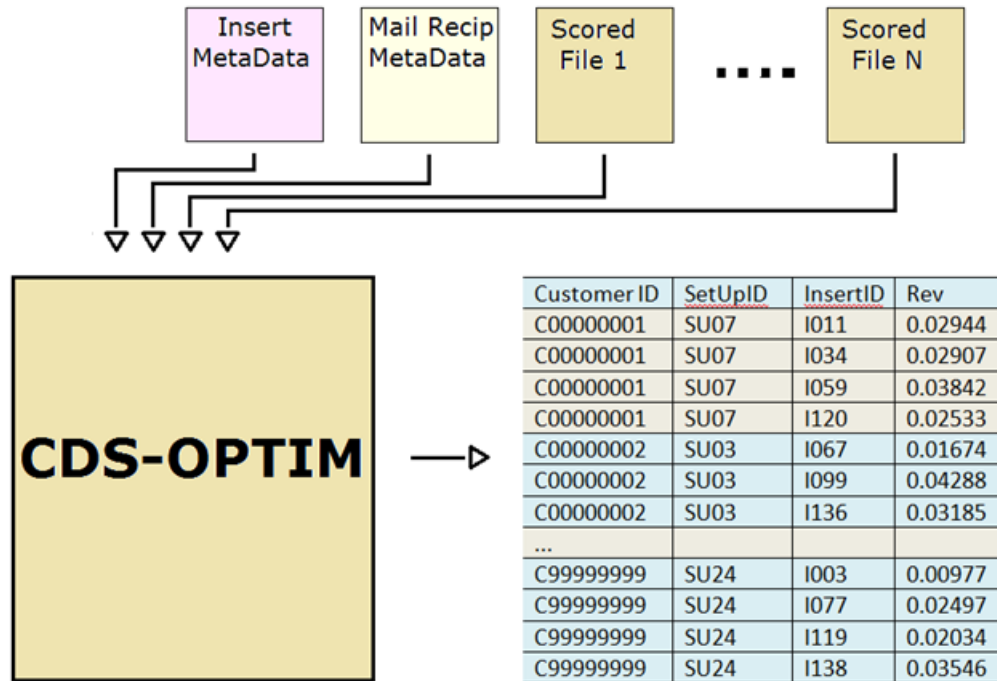
The high level schematic of the AP internal to CDS-OPTIM is depicted below:
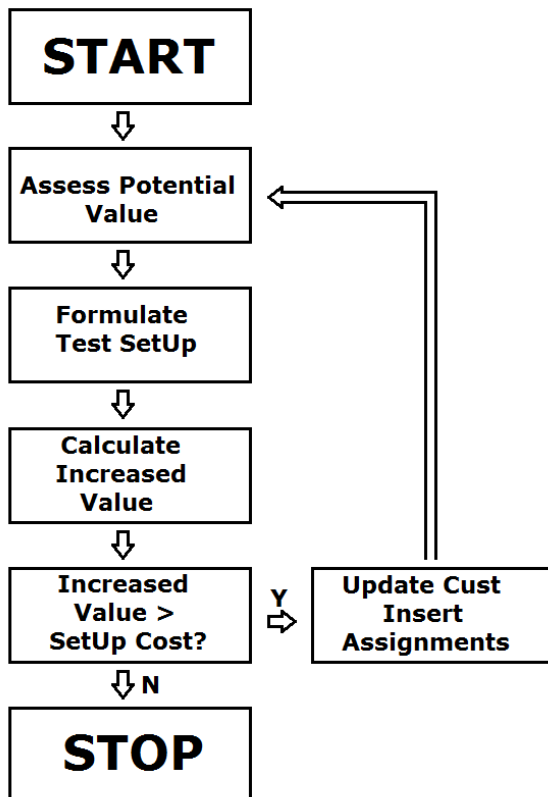
The "profit mining" CDS-OPTIM AP is an iterative, two step, "yield management" process. The two steps roughly are:

- construct a test SU based on an assessment of which set of inserts will generate the most revenue for the MCO

- for each recipient determine its test revenue from the combination of inserts in the test SU that would generate the most revenue for the MCO. Next compute the net revenue (test revenue - current revenue) of each recipient. Lastly, compute incremental revenue of the recipient and add it to a running total of incremental revenue. incremental revenue added by each recipient is:
  - net revenue if > 0
  - else 0

The process is repeated every time the total incremental revenue exceeds the SUC

The CDS-OPTIM alternative process differs greatly from current processing. Besides "revenue mining" from a much richer environment created by VP it employs a "yield management" philosophy that simultaneously lowers absolute operating costs. In a sense, it turns current processing on its head. Current AP generates "revenue side" plans of action on less lucrative recipient bases first. Second, the "cost side" of the 3PM operations is left to manage the consequences of the AP plans created with tenuous, at best, regard of cost consequences.

Yield management reverses this order by starting with the known "cost side" expense of an SU and calls upon its rigorous "revenue mining" algorithms to generate as much profit as possible from the "revenue side" for the SU. Every outlay of expense for an additional SU must be justified by generated revenue in excess of that SUC or it will not take place. Current 3PM operations can only limit CAC revenue to reduce SU and SUC or bear the consequences of poorly managed SUC.

You may also note the logic of the iterations on the revenue generated from individual recipients. CDS-OPTIM essentially is subjecting all 3PM and their inserts to two forms of intense competition that raise the amount of revenue (CAC) the MCO recipients bring forth. The first form of competition is "within SU". Given any specification of insets in an SU, CDS-OPTIM employs rigorous "true" optimization algorithms to select the subset of inserts in the SU that maximize total CAC for the MCO. This demonstrably generates more revenue for the MCO than does the industry practice of "filling to weight" processes in current AP. Our view is that calling "filling to weight" algorithms "optimization" is a misuse of the term. If in algorithm or process can be improved upon then it is not maximizing/optimizing.

The second form of competition engendered by CDS-OPTIM is "across SU". Every assignment of inserts to recipients within an SU is being challenged for possible improvement by "cannibalization" attempts from successive SU. Every iteration of the AP in CDS-OPTIM either improves each recipient's generated revenue by transferring it from its current SU to a new economically justifiable SU or leaves it in place as is. The true appeal of CDS-OPTIM is its ability to create new combinations of inserts for SU that both increase total revenue generated and converge to quickly a point where further improvement is unlikely. This directly limits SUC and indirectly limits PSC because fewer SU means more recipients per SU and recipient processing order can easily be set up to be that of the actual physical delivery routes of the U.S. postal service. This would require less effort by pre-sorters and MCO presumably could negotiate lower rates for the lesser pre-sorting services.

Below is a screen shot of CDS-OPTIM during processing:
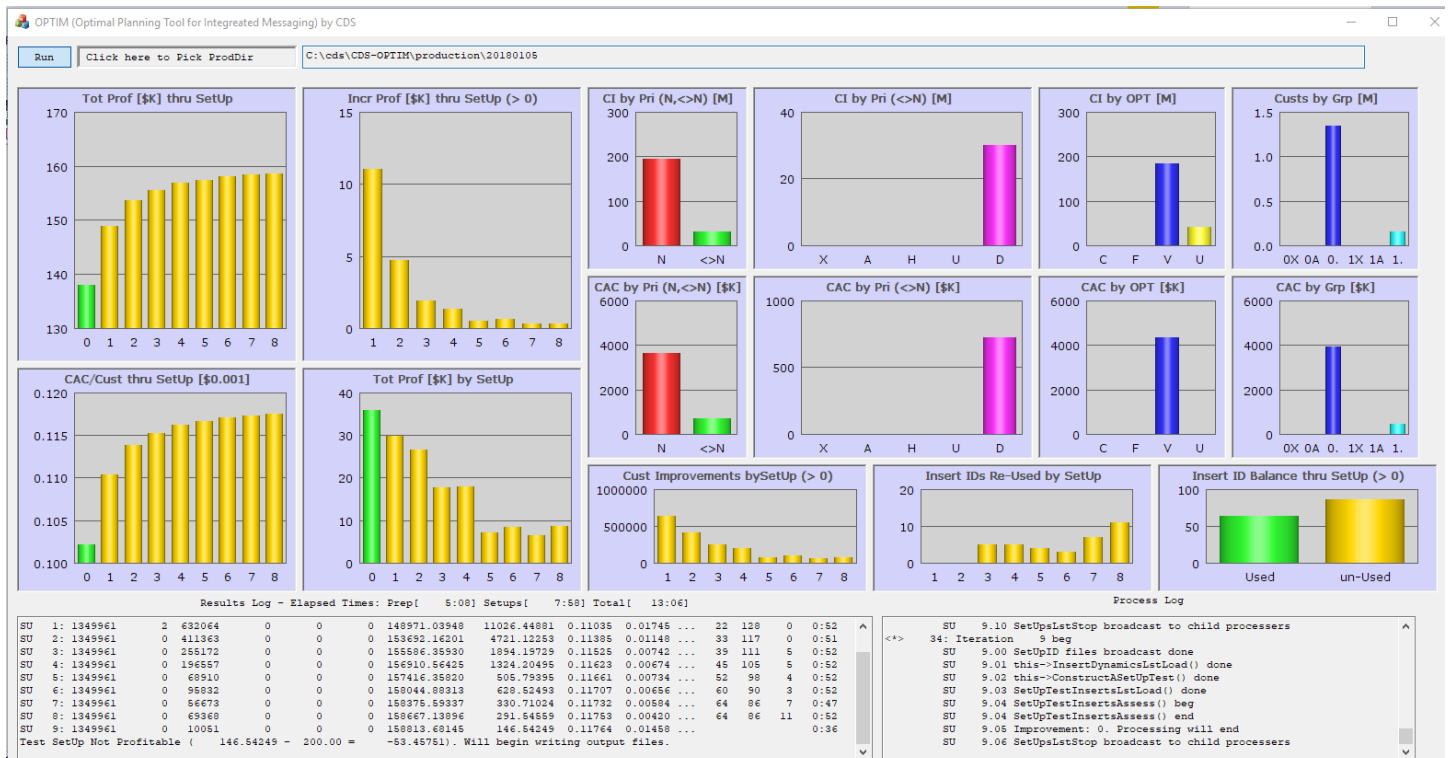
Of particular note are the two charts on the left side of its dashboard. The upper one displays a re-assuring (to economists at least) graph of profits increasing at a decreasing rate. This is consistent with the notion that the AP algorithm is doing a good job in identifying the next best set of inserts to be used in a test SU for every new iteration. It is also encouraging that the AP process converges quickly. This was an unexpected but welcome result that testing implied substantial savings in SUC and PSC over current AP in every test run. We will estimate the cost reductions in the summary section.

The lower of the charts is also re-assuring. It shows that average revenue (CAC) per recipient increasing after every addition of a profitable SU. This is in line with the observation that the AP algorithm in CDS-OPTIM either increases MCO revenue from every recipient by re-assigning it to the newest SU or keeps MCO revenue constant by leaving the recipient in its existing SU.

8. Findings and Conclusions

We ran a wide variety of test case scenarios we term as "direct" and "inferential". Direct test cases were run on data sets with 1.5M recipients and were meant to provide direct observations on what we take to be common daily mailing obligations by MCO. Inferential test cases were run on sample recipient data sets of 5K to 15K recipients in increments of 2.5K. The inferential runs were meant to provide insight into likely results for recipient numbers 100 times as great (500K to 1.5M in increments of 250K). These inferential runs scale the number of virtual recipients by 1/100 so we also scaled the SUC by 1/100 of that used in any related direct runs. This dual scaling allowed us to submit what we believed to be qualitatively similar problems to the AP processes within CDS-OPTIM. It provided the capability to produce a greater number of inferential test runs in a shorter amount of time. Our hope was that the profitability results from the inferential runs could be scaled up by 100 to provide reasonable predictions of what would take place in the direct runs. This was borne out in the cases where direct and inferential runs differed only by the number of recipients.

As of November 2019, we have a catalog of over 800 of these "variation" test cases housed in a pivot table. Listed below are the test run settings that were allowed to vary from run to run:

Setting	Possible Settings	Number of Settings
Number of Recipients	500K to 1.5M in increments of 250K	5
Bins Per Machine	6, 11, 16	3
Usable 3PM Inserts	100, 150, 200	3
Weight-CAC Correlation*	0.00, 0.50, 1.00	3
Set Up Charge	$200, $250, $300, $350, $400	5

All the above options should be readily understood with the exception of the Weight-CAC Correlation. We note that this parameter is a means to control revenue "richness" (aggregate revenue per gram of the recipient base) in the test data with 1.00 indicating the recipient data with the lowest richness.

In order to provide credit card MCO an extremely accurate picture of how well 3PM operations could be improved we would need to apply VP and CDS-OPTIM to actual data. Nevertheless, we are confident that we can place these MCO in the ball park of where they should be with a single high level calculation. The chart below provides averages of a large number of "variation runs" solely on the test recipient data that exhibited the lowest "richness" (aggregate CAC per gram).
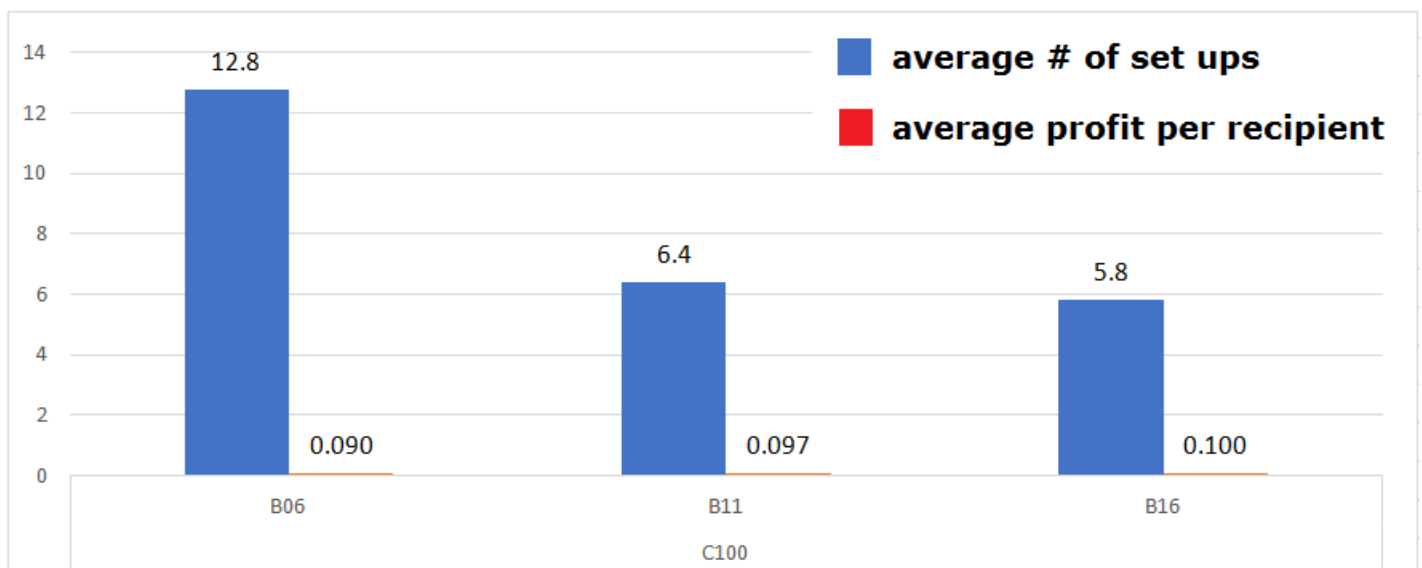
Under the assumptions that the vast majority of mail recipients get a single page bill and that these recipients have 12 grams (~0.43 ounces) of surplus weight, the above chart should enable them to determine very quickly what the annual profitability of their 3PM operations should be. For example, suppose the MCO has 1M "marketable" recipients (different than the number of total mail recipients because, for many reasons, a cardholder may be prohibited from receiving inserts). If the MCO machines had 11 bins we would take the $0.097 monthly Profit Per Recipient figure, multiply it by 12 to get an annual Profit Per Recipient figure of $1.164, and multiply that by the 1M marketable recipients to get $1.164M as a guess for annual profitability.

The MCO could also get a rough idea on cost reductions in SUC in a slightly different manner. The MCO would simply look at SU per day figures from current operations and the 6.4 figure from the chart. If the current SU per day were 25 then annual cost reductions in SUC alone would be (25 - 6.4) * processing days per year * SUC. As an example, if SUC were $300 and mailing operations just took place on weekdays, 260 times a year, (52 weeks * 5 days per week) then savings would be over $1.4M ($1,450,800).

The first calculation provides a rough idea of what the annual profit levels can be for a credit card MCO. This calculation includes reductions in SUC but does not include potential further savings in PSC (pre-sorting charges). Fewer SU means more recipients in SU and there is no reason why the processing order of mail recipients cannot take place in postal route order. This means pre-sorters need less time and effort to sort the mail pieces and the MCO could negotiate lower prices for the pre-sorting. The second calculation gives a rough idea of the budget that will be freed up under the CDS alternative business process.

The above data and inferences should provide MCO managers immediate cause to question the profitability of their current business practices. More importantly, corporate strategic planners also should be interested given the capital value potentially available for major corporate improvement. Should the assumptions we used above not quite fit specific MCO circumstances CDS can leverage its knowledge of 3PM and its simulation software to provide good, customized estimates of attainable profit improvement rather quickly.

However, we stress the need for a rigorous analysis of 3PM operations using actual MCO data. CDS is extremely confident in the applicability of its business solutions to MCO 3PM operations to other than credit card companies.   As proof of that confidence, this audit can take anywhere from 2 to 4 weeks and, under reasonable conditions, can be absolutely free. Further, this revamping of 3PM operations is but the first of many improvements we will bring to the mail channel and other communications channels.

 Feel free to contact jimenright@critisys.com for any and all questions.