# Priceless The Role of Payments in Abuseadvertised Goods

Damon McCoy, Hitesh Dharmdasani, Christian Kreibich, Geoffrey M. Voelker and Stefan Savage







### Talk today

- Context
  - Ad-based e-crime & affiliate programs
  - Why the action is at the payment processing
- Goal: Analysis of what happens when pressure is applied to payment processing infrastructure?

# Advertising-based e-crime

- Range of abuse vectors to reach consumer
  - E-mail spam, SEO, OSN abuse, blog spam, etc.
- Range of products/services advertised
  - Pharma, replica luxury goods, books and software
- Almost all use an affiliate marketing structure
- Monetized directly & knowingly by consumers

#### Affiliate program structure

- Affiliates handle advertising (e.g., spam, SEO)
  - Independent contractors
  - Paid 25-60% commission depending on program
- Affiliate programs handle backend
  - Payment processing, customer service, fulfillment
  - Sometimes hosting and domain registration

# Fine Grained RX-Promo Cost Structure

Direct costs (70 8%) Gross rever 16.3% net revenue agrees with chat logs from GlavMed/SpamIt reporting 10-20%

	March – September 2010			
Gross revenue	\$7.8M			
es with	\$5.5M	(70.8%)		
_	\$3M	(38.1%)		
/SpamIt	\$1.4M	(17.6%)		
•	\$1M	(13.2%)		
	\$148.3K	(1.9%)		
<b>Indirect costs</b>	\$1004K	(12.8%)		
Administrative	\$197K	(2.5%)		
Customer service	\$124K	(1.6%)		
Fines	\$107K	(1.4%)		
IT expenses	\$202K	(2.6%)		
Domains	\$114K	(1.5%)		
Servers, hosting	\$66K	(0.8%)		
Selling expenses	\$315K	(4%)		
Marketing	\$105K	(1.3%)		
Lobbying	\$157K	(2%)		
Other indirect	\$134K	(1.7%)		
Net revenue	\$1.3M	(16.3%)		

**RX-Promotion** 

#### Where does the money come from?

Consumer payment networks















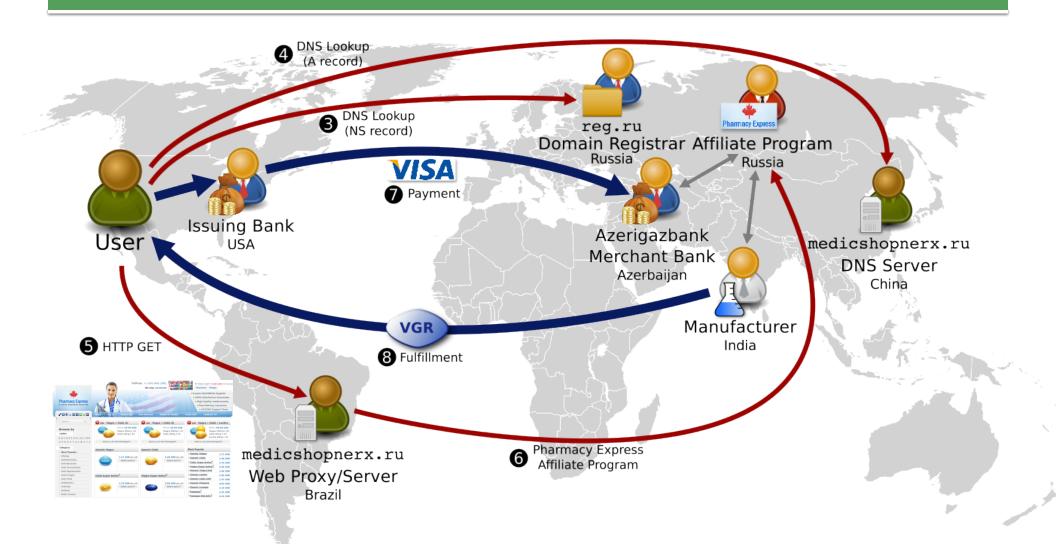


- Of \$173M in Glavmed/Spamit revenue
  - 67% Visa, 23% Mastercard, 6% Amex, 3% e



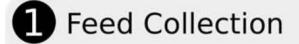
McCoy, Pittsillidis, Jordan, Weaver, Kreibich, Krebs, Voelker, Savage, Levchenko, *Pharmaleaks: Understanding the Business of Online Pharmaceutical Affiliate Programs*, USENIX Sec 2012

# Spam Value Chain



#### Measuring the Value Chain

- Where is the best place to disrupt the chain?
- Map infrastructure used in real spam campaigns
- Locate bottlenecks and evaluate interventions





Spam Feeds

http://sdfjsdf.ru

http://pillsale.cn drugz.com http://capharma.com

**URL Feeds** 



2 URL Extraction



http://cheapdrugz.com

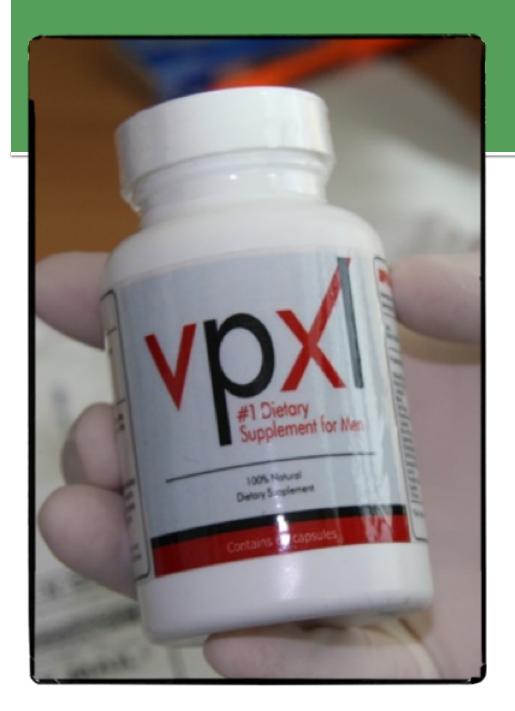
http://pillsale.cn

		Distinct	Received	Feed
Program		Domains	URLs	Volume
- Trogram				
RxPrm	RX–Promotion	10,585	160,521,810	24.92%
Mailn	Mailien	14,444	69,961,207	23.49%
PhEx	Pharmacy Express	14,381	69,959,629	23.48%
EDEx	ED Express	63	1,578	0.01%
ZCashPh	ZedCash (Pharma)	6,976	42,282,943	14.54%
DrMax	Dr. Maxman	5,641	32,184,860	10.95%
Grow	Viagrow	382	5,210,668	1.68%
USHC	US HealthCare	167	3,196,538	1.31%
MaxGm	MaxGentleman	672	1,144,703	0.41%
VgREX	VigREX	39	426,873	0.14%
Stud	Stud Extreme	42	68,907	0.03%
ManXt	ManXtenz	33	50,394	0.02%
GlvMd	GlavMed	2,933	28,313,136	10.32%
OLPh	Online Pharmacy	2,894	17,226,271	5.16%
Eva	EvaPharmacy	11,281	12,795,646	8.7%
WldPh	World Pharmacy	691	10,412,850	3.55%
PHOL	PH Online	101	2,971,368	0.96%
Aptke	Swiss Apotheke	117	1,586,456	0.55%
HrbGr	HerbalGrowth	17	265,131	0.09%
RxPnr	RX Partners	449	229,257	0.21%
Stmul	Stimul-cash	50	157,537	0.07%
Maxx	MAXX Extend	23	104,201	0.04%
DrgRev	DrugRevenue	122	51,637	0.04%
UltPh	Ultimate Pharmacy	12	44,126	0.02%
Green	Greenline	1,766	25,021	0.36%
Vrlty	Virility	9	23,528	0.01%
RxRev	RX Rev Share	299	9,696	0.04%
Medi	MediTrust	24	6,156	0.01%
ClFr	Club-first	1,270	3,310	0.07%
CanPh	Canadian Pharmacy	133	1,392	0.03%
RxCsh	RXCash	22	287	< 0.01%
Staln	Stallion	2	80	< 0.01%
	Total	54,220	346,993,046	93.18%

Royal	Royal Software	572	2,291,571	0.79%
EuSft	EuroSoft	1,161	694,810	0.48%
ASR	Auth. Soft. Resellers	4,117	65,918	0.61%
OEM	OEM Soft Store	1,367	19,436	0.24%
SftS1	Soft Sales	35	93	< 0.01%
	Total	7,252	3,071,828	2.12%
ZCashR	ZedCash (Replica)	6,984	13,243,513	4.56%
UltRp	Ultimate Replica	5,017	10,451,198	3.55%
Dstn	Distinction Replica	127	1,249,886	0.37%
Exqst	Exquisite Replicas	128	620,642	0.22%
DmdRp	Diamond Replicas	1,307	506,486	0.27%
Prge	Prestige Replicas	101	382,964	0.1%
OneRp	One Replica	77	20,313	0.02%
Luxry	Luxury Replica	25	8,279	0.01%
AffAc	Aff. Accessories	187	3,669	0.02%
SwsRp	Swiss Rep. & Co.	15	76	< 0.01%
WchSh	WatchShop	546	2,086,891	0.17%
	Total	7,530	15,330,404	4.73%
_	<b>Grand Total</b>	69,002	365,395,278	100%

# Purchasing























#### Merchant banks (circa late '10)

St. Kitts & Nevis –

AGBank

DnB NORD –

- Low diversity
  - 3 banks covered 95% of pharma/replica/software spam
  - Fewer banks willing handle "high-risk" merchants
- High switching cost
  - Time: In-person account creation, due diligence
  - Money: Upfront capital, holdback forfeiture

Levchenko, Pitsillidis and an amazing cast of 13 others...

Click Trajectories: End-to-end analysis of the Spam value chain, IEEE S &P, 2011

### Hypothesis

- If we could target merchant accounts...
  - Could demonetize entire system
  - Asymmetry that favors the good guys!

#### So... what happened since?

- A stew of activities
  - Encouragement from D.C.
  - Brand interest
  - Card association cooperation
  - Complex politics around SOPA/PIPA/etc
- Leads to two major changes
  - Visa Global Brand Protection Program (GBPP)
  - Targeted merchant intervention (IACC & brands)



#### Visa GBPP

Lots of stuff, but key to this conversation:

Result: major tightening of high-risk merchant account availability for pharma

Startups (i.e., w/o processing history): forget it Higher discount rates for established players Fragile schemes (factoring, miscoding)

 Bank penalized if they get too many of these; restriction of business, up to deassociation

#### Undercover test purchase

Bank Identification Number (BIN) 440553
Merchant descriptor "BUYGOODMEDS COM"
Card Acceptor ID "IBA000000000443"

Merchant Category Code (MCC) 5912 (DRUG STORES & PHARMACIES)



#### Essence of targeted intervention

- Undercover test purchase at counterfeit site
  - Only needs to authorize to get BIN
- IP holder notifies card network (e.g., Visa/MC)
  - Investigation
  - Complaint delivered to acquiring bank
- Leverage via card association contract
  - Remember acquirer owns liability
  - Fines, increased scrutiny, de-association
- Merchant account shutdown

#### So... does it work?

- Bottom line: Yes
- We tracked bank association w/affiliate programs for over 18mos (continuing...)
  - ~800 purchases (Visa only)
- Tracked impact of targeted complaints
  - 170 against 25 distinct programs;
     takedown in 30 days or less is typical
- Joined programs to get damage assessment from inside

#### Major pharma affiliates















**EvaPharmacy** 









































#### Major OEM affiliates





software .













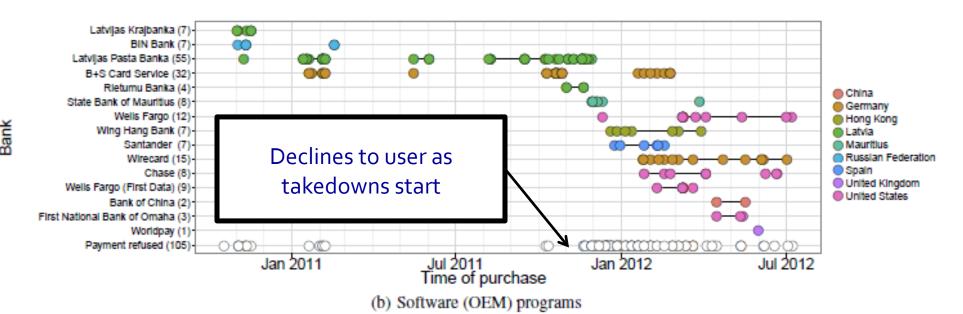






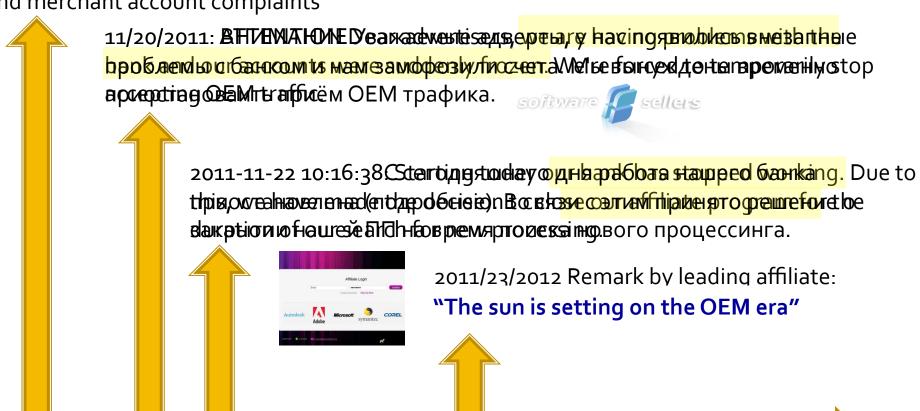
#### OEM software story

- Software brandholder (Nov '11)
  - Methodically issued complaints for accounts of every major affiliate program
  - Diligent follow up: new processing -> new complaints (and quickly)



#### **OEM Timeline**

11/2011: Major software brand holder starts test purchases and merchant account complaints



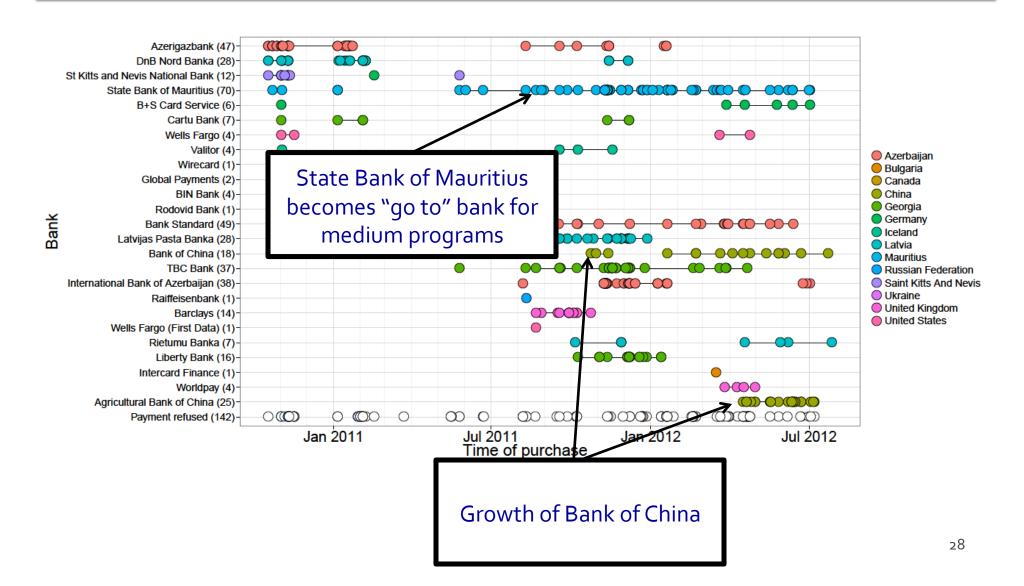
#### **OEM** software story

- Today
  - OEM software market has been decimated
  - 90% of programs have folded
  - Remainder have removed brand holder's products (need for cross-company collaboration)

#### The pharma story

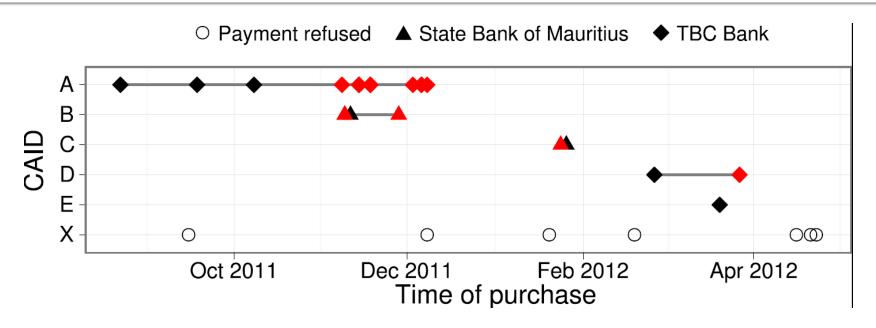
- Much more developed ecosystem
- Intervention less focused, less comprehensive, less follow up
- Still significant impact

# Major banks serving pharma (last 18mos)



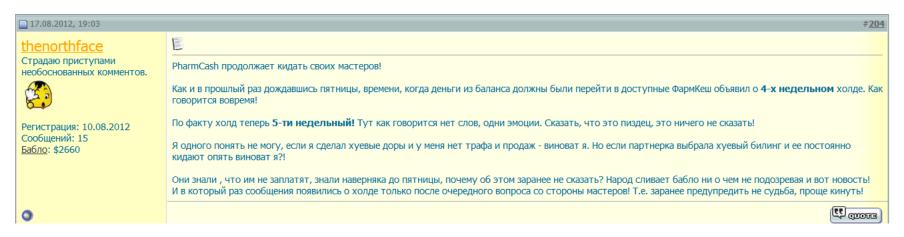
# Example: targeted intervention





Red markers are complaints

#### Tough life for Pharmcash affiliates



PharmCash continues to cheat its [Web] masters!

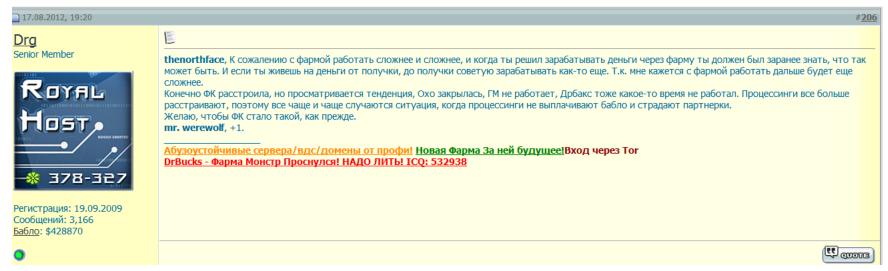
Just like last time, come Friday, when money from the balance should've become available **PharmCash announced a four-week hold.** Just in time!

So in fact, the hold is now five weeks! There are no words to describe this. To say that we're getting fucked is not saying much.

I can't understand one thing, if I made shitty doors [gateway sites] and I have no traffic or sales - my fault. But if the program chose shitty billing and it's always getting dropped it's my fault!?

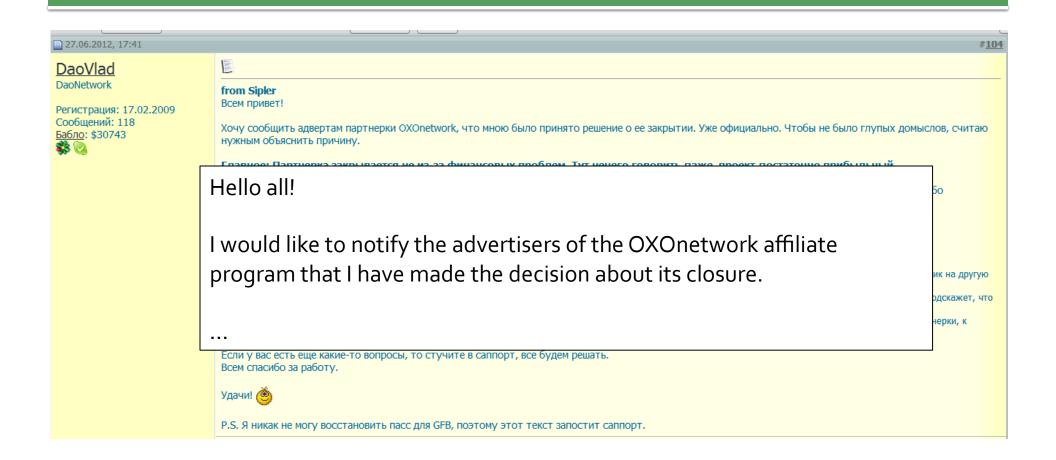
They knew that they would not get paid, likely knew it before Friday, why not tell us about this sooner? People are pouring good money into them unsuspected and then this news! And again the announcement about the hold appeared only after questions from the [Web] masters! le easier to screw someone over then warn they ahead of time!

#### Tough life for Pharmcash affiliates

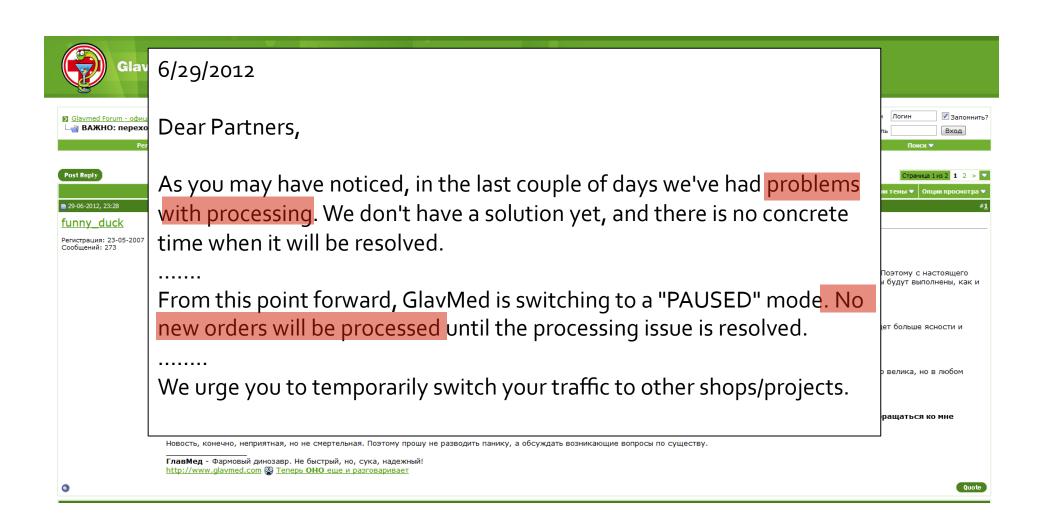


thenorthface, unfortunately its becoming harder and harder to work with pharma, and when you decided to earn money in pharma you should've known that this could happen. If you're living on your payouts, I suggest earning money some other way until the payout since it seems to me working with pharma will only get harder. Of course PhC [PharmCash] disappointed, but there is a trend, Oxo closed, GM is not working, DrBucks also stopped working for some time. Processors keep letting us down, and so it's becoming more frequent that processors don't pay and the partners suffer.

#### OxoPharm



#### Glavmed



#### Mailien

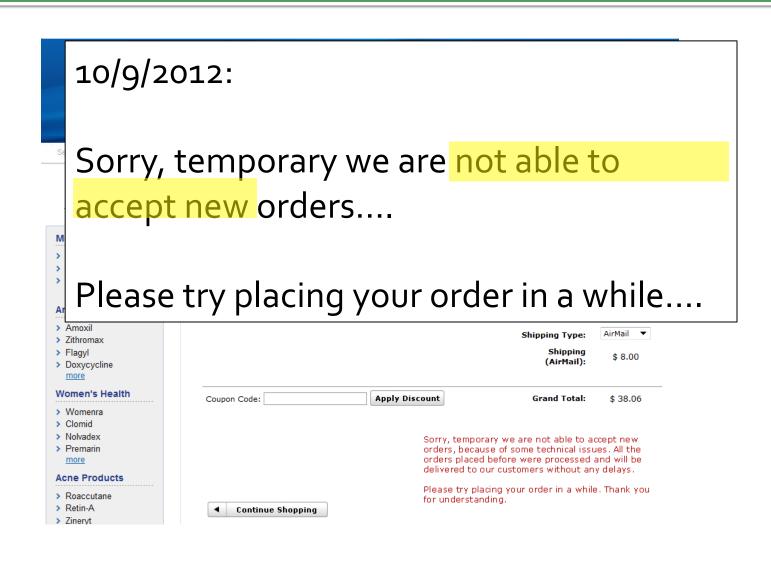
og/19/2012 Dear webmasters, due to temporary problem with processing of orders, affiliate program has to take a break. Unfortunately, we can't name the exact time of recovery.

- All Pending orders will be transferred to Decline.
- We can't collect orders in batch, because orders can't be billed after a few days.

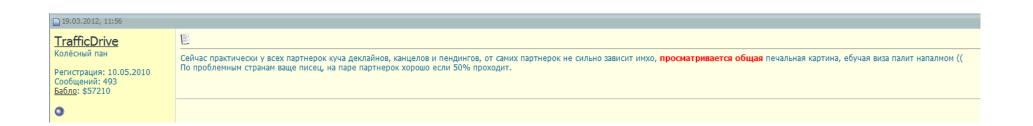
. . . . . . .

Thank you for being with us! Regards, Mailien team..

### DrugMeds



# Life is tough all around...



"Right now most affiliate programs have a mass of declines, cancels and pendings, and it doesn't depend much on the program imho, there is a general sad picture, fucking Visa is burning us with napalm (for problematic countries, it's totally fucked, on a couple of programs you're lucky if you get 50% through)."

## Ecosystem response

### Order filtering

- Phone verification & documentation
- Blacklisting (IP, name, address, card, BIN, geo)

## Complaint bypass

Brand removal; movement to generic names

### Evasion

- MCC miscoding (only 10% in 2010, 70%+ today)
- Aggregation and laundering (new banks); fragile

### Alternative payment

COD, eCheck, WU

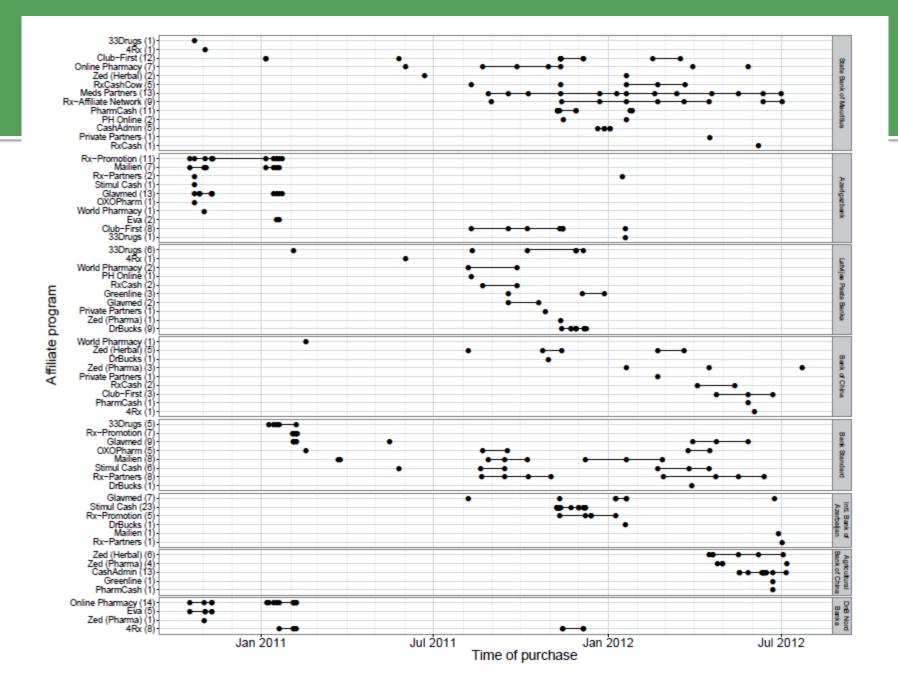
# Challenges

- Hugely powerful tool, but tricky to do right
- Target selection
  - Can't be URL-centric; need to focus on programs
- Identity backstopping (PITA)
  - Diversity&agreement for IP, addr, card, BIN, phone
  - Order history
- Follow up and monitoring
  - Inside and outside if possible
  - Need to track (program, descriptor, BIN) mapping

## Summary

- Much of crime ecosystem is funded by Western consumers via payment cards
- The banking relationship is the bottleneck resource in the business model
  - Can't be hidden, high switching cost, valuable
- Payment intervention is hugely effective when done right

## Questions?







#### USD GBP CAD EUR AUD CHF

#### MEN'S HEALTH

Viagra	*
Cialis	*
Viagra Super Active+	*
Levitra	*
Viagra Professional	*
Cialis Super Active+	*
Viagra Super Force	*
Cialis Soft Tabs	*
Cialis Professional	*
Viagra Soft Tabs	*
Propecia	*
Maxaman	*
Super Active ED Pack	
VPXL	
View all products	

#### **PAIN RELIEF**

Soma



### Healthcare Online



Your Cart:

Search Enter product name

Items: 0 | Total: \$0.00

#### Most Popular Products



#### Viagra as low as \$1.85

Generic Viagra, containing Sildenafil Citrate, enables many men with erectile dysfunction to achieve or sustain an erect penis for sexual activity. Since becoming available Viagra has been the prime treatment for erectile dysfunction.

More Info



#### Cialis as low as \$1.95

Cialis is a highly effective orally administered drug for treating erectile dysfunction, more commonly known as impotence. Recommended for use as needed, Cialis can also be used as a daily medication.

More Info



#### Viagra Super Active+ as low as \$2.79

Viagra Super Active represents the fourth generation of phosphodiesterase inhibitors. This new formulation of a world-known medication provides even more powerful penis blood circulation, increased stamina and sensitivity to stimulation.

More Info

Order now

Order now

Order now

Home | FAQ's | Contact Us | Testimonials | About Us



Shopping Cart: \$0.00 Checkout

WATCHES HANDBAGS & WALLETS



JEWELRY & ACCESSORIES



LOUIS VUITTON



View Similar

TIFFANY & CO.



Get free shipping today



Get 15% Discount On ALL Watches

**New Models** 

2010 Hot New Rolex Styles now Instock Details >

FREE SHIPPING!

on all products



**2010 Brand New Models** 



FIND SOFTWARE: A  $\mid$  B  $\mid$  C  $\mid$  D  $\mid$  E  $\mid$  F  $\mid$  G  $\mid$  H  $\mid$  I  $\mid$  J  $\mid$  K  $\mid$  L  $\mid$  M  $\mid$  N  $\mid$  O  $\mid$  P | Q | R | S | T | U | V | W | X | Y



## Show Mac Software



- Acronis
- Adobe
- Ashampoo
- Autodesk
- Business Objects
- Cakewalk
- Chief Architect
- CodeGear
- Corel
- CyberLink
- Filemaker
- Intuit
- McAfee
- Microsoft
- Mindjet
- Nero
- Nuance
- onOne
- Other
- Pinnacle
- Quark
- Roxio
- Smith Micro Software
- SolidWorks
- Steinberg
- Symantec
- TechSmith
- Ulead
- VMware

#### ★ MOST POPULAR SOFTWARE



search software.

#### 0

#### MICROSOFT WINDOWS 7 ULTIMATE



Our Price \$99.95 Retail Price \$319.95

You Save \$220.00

more info

add to cart

#### MICROSOFT OFFICE PROFESSIONAL PLUS 2007

ADOBE PHOTOSHOP CS5

EXTENDED



Our Price \$69.95 Retail Price \$399.00 You Save \$329.05

more info

add to cart

#### ADOBE CREATIVE SUITE 5 MASTER COLLECTION



Our Price \$299.95 Retail Price

\$2599.95 You Save

\$2300.00

more info

add to cart

#### MICROSOFT OFFICE PROFESSIONAL PLUS 2010



Our Price \$79.95

Retail Price \$699,00 You Save

\$619.05

more info

add to cart

more info

MICROSOFT WINDOWS XP

PROFESSIONAL SP3

m add to cart

Our Price

\$109.95

Retail Price

\$999,00

You Save

\$889.05

#### MICROSOFT WINDOWS 7 HOME PREMIUM



Our Price \$74.95

Retail Price \$199.95

You Save \$125.00

more info

add to cart

#### ADOBE ACROBAT 9 PRO EXTENDED



more info

Our Price \$99.95

Retail Price \$699.00

You Save \$599.05

add to cart



Our Price \$59.95 Retail Price

**\$139.95** You Save \$80.00

more info

add to cart

#### ADOBE CREATIVE SUITE 4 DESIGN PREMIUM



Our Price \$239.95 Retail Price

\$1799.00 You Save \$1559.05

more info

add to cart

#### ONONE PLUG-IN SUITE 5 (CS5 READY)



Our Price #60 OF

#### ADOBE ACROBAT 8 PROFESSIONAL

Our Price AGO OF



AUTODESK AUTOCAD 2010

44





























































AUÐVELDAR VIÐSKIPTI

























Brand & Generic Medications





**World Software** 

Localized language version





Canadian

Drugstore









47























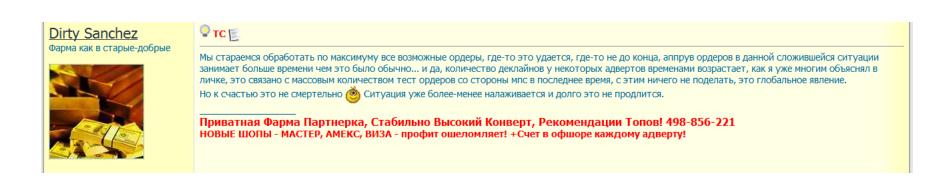












We are trying to process all orders as much as possible, sometimes it works, sometimes only partially, order approval under the current circumstances takes more time than it used to ... and yes, for some advertisers the number of declines periodically sometimes increases, just as I explained to many of you in private messages, this is connected with the massive number of test orders from MPS recently, nothing we can do about it, it's a global phenomenon.

Fortunately it's not fatal:) The situation is improving and won't last long.

