

Building a successful business *after* launch through rapid iteration

GDC Online

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IMVU, Inc.

Game Developers Conference® Online
October 5-8, 2010 | Austin, TX
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Building a successful business *after* launch through rapid iteration

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#imvugdc

Brett G. Durrett (@bdurrett)

VP, Engineering & Operations, IMVU, Inc.

GDC Online, Austin, TX - October 7, 2010



About Brett

- IMVU
 - Social entertainment
 - 2005 – present
 - VP Engineering & Operations
- There.com
 - Virtual world, RIP 2010
 - Various executive roles, 1999-2004
- Asylum Entertainment
 - Game developer
 - 1992-1999... think Gameboy -> Playstation era
 - CEO



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Brett

£ 51,956 credits

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- Adventure
- Multiplayer
- Life & Style

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Bouncing Balls



Vulcan



Polarity



Indestructo Tank



G Virus: Episode 1



Pixel Mission



Hitstick



Monster Truck Trials



Bubble Tanks Tower Defense



Grid16



James the Circus Zebra



Snot Put



Oroboros



The Champions 2



Air Battle



Shift



Putt It In!



Origami



Super Race



Sea Diver

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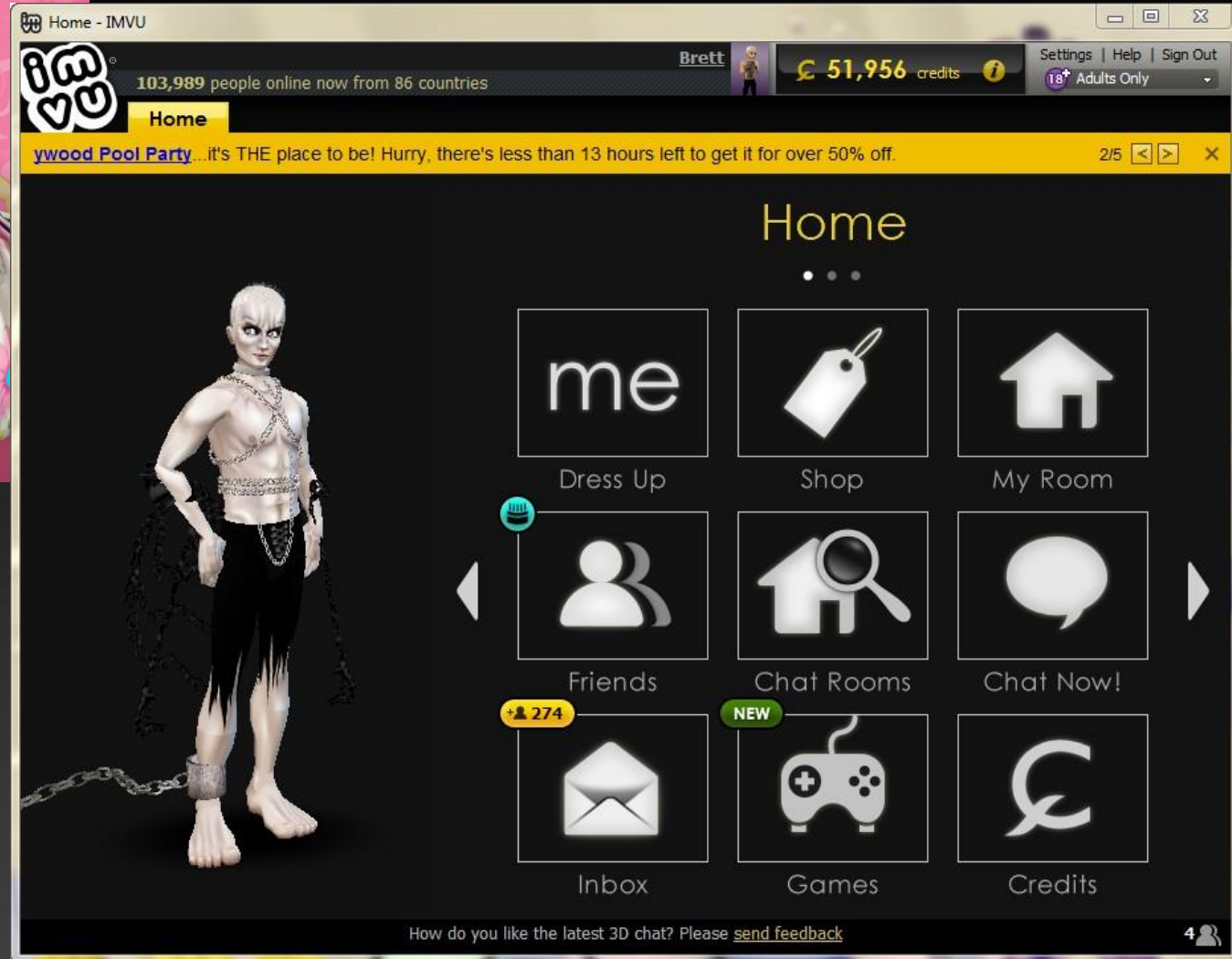
10th



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Wonderland
by [shakespearefreak](#) [+]

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Shop - IMVU

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68,520 people online now from 87 countries

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1,423 credits

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Sort by: Hottest Products

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diamond cat eyes [FL]

c 392

by flowereyes

TryBuy

[TP] Fatal Blue Eyes

c 392

by Terpsicore28

TryBuy

TF Lustrous Eyes Teal

c 359

by TheEyeFactory

TryBuy

nr green tea (F)

c 438

by nutsbar

TryBuy

[TP] Fatal Green Eyes

c 392

by Terpsicore28

TryBuy

[ns9n] Black Vacuum

c 414

by xx8trychxxx

TryBuy

Actions

f f q5 q6 q7 q8 q9 q0 w1 w2 w3 w4 blink w5 w6 w7

Text Chat

Shop - IMVU

77,227 people online now

HomeDress UpShop

1,000 credits

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allwomenmenroomsfurnitureposeswishlist

Show OnlyHardstylesAll Prices

Sort by: Hottest Products

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[TP] Jilanda / M. LITTLE

c 630

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c 630

by Olivita

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u/C / Olivita Black

c 553

by Olivita

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~RK~ Yakoyama Red

c 603

by Yakoyama

TryBuy

~RK~ Maria Black

c 634

by Maria

TryBuy

Black Goddess

c 557

by Goddess

TryBuy

~RK~ Backho Black

c 608

by Backho

TryBuy

OLIVITA Pink

c 630

by Olivita

TryBuy

(G) Tamara Black

c 553

by Tamara

TryBuy

OLIVITA Black

c 630

by Olivita

TryBuy

~RK~ Sakura Black

c 603

by Sakura

TryBuy

brown hair Winona

c 597

by Winona

TryBuy

Actions

p5 p6 p7 p8 p9 s1 s2 s3 s4 s5 blink s6 s7 wave p1 p2 p3 p4

Undo

Total c 3,966

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fall's new
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Now!

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Club Socialite

You'll get the complete look!



In a two-piece suit this fine, you clearly belong in the VIP lounge. Suits are a way to start playing with fall colors, and sleek footwear really kicks this look to the next level.

FASHION TIP



Eyewear is an excellent way to add bling to your look while leaving your hands free to spin your latest beat. Sophisticated shades add glamour to this club style.



"add bling to your look"

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ANDREW



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About Me



littlegreengirl86

Avatar since: 08/20/07

Female

Age: 24

United States - CA

Last log on: 10/05/10



"PM me if you think you have what it takes to make a PPC gift!"

[View my pictures](#)



Relationship Status: In a Relationship

Orientation: Straight

Looking For: Chatting

Smoking: Never

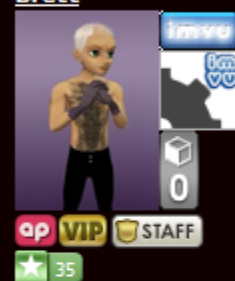
Drinking: Moderate

My Gallery

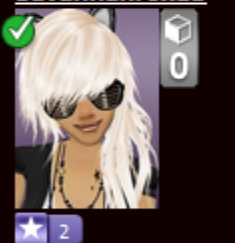


My Visitors (2891)

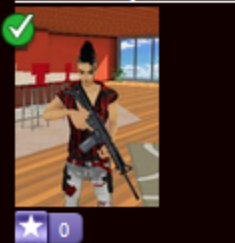
Brett



Savannahrox13



Guest legalhothe



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IMVU Hits \$40 Million Annual Revenue Run Rate

Robin Wauters 855 people Buzz 39 Tweet 0 0 18 Comments

Apr 24, 2010

Yesterday at the [Startup Lessons Learned](#) conference in San Francisco, Brett Durrett, James Birchler and Timothy Fitz from avatar-based social network and 3D virtual world **IMVU** took the stage and talked about [scaling startups](#) (worth your time).

IMVU CEO [Cary Rosenzweig](#) didn't come speak at the event, but was featured in a [video preview](#) on the event website (third video on that page).

In this video – I'm not sure how long it has been online already – Rosenzweig boasts about the company's profitability and cites its annual revenue run rate, which he says is now at \$40

A screenshot of the IMVU chat interface. It shows a chat window with a blue header and a list of users. The main chat area shows a conversation between two users, with one user's avatar visible. The interface includes a search bar, a list of users, and a chat log.

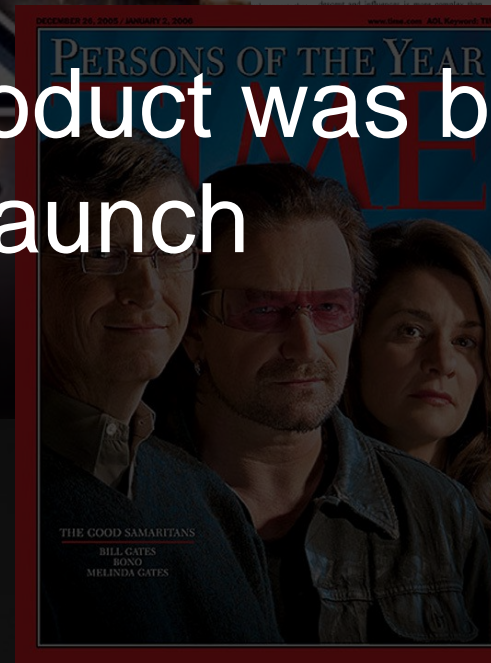
IMVU's Big Product Launch!



IMVU's Big Product Launch!

Didn't Happen That Way

Most of our product was built after launch





Instant messaging just got way cooler™



Way more visual!
Way more expressive!
Way more fun!

FREE download

3.8MB | NO spyware

What is IMVU? IMVU turns IM into avatar chat, letting you and your friends IM as animated characters in a 3D scene. The characters are called avatars. The scenes are called 3D chat rooms. IMVU and your first avatar are free. If you want to buy more avatars, clothes, or chatrooms, they are for sale in the catalog for about 50 cents each. Click for [more info](#).



Avatars!
IMVU avatars have lifelike behavior, movement and body language.



Animations!
Make your avatar smile, frown, or jump for joy as you chat with your IM buddy



3D chatrooms!
Choose where to chat. In the firelit log cabin? On the ferris wheel? Location is everything.



Customize!
Shop for clothing and accessories in the catalog. Compile your own style!



Bubbles!
Chat cartoon-style! Your words in wobbly, floating bubbles!



Get creative!
Got skills? Get busy making new avatars, clothing and rooms. [more info](#)



IMVU works with all major IM networks. [Compatibility list](#)

*All trademarks and company names are the property of their respective owners.



Goals for this Session

- Describe IMVU's development systems
- Provide examples that
 - Generate ideas
 - Inspire you to develop faster and better
 - Help you get started
- Convince you that this is possible at your company



Rapid Iteration



Big Project



Need solid understanding of
your destination, *exactly*
how to get there

Hard to change course once
the mass is in motion

Plan, check plan, re-plan,
review plan, execute plan

Big risk, big rewards!

You probably get one shot



Big Project

Rapid Iteration



React to the road ahead, obstacles unknown

Frequently adjust and fix (pit stops)

Smaller risk, incremental rewards

Ability to change course, or destination

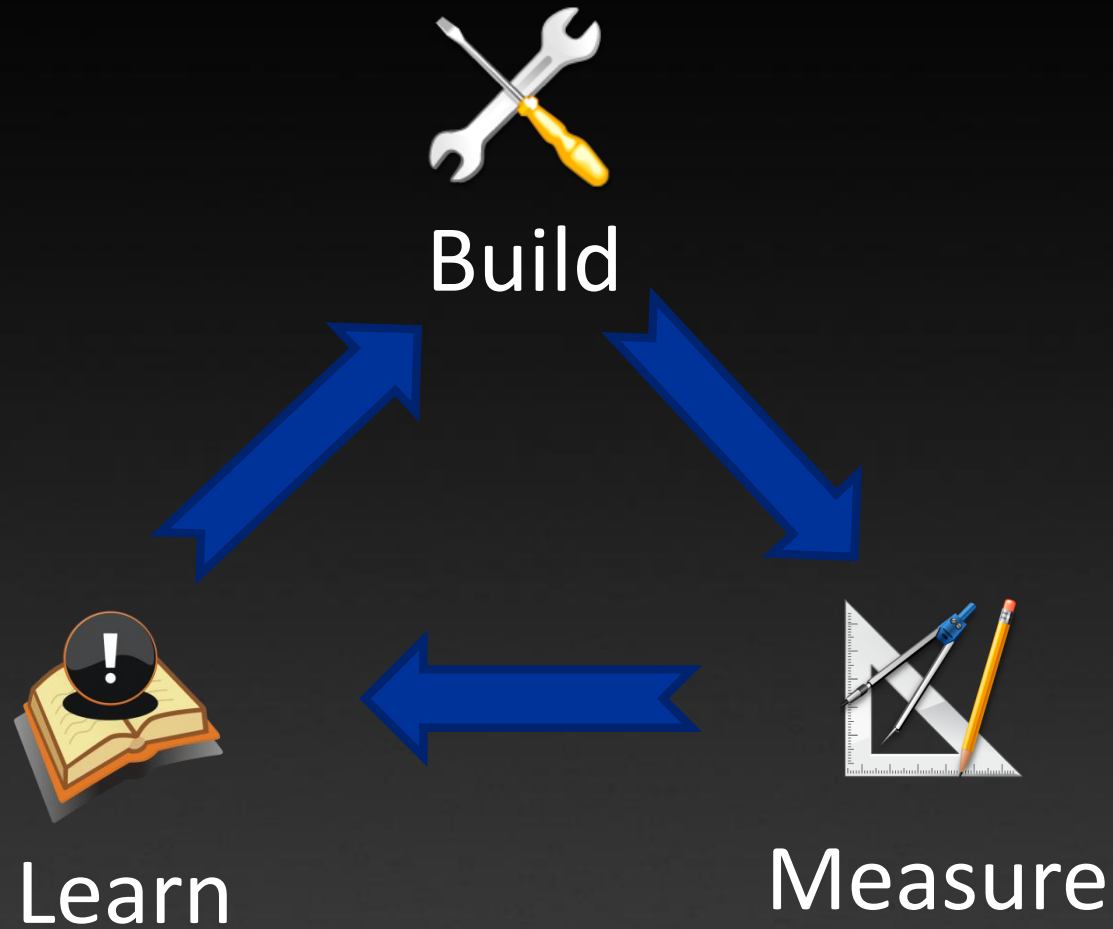


IMVU went with rapid iteration

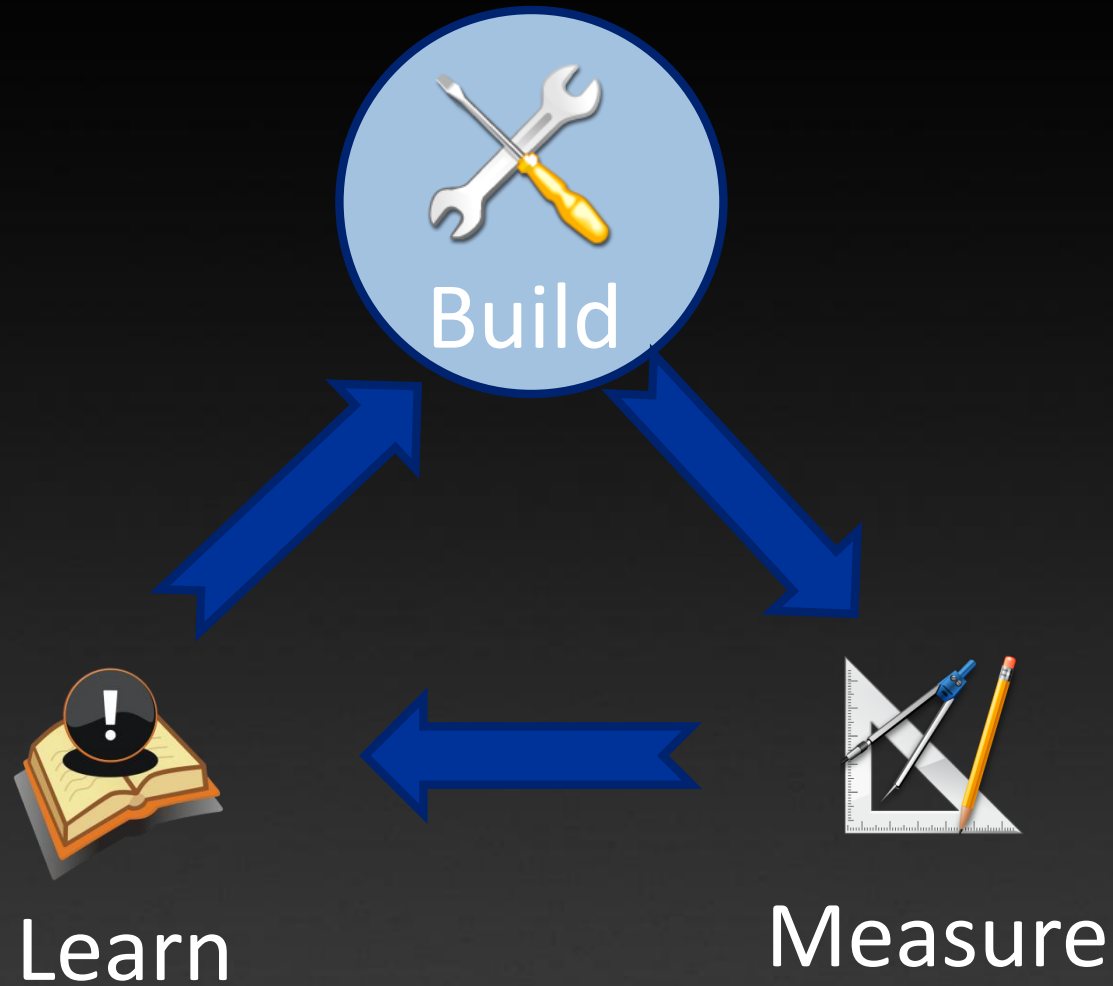


Actually... we started with something like this

Iteration Cycle



Iteration Cycle



Guidance for Making “Build” Rapid

1. Customer-facing changes can be made at any time



Build Today

Engineer commits code

20 minutes later it is live in production

Repeat about 50 times per day



Does This Really Work?

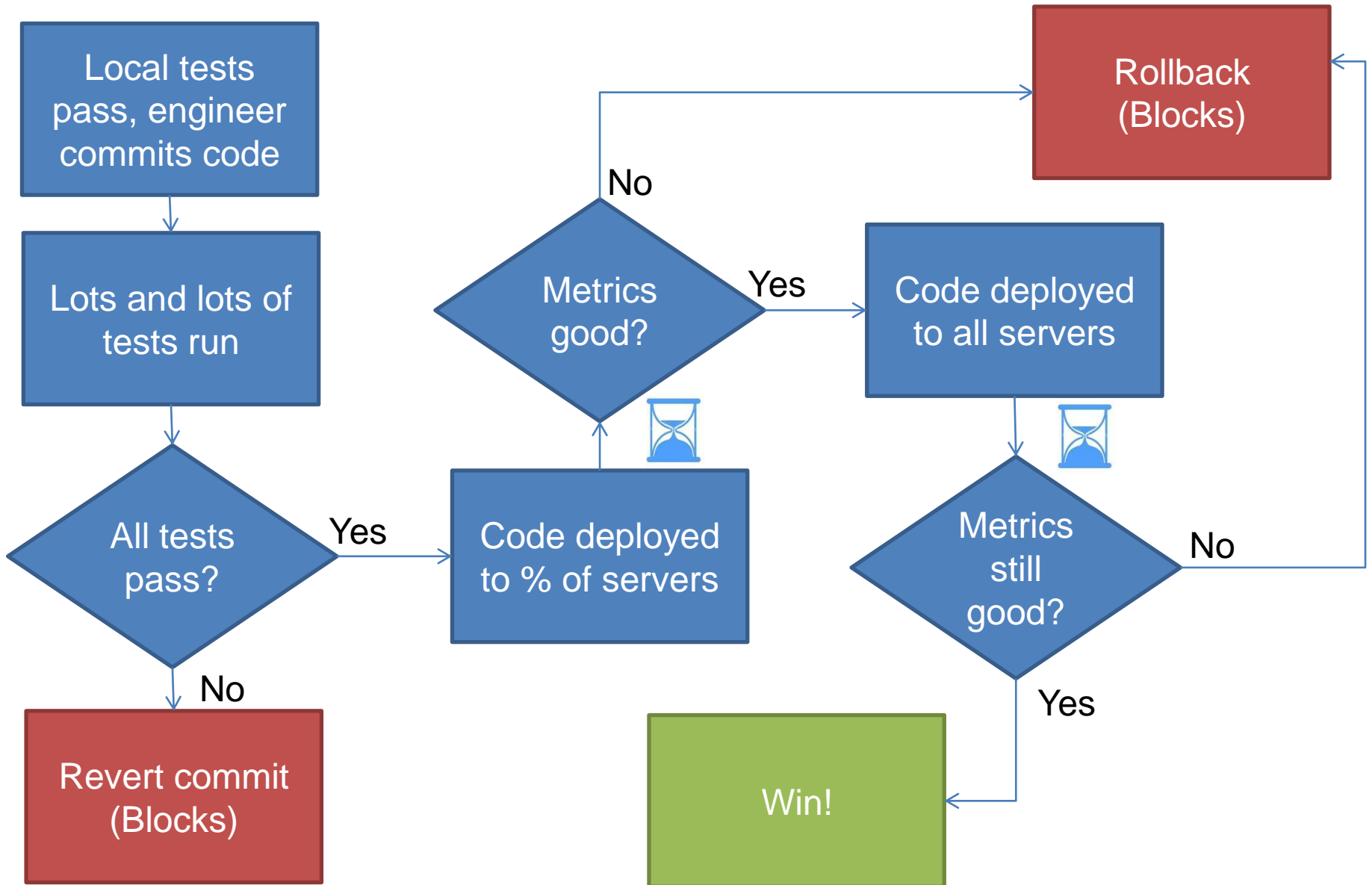
*“Maybe this is just viable for a single developer
... your site will be down. A lot.”*

*“It seems like the author either has no
customers or very understanding customers”*

Responses to February 2009 posting about Continuous Deployment at IMVU

(at the time IMVU had a \$12 million run rate)





Benefits of Continuous Deployment

- Rapid iteration using real customer metrics
- Regressions easy to find, correct
- Releases have zero overhead
- Engineers deploy code first day on job!



#imvugdc

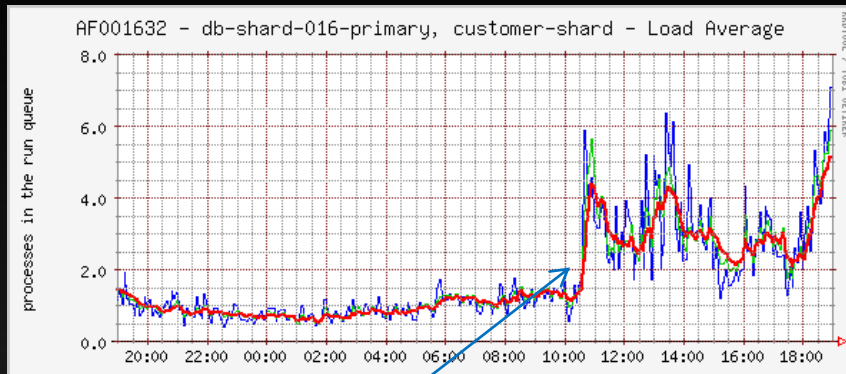


The Cluster Immune System

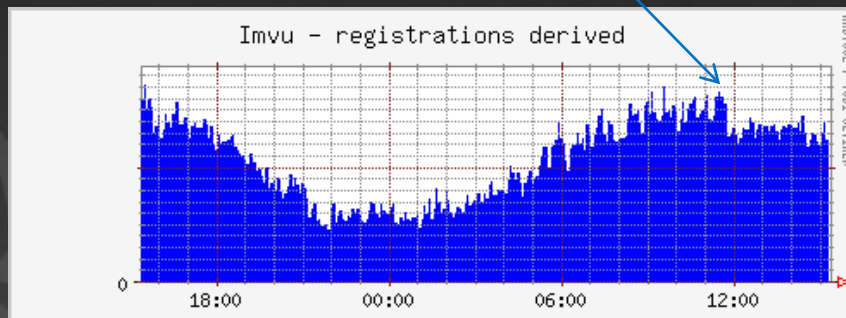
- Actively watches key metrics
 - Business: revenue, registration, logins
 - System: loads, database connections
- Two phase
 - Initial roll-out to ~5% hosts
 - Complete roll-out to 100% host
- Roll-back is automatic if metrics suffer



Finding and Fixing Problems



Identifying cause
takes minutes



- Each release has few changes, 1-3 commits
- Production issues correlate with check-in timestamp
- No overhead to producing a new release to correct issue

Schema Changes

Problems

- Difficult to roll-back schema
- Alter statements lock / impact customers

Solutions

- New schema has formal review process
- No alter on large tables, create new table
 - Copy on read
 - Complete migration with background job
- NoSQL back-end



New Features

- Developed on trunk, not branch
 - “hidden” from customers by A/B experiment
 - 100% control, add QA to experiment
- Deployed daily during development
- Slow roll-out by increasing experiment %
 - Experiment closed = fully launched



Challenges with Continuous Deployment

- Won't catch issues that fail slowly
 - `SELECT * FROM growing_table WHERE 1`
- Some critical areas cause hard lock-ups
 - MySQL
 - Memcached
- Lack of test coverage of older code
 - Not an issue if you start with test coverage
- Outsourcing

The Beginning of Build at IMVU



1. Check-in to CVS repository
2. Occasionally rsync to live server (manual)
3. Pray for the best

...and there was no automated test coverage



#imvugdc

Getting Started – Extreme Basics

1. Continuous integration system
2. Production monitoring and alerting
 - System performance
 - Business metrics
 - Trending is nice too 😊
3. Simple deploy / roll-back system



Commit to Making Forward Progress

- Require coverage for all new code
- Add coverage for failures / regressions
- Understand and fix *root cause* of failures
 - Failures in production
 - Intermittent test failures

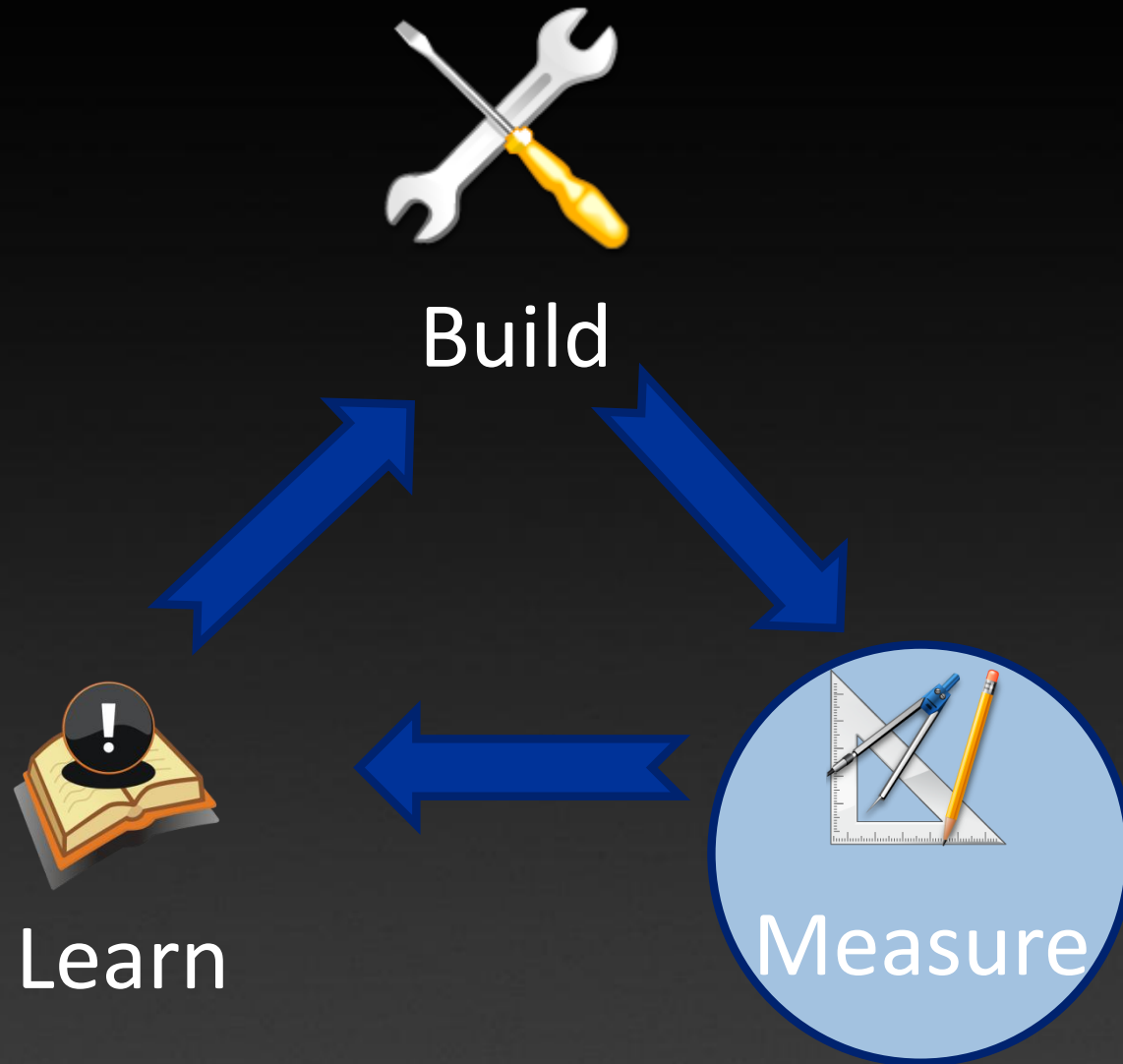


Expect Some Hurdles

- Production failures
- Different overhead
 - Tests
 - Build systems
- Production failures
- Frustration
- Process changes
- Production failures



Iteration Cycle



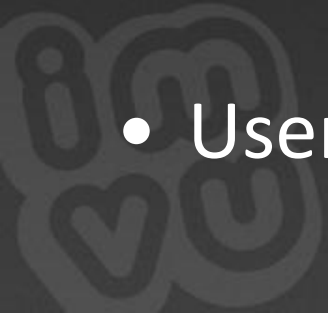
Guidance for Making “Measure” Rapid

1. Make it simple to add instrumentation
2. Aim for real-time measurements of all business-critical data



“Measure” Today

- Split-test experiment system
 - Multiple branches
 - Roll-out system
- Real-time business metrics
 - Monitoring
 - Alerting
 - Trending
- User tests



Value of Experiments

- Freedom to try new things
- Validates hypothesis (or not)
- Identifies surprises (big ones)
- Identifying anomalies



Simple Experiment System

- Define experiment in code, branch
- Web interface for adjusting parameters
- Ability to compare metrics vs. control
- Make it easy to do this! Encourage use!



Easy Experiment Setup

```
$experiment = array(
    'name' -> 'DemoGDC',
    'initial_rollout' => '0',
    'branches' => array(
        'Enhanced' => 0.5,
        // can specify multiple weighted branches
    )
);

// Helper function for readability
function user_should_see_test_feature( $uid = NULL ) {
    return get_branch_for_customer( $uid,
    $experiment ) ) == 'Enhanced';
    // assigns customer if first time called
}

// The experiment branch
if( user_should_see_test_feature( $uid ) ) {
    // behavior for experiment
} else {
    // control behavior
}
```

Experiment Admin Interface

Filter Experiment List By

Feature name	Rollout Status	Experiment Status	Explanation
<div></div> <p>Admins and qa get selected into branches at random. Everyone else will get the control behavior without being added to branches.</p>	QA and Admin only ▾	(open/active) ▾	<input type="button" value="Submit"/>
AMC:DollarStoreRedesign2 <p>Everybody gets control behavior because the rollout is 0. Nobody gets assigned to experiment branches.</p>	0% ▾	(open/active) ▾	<input type="button" value="Submit"/>
<div></div> <p>Everybody gets 'control' behavior now, and the experiment is over.</p>	0% ▾	Closed on control ▾	<input type="button" value="Submit"/>
AMC:InvitePage <p>Everybody gets 'remove' behavior now, and the experiment is over.</p>	100% ▾	Closed on remove ▾	<input type="button" value="Submit"/>

You are not your user!

- Don't rely on summarized data
 - Have the whole team *watch*
- Users better at expressing pain than telling you what you should build
- Possible with cheap equipment / no overhead



Monitoring, Alerting, Trending

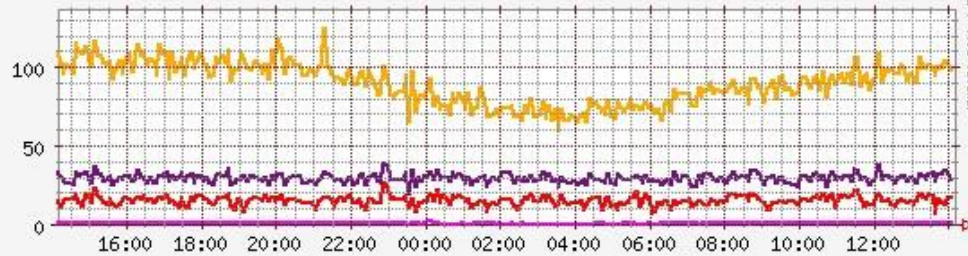
- System metrics
 - Loads
 - Response times
- Business metrics
 - Revenue
 - Key customer behavior



System Trending

Graph Template: DB Writes

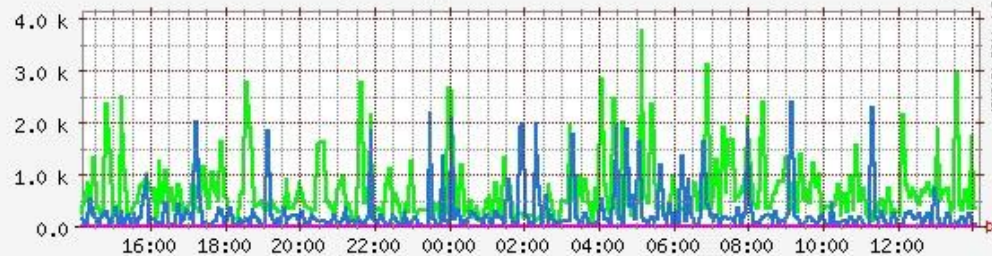
AF001653 - db-shard-016-primary, customer-shard - DB Writes (derived)



Insert	Current: 97.35	Average: 89.27	Maximum: 124.13
Delete	Current: 16.52	Average: 14.97	Maximum: 25.85
Replace	Current: 1.01	Average: 833.10 m	Maximum: 2.27
Update	Current: 28.32	Average: 29.08	Maximum: 38.67

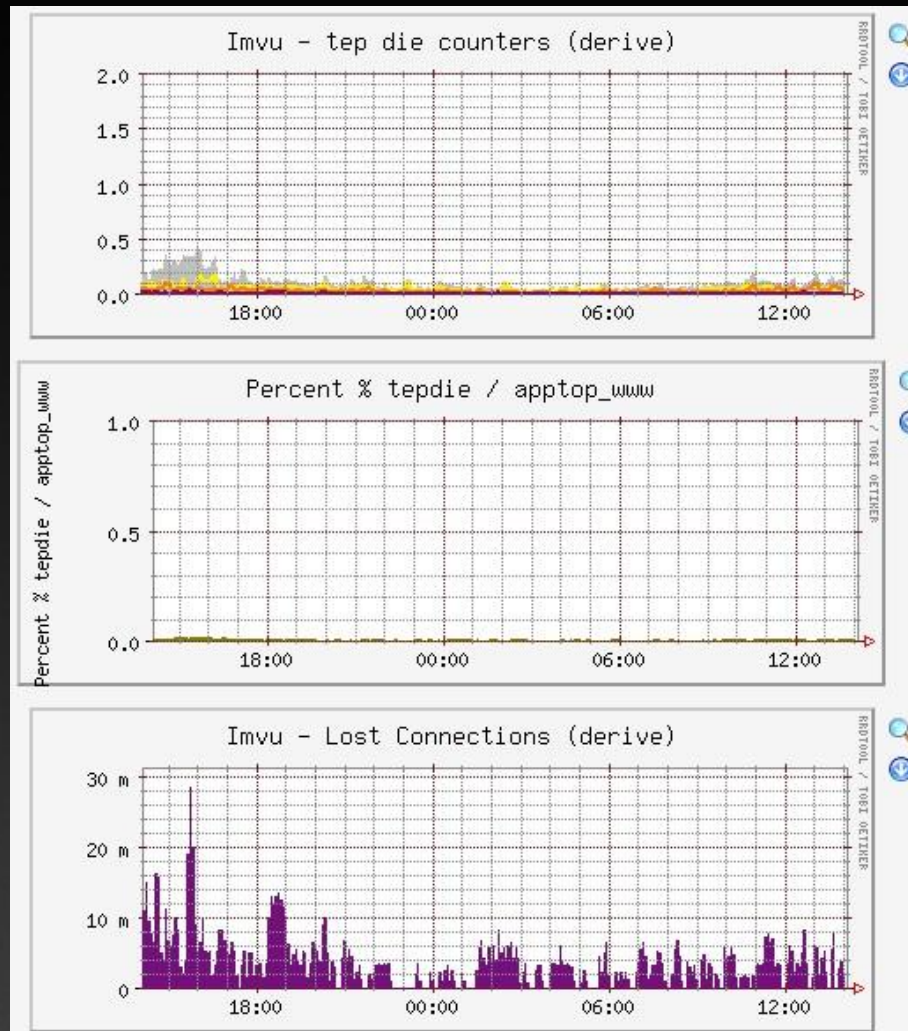
Graph Template: Imvu - IO (Disk and Swap)

AF001653 - db-shard-016-primary, customer-shard - IO (Disk and Swap)



bi 358 bo 51 si 0 so 0





Application Trending



System Alerting

AF001141	Apache Connections Monitor	OK	2010-08-20 13:58:57	65d 21h 46m 39s	1/5	Current Apache Connections: 19 OK
	Apache Server Log Size Limit	OK	2010-08-20 13:33:03	110d 5h 53m 54s	1/2	OK. All files in /var/log/apache2 are of expected size
	Capacity Based LA Check	OK	2010-08-20 13:57:18	111d 2h 24m 1s	1/2	OK. LA is 5.98/6.08/5.77
	Cybersource API Check	OK	2010-08-20 12:04:42	304d 3h 2m 33s	1/2	OK, Cybersource API present and loaded successfully.
	DNS Drone Configuration Test	OK	2010-08-20 12:05:51	746d 3h 31m 14s	1/2	OK: DNS Drone configuration for AF001141 verified
	DNS Drone Running	OK	2010-08-20 12:07:00	492d 0h 26m 14s	1/3	PROCS OK: 1 process with args 'named'
	Host Clock Skew	OK	2010-08-20 13:55:59	110d 20h 24m 42s	1/4	Clock skew of -1 seconds in withing acceptable limits...
	IMVU Apache Log Size Check Inconvenient	OK	2010-08-20 13:54:02	17d 0h 36m 13s	1/2	Ok, /var/log/user.log increasing by 0 lines per second (0 lines over 619 second period)
	IMVU PHP Fatal Error Check	OK	2010-08-20 13:54:49	1025d 2h 13m 51s	1/4	ok, 0 PHP Fatal errors in 1800 second interval
	IMVU Webserver HTTP	OK	2010-08-20 13:55:32	186d 5h 3m 23s	1/4	HTTP OK - HTTP/1.1 301 Moved Permanently - 0.078 second response time
	NTPd Running	OK	2010-08-20 13:56:44	111d 21h 48m 59s	1/5	PROCS OK: 1 process with args 'ntpd'
	Validate Networking Configuration Monitor	OK	2010-08-20 12:14:31	72d 2h 24m 1s	1/2	OK:: Routes, IPs, & SYNTAX defined in "/etc/network/interfaces" look good and consistent with the running configuration
	Webserver HTML Homepage Check	OK	2010-08-20 13:59:54	366d 19h 30m 5s	1/3	OK, wget output had 680 lines and closing tag from 10.5.4.117 for www.imvu.com request
	cron running	OK	2010-08-20 13:51:14	84d 19h 39m 28s	1/5	PROCS OK: 1 process with args 'cron'
	disk space high priority	OK	2010-08-20 13:33:03	136d 14h 26m 34s	1/3	DISK OK - free space: / 32959 MB (52%); /dev/shm 1645 MB (100%); /tmp 254 MB (99%); /dev 10 MB (99%);
	eAccelerator 0.9.5.3 enabled check	OK	2010-08-20 13:57:50	109d 20h 23m 53s	1/8	OK: eAccelerator is enabled.
	eAccelerator Functionality	OK	2010-08-20 13:05:11	168d 2h 26m 11s	1/8	OK. rc2.d symlink found OK. Directory and permissions verified
	webserver load	OK	2010-08-20 13:59:42	42d 1h 57m 20s	1/3	OK - load average: 6.22, 6.13, 5.83

Business Metric Alerting

alerts	Apache Restarts by Nagios	OK	2010-08-20 14:00:50	17d 22h 15m 57s
	Bulk Import AOL Simple 	OK	2010-08-20 13:55:28	17d 0h 58m 14s
	Bulk Import Gmail Simple	OK	2010-08-20 13:52:24	0d 0h 9m 13s
	Bulk Import Hotmail Simple	OK	2010-08-20 14:01:20	9d 15h 15m 15s
	Bulk Import Yahoo Simple	OK	2010-08-20 14:00:09	17d 1h 9m 19s
	Cacti Poller Complete In Time 	OK	2010-08-20 14:00:05	17d 0h 42m 0s
	Cacti Updating Check	OK	2010-08-20 14:01:15	29d 20h 30m 49s
	Chat Service Monitor 	UNKNOWN	2010-08-20 13:57:11	97d 20h 7m 23s
	Check database backups based on last success run	OK	2010-08-20 12:04:37	0d 23h 59m 16s
	Client Release Exception Rate	OK	2010-08-20 13:37:08	0d 0h 54m 53s
	Customer Registration Quality	OK	2010-08-20 13:59:53	3d 20h 33m 32s
	Customer Registration State Queue Delay	OK	2010-08-20 14:00:13	0d 0h 48m 58s
	Customer Shard Usage 	CRITICAL	2010-08-20 12:09:14	18d 5h 1m 6s
	Cybersource Successful Orders Rate [Off-Peak Hours]	OK	2010-08-20 06:58:03	37d 21h 6m 23s
	Cybersource Successful Orders Rate [Peak Hours]	OK	2010-08-20 14:00:30	12d 5h 40m 10s



Predictive Monitoring

- Sounds great!
 - But we can't make it work
- Problems with variation in business
- False alerts lead to ignored alerts



The Beginning of Measure at IMVU



1. Simple A/B experiment system
2. No cluster monitoring
3. Manual SQL queries



Getting Started with Measure

1. Enable experiments
2. Deploy a packages for trending & alerting
3. Add a simple counter system (memcached)
 - increment / set key functions for your app
 - simple template for monitoring to read value
4. Start counting something (revenue is good)



#imvugdc

Monitoring and Alerting Options

- Nagios – alerting, scales well, state is an issue
- Cacti – trending, simple to start, difficult to scale
- Ganglia – trending, scales well, work to centralize
- Zabbix – trending and alerting
- Munin – trending



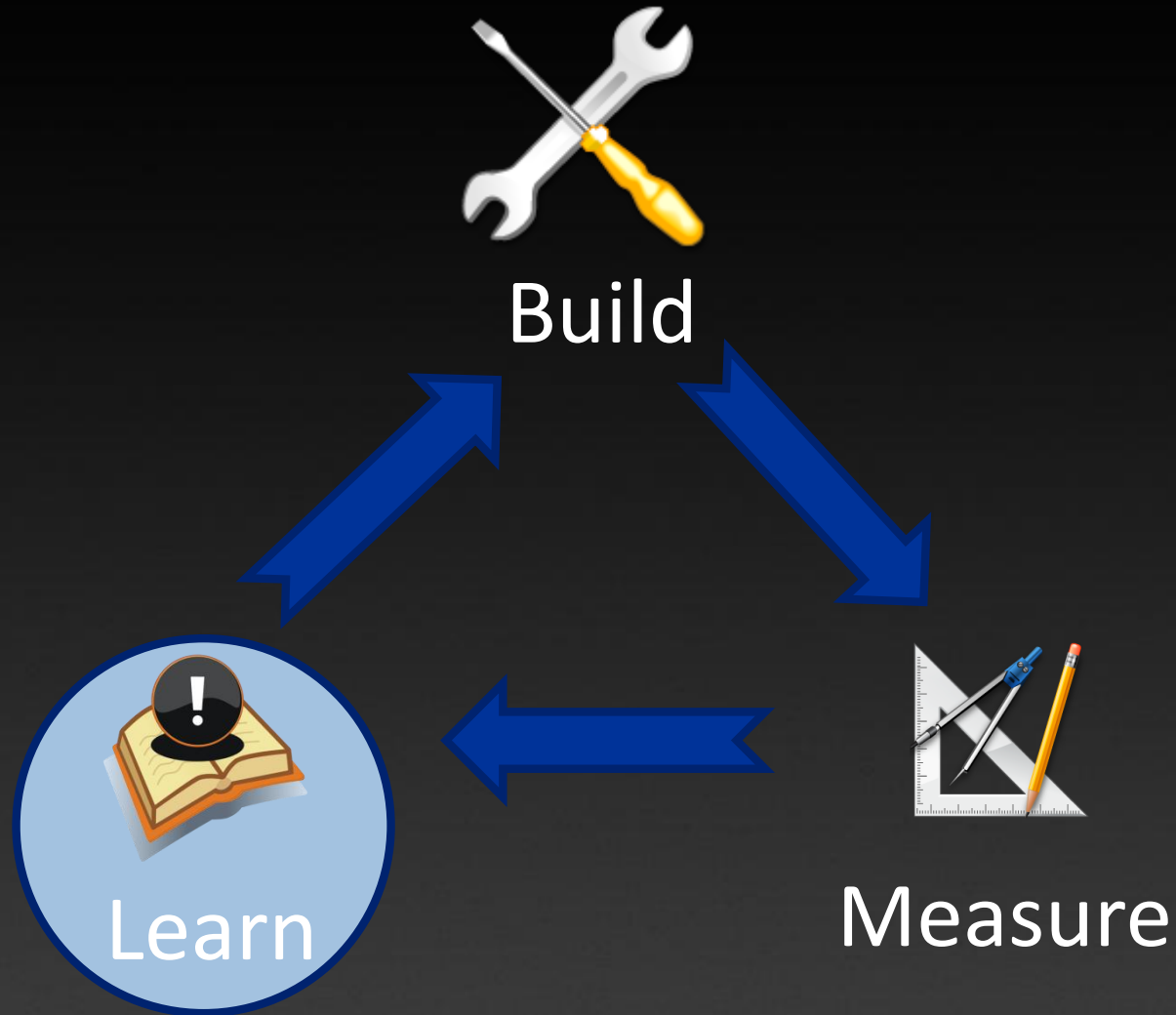
Consider Monitoring

- Basic system (load, disk, availability)
- Customer lifetime funnel
- Key business metrics
- As you learn, anything that impacts these

We are constantly adding new monitoring



Iteration Cycle



Guidance for Making “Learn” Rapid

1. Regularly review data from “measure”
2. Make process change part of the process
3. Share data widely as possible



“Learn” Today

- Data frequently reviewed
 - Postmortem failures
 - Scrum retrospectives
 - Weekly business review
 - Experiment results
- Iterate on processes after every sprint
- Data shared with *all* employees



Experiment System Output

Start date: 2010

End date: 2010

Run Report

☒ Flush cache

AMC:avatar

Add Buckets

[delete](#)

Bucket

All accounts that logged into client

☒ Logged into client

Experiment:

[delete](#)


Bucket

appendation

☒ Logged into client

Experiment:

		control	appendati on
User Count		148266	150702
	%	20.19	20.22
	%		
female	%	69.36	69.06
	%		
	%		
	%	0.24	0.23
	%	0.57	0.59
	%	35.50	35.37
	%	29.48	29.61
	%	25.80	25.93
	%	1.54	1.51
	%	5.50	5.44
	%	2.18	2.14
	%	43.59	44.39
	%	15.74	16.01
		136.91	135.30



#imvugdc

%

	Control	Treatment
Samples	64630 / 148266	66903 / 150702
Mean	0.43591	0.44394
Variance	0.24589	0.24686
P-value: 0.000010		
Significance: 99.9990%		
Chance of occurring randomly: 0.0010%		

- Experiments simplify understanding 'R'
 - Measure revenue per user in experiment
- Scrum simplifies understanding 'I'
 - Track “actual time” on each task



Beware Data!

- Do you understand what was measured?
- Do the results make sense?
- Have you reached a local maximum?
- Is your view too narrowly focused?
- Is it statistically significant?



#imvugdc

Statistical Significance Made Simple

1. Define N as “the number of trials.”
2. Define D as “half the difference between the 'winner' and the 'loser'.”
3. The test result is statistically significant if D^2 is bigger than N.

	T1	T2	T3
Control	8	32	62
Experiment	4	19	40
N	12	51	102
D	2	6.5	11
D^2	4	42.25	121
Significant?	No	No	Yes

Requires 50/50 split between control and experiment. Provides 95% confidence interval using a Chi-squared test

This is a great blog post: <http://blog.asmartbear.com/easy-statistics-for-adwords-ab-testing-and-hamsters.html>

Review and Revise

- Regularly review your operating data
 - Business performance
 - Experiment results
 - Retrospectives for process
- Change processes based on learning
 - Stop doing, Start doing



Now What, Mr. Rapid Iteration?



Failure is a Learning Opportunity

- Postmortem undesired results
 - Service failure
 - Business failure
 - Organizational problems
- Produce action items that prevent recurrence
 - And actually do them



Toyota “5 Why” Method

- Get to root cause, not just symptom
- Ask “why” 5 levels deep for each issue
- Identify corrective measures for each cause
 - Respond with appropriate level of investment



Example 5 Why

Y1: Why were logins failing

A1: The master database has too many connections

Y2: Why did the master have too many connections?

A2: A new feature was using slow-running queries

Y3: Why were there slow queries?

A3: They were implemented with a cache time of 0

Y4: Why would queries have a cache time of 0?

A4: Ned, the new engineer, did not know that slow queries on the master have to be cached

Y5: Why didn't Ned know about caching slow queries?

A5: Well, he's new and we don't discuss it in boot camp and he cut and pasted from another query as an example

Transparency

- Share data!
 - More informed decisions
 - Empowered staff
- Share the good and the bad
- Don't penalize failures
 - People avoid sharing data if they are penalized
 - Failure is an opportunity to learn & improve



#imvugdc



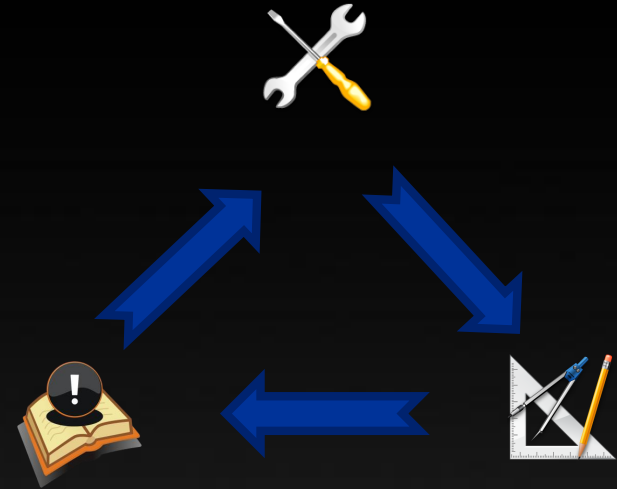
The Beginning of “Learn” at IMVU



1. A/B testing (no roll-out)
2. *Extremely* basic reporting on funnel
3. Shared in daily standup and by e-mail



Making Iteration Rapid



- Make it easy
- Measure!
 - Look for anything that slows the iteration cycle
- Incremental improvements
 - Baby steps on your way to rapid iteration
 - Pick one thing to improve



Thank You! Any Questions?

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