T16

DevOps/Continuous Delivery
Thursday, October 4th, 2018 1:30 PM

What You Can't Measure, You Can't Improve: Measurements for a Continuous Delivery Organization

Presented by:

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Hudl

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Ashwin Desai

Vice president of Quality at Hudl, Ashwin Desai is responsible for leading the transformation of a worldwide QA team to an automation focused organization following the testing pyramid and setting quantitative measures to allow the company to learn and improve quality. Previously Ashwin was the VP of Engineering, Quality and DevOps at ikaSystems where he led a large transformation to agile and continuous testing and continuous delivery across the organization. Prior to that Ashwin worked as the Principal Quality Architect at IBM and provided leadership for the agile transformation of the Engineering team and was responsible for developing an overall testing approach and continuous deployment pipeline for an omnichannel eCommerce platform.

What you cant Measure, you cant Improve.

Ashwin Desai
VP Quality

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Agenda

- Hudl Overview
- Product Team
- Measure & Improve Quality
- Learnings
- Metrics 2.0
- Wrap up

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We help teams
and athletes win.

Helping Teams Win

Capture

Share

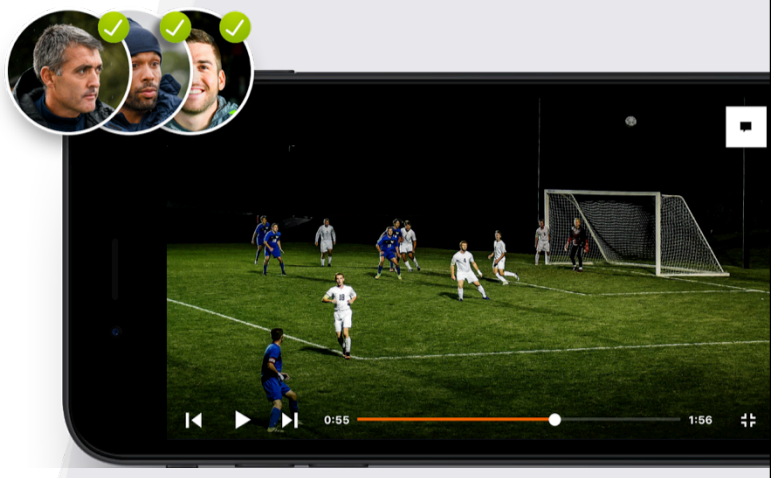
Analyse

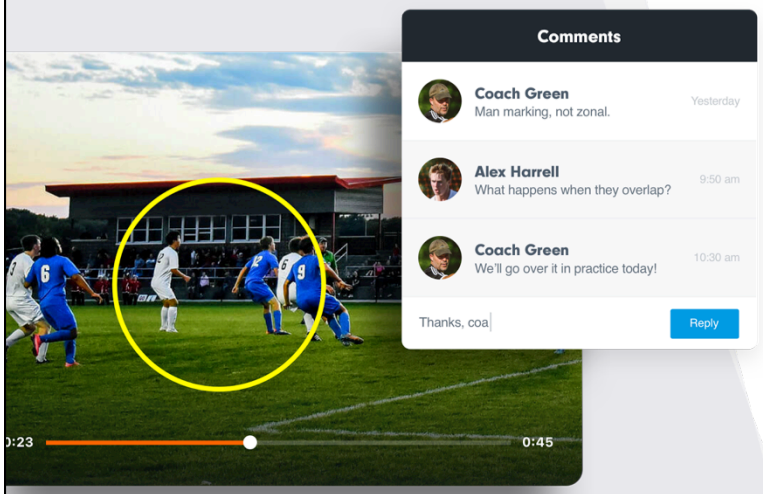
Record with your favorite device.

Use your iPhone, iPad or hard drive camera to record every game or training session. Connect to Wi-Fi and the video will upload as it's captured.

Access video anywhere.

Full games and practices can be shared with the whole team to study from any computer or mobile device.





Bring lessons to life.

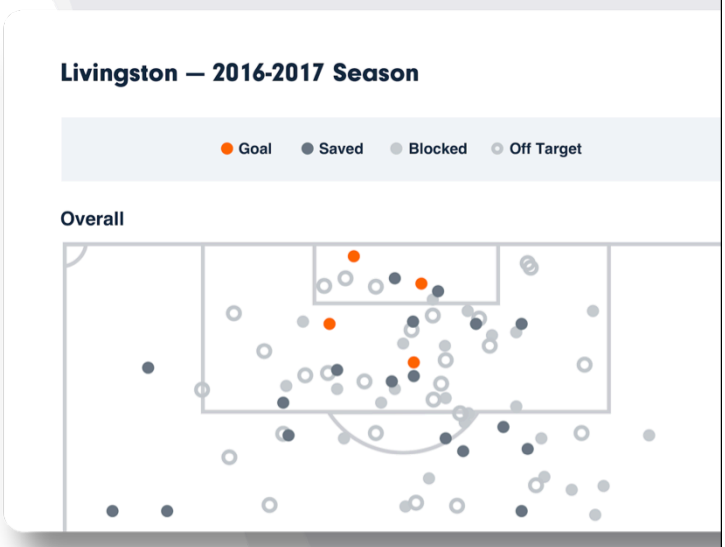
Help your team see exactly what needs to improve. Allow players to critique their own performance, or provide personalized feedback by sharing comments and drawings.

Interactive Visual Reports

Shot charts allow you to study every shot type for your team and the opponent.

View shots and goals from a single game or the whole season in seconds.

Click any shot in the chart to watch the video.



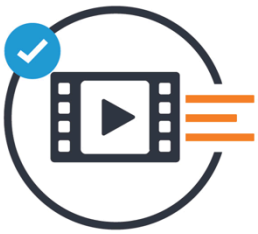
Three ways to track stats

At the Game

Have an assistant coach, injured player or parent use the Hudl app to track your team stats live.

After the Game

Track team and player stats as you re-watch the game on any iPad or computer.



Leave It to Us

Send us your video through Hudl Assist and you'll receive team and player stats in under 24 hours.

We have products for teams at **every level** of competition.

We work with the **world's best**.

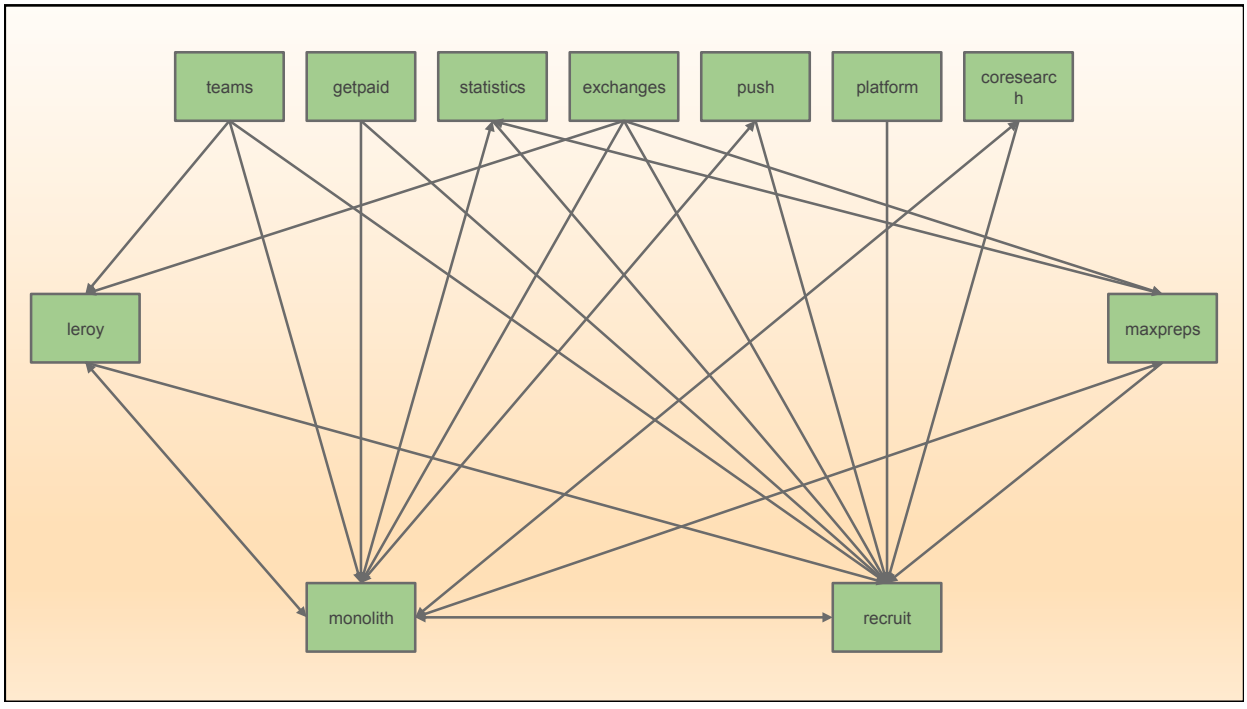
20/20 English Premier League	**15/23** Major League Soccer	**29/30** National Basketball Association	**18/18** Australian Rules Football League	**18/20** Chinese Basketball Association

Hudl is the industry standard.

- **4.5MM** app downloads
- **4.4MM** active users
- **160K** active teams
- **98%** of high school football teams
- **41K** high school basketball teams
- **30+** sports around the world
- **38** hours of video loaded every min at peak

Product Team @ Hudl

Microservices architecture



Product Team @ Hudl

~25 small autonomous squads working on ~12 Bets

Ship early, ship often

Anyone can work on any code.

Anyone can deploy, anytime

Deploys and rollbacks are fast and easy

~ 250 deploys to production per week

Product Team @ Hudl - 2016

Use monitoring in production to understand Quality.

Quantitative in-process data was not being collected.

Lack of standardization.

Goal

Improve Quality delivered by Product Team

Hypothesis – Build Quality In.
Reduce rework. Increase flow.

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Build Quality In

Improve Quality.
How would we know it has improved?

Improving Quality

You need to measure it, to show improvement.

Process

Introduce concepts of in-process and production quality

Standardize data collection

Process

Agree on Measurements

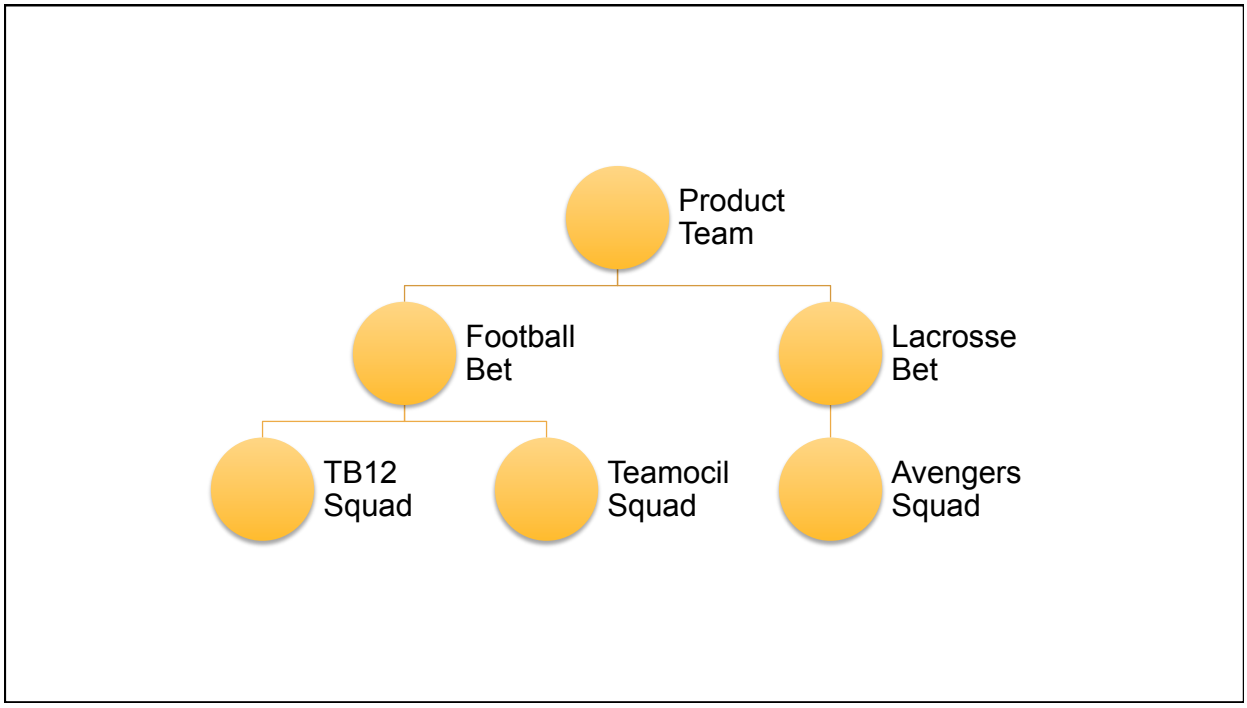
Collect Measurements

Establish Baseline

Analyze data

Identify Changes

Repeat Measurements to see if improvement in Baseline



Measure Quality for each Bet – use same measurements for each Bet.

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Add up measurements of individual Bets to understand overall quality produced by the Product Team.

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Use time intervals, not releases, as a basis to measure quality

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Goal – improve Product Team Quality by improving Quality for each Bet

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Quality metrics

Concerns/Questions

1) Why have metrics?
2) What will we measure?
3) What will you do with the metrics?
4) Metrics can be misused
5) Metrics can be gamed.

Key definitions

Bets = Investment themes/projects

Bet Sub-defects = defects found before deploy to production

Bet Defects = defects for functionality worked on by the bet found after deploy in production.

Measurements – for each bet

1) Testing effectiveness

a) Quality coming into QA = Sub-defects per developer per week

b) Quality Leaving QA = Defects per developer per week

Testing effectiveness = Quality Leaving QA/Quality coming into QA

Measurements for each bet

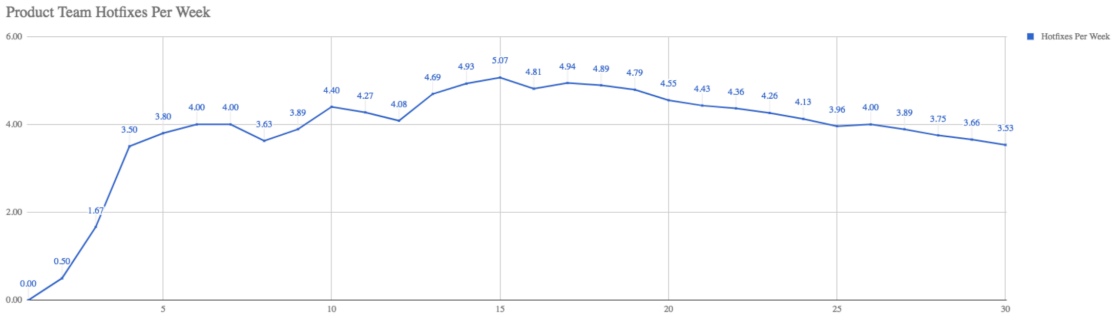
2) **Amount of rework** - % of total deploys to production that are fixes.
3) (**External) change fail percentage** – Hotfixes per week
4) **Debt** - Open legacy defects
5) **Customer feedback** - Number of support interactions

The numbers

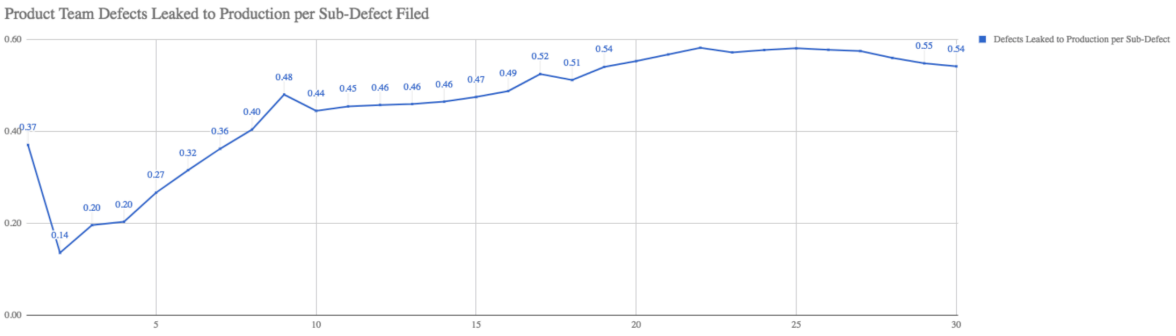
Bet Quality

Bet	Sub-Defects per Engineer per Week (SEW)	SEW Trend	Bet Defects per Engineer per Week (BEW)	BEW Trend	Defects Leaked to Production per Sub-Defect	Fix & Hotfix Merge % (FHM)	FHM Trend	Hotfixes per Week (HW)	HW Trend
[redacted]	0.38	Trending Up	0.10	Trending Down	0.27	24.84%	Trending Down	0.15	Trending Down
	0.78	Trending Up	0.21	Trending Up	0.27	21.73%	Trending Down	0.24	Trending Down
	0.32	Trending Down	0.28	Trending Up	0.85	29.08%	Trending Down	0.17	Trending Down
	0.18	Trending Up	0.29	Trending Down	1.65	19.31%	Trending Down	0.50	Trending Down
	0.58	Trending Down	0.19	Trending Down	0.32	24.90%	Trending Up	0.08	Trending Up
	0.53	Trending Up	0.19	Trending Down	0.36	31.92%	Trending Up	0.09	Trending Down
	0.40	Trending Up	0.43	Trending Down	1.09	31.58%	No Change	1.63	Trending Down
	0.37	Trending Down	0.08	Trending Down	0.22	18.55%	No Change	0.06	Trending Down
	0.55	Trending Up	0.09	Trending Down	0.17	19.18%	Trending Up	0.18	Trending Down
	0.49	Trending Down	0.18	Trending Down	0.34	19.07%	Trending Up	0.13	Trending Down
	0.50	Trending Up	0.05	Trending Up	0.10	14.6%	#DIV/0!	0.00	No Change
	0.33	Trending Down	0.33	Trending Up	1.00	15.74%	Trending Down	0.00	No Change
Product Team	0.46	Trending Up	0.25	Trending Down	0.55	26.85%	Trending Up	3.66	Trending Down

The trends



More trends...



Inspect

1) The teams were collecting the data but were not using the data.
2) Data collection not consistent across teams.
3) Concerns of misuse.
4) Concerns of changed behavior among teams.
5) Hard to change culture!!

Adapt

- Form a team of QAs to focus on metrics.
- Send a survey to product team
- Analyze the level of adoption, applicability and usefulness of the current Quality Metrics
- Determine areas of improvement.

Results

Are you aware of the existence of Bet Quality metrics?

Yes	No
92%	8%

Do you know where to find the Bet Quality metrics for your Bet?

Yes	No
61%	39%

Do these metrics paint a clear picture (or provide any insights?) of your Bet/Squad's week-to-week quality?

Yes	No
39%	**61%**

Results

Here are the currently tracked Bet Quality metrics. For each metric, specify whether or not the metric provides insight into Bet Quality.

Current Metric	Yes	No
Sub-Defects per Engineer per Week	35%	**65%**
Bet Defects per Engineer per Week	44%	**56%**
Defects Leaked to Production per Sub-Defect	**61%**	39%
Fix & Hotfix Merge %	**75%**	25%
Hotfixes per Week	**82%**	18%
Hotfixes per 10 Engineers per Week	34%	**66%**
Total Open Bet Defects	**67%**	33%
Total Open Legacy Defects	**51%**	49%
Bet Support Interactions	**65%**	35%
Total Support Interactions	**58%**	42%

Qualitative Feedback

1) Each bet is different in nature, some more so than others.
2) Per engineer metrics are problematic; the current metrics are creating unhealthy pressure.
3) **Too many metrics.**

Learnings

- Keep it simple
- Allow flexibility for bets
- Remove bet to bet comparison
- Collaborative v/s competitive

Metrics 2.0

Changes

- Core Metrics
- Product Team level reporting
- Three measurements

“Product Team” Core Metrics

- Internal change failure rate - % of stories that have at least one sub-defect logged against them.
- Testing effectiveness – % of defects found pre-prod v/s in production
- External change failure rate - % of total deploys to production that are fixes.
- Flow - # of Deploys per month to production

Quality Improvement Team

1) Sub-defects, defects, story understood and applied consistently.
2) Establish Bet lead circles to learn and improve.
3) Work with Bets to review their Bet Quality metrics and outcomes.
4) Establish framework to sustain gains.

“Product Team” Metrics Trends

- What do they look like?

“Product Team” Metrics Trends

- % of stories with at least one defect – ↑
- % of defects found in prod – ↑
- % of prod deploys that are fixes – ⇨
- # of prod deploys per month – ↑

“Product Team” Metrics Trends – Diving in

- % of stories with at least one defect – ↑
- % of defects found in prod – ↑

High percentage of prod defects was legacy defects.

Next steps

- Use data to get buy in for changes –
  - Focus on defect prevention into QA (eg Test Driven Development)
  - Focus on defect detection in QA (eg document and review test cases, “test bash”)

What about squads/bets?

- Customized Model
- Up to the team

Guidelines for teams -

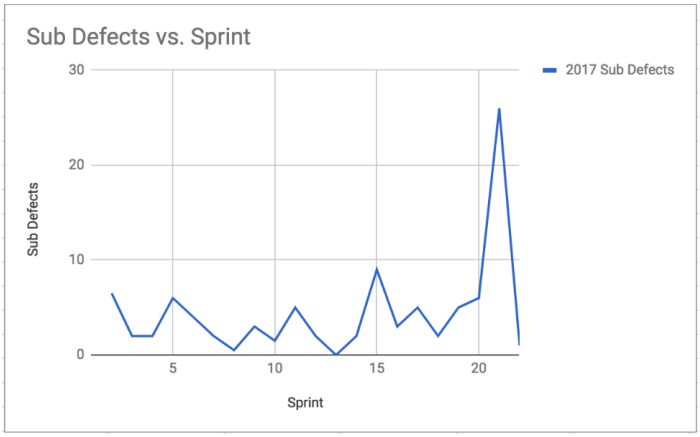
- Figure out what works for you.
- Limit to top three.
- Make them visible.
- Use data and demonstrate improvement in quality.

Customized metrics for a bet

V3 Workflow Cumulative Quality Report

Job	Prod Defects	UX/Design Debt	Tech Debt	Test Coverage	TOTAL
Web Upload	0 issues	0 issues	0 issues		0 issues
iOS Record and Upload	0 issues	0 issues	1 issue		1 issue
Publisher and Encoding Pipeline	0 issues	0 issues	0 issues		0 issues
Finding and Organizing Video in the Library	12 issues	0 issues	14 issues		26 issues
Video Playback	13 issues	0 issues	7 issues		20 issues
Curating Video Data	10 issues	0 issues	14 issues		24 issues
Presenting	1 issue	0 issues	1 issue		2 issues
Sharing	0 issues	0 issues	5 issues		5 issues
Highlighting	2 issues	0 issues	3 issues		5 issues

Squad data



What's Missing?

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Thanks!

Code Quality Improvement Team

- Asma Gulbaz
- Peter Yasi
- Michael Li
- Jaron Ahmann
- Sufyan Farooqi
- Mark Noble
- Mike Korsakas
- Ethan Seyl

Wrap Up

1) Measurements key to improving quality.
2) Figure out what works for ”**your**” team.
3) Look for counterbalancing measures.
4) Look at trends.
5) Make measurements visible.
6) Make sure teams use data from measurements to improve.
7) Expect to make changes to measurements based on team feedback.

Quality is an ongoing journey – create a Continuous Improvement culture

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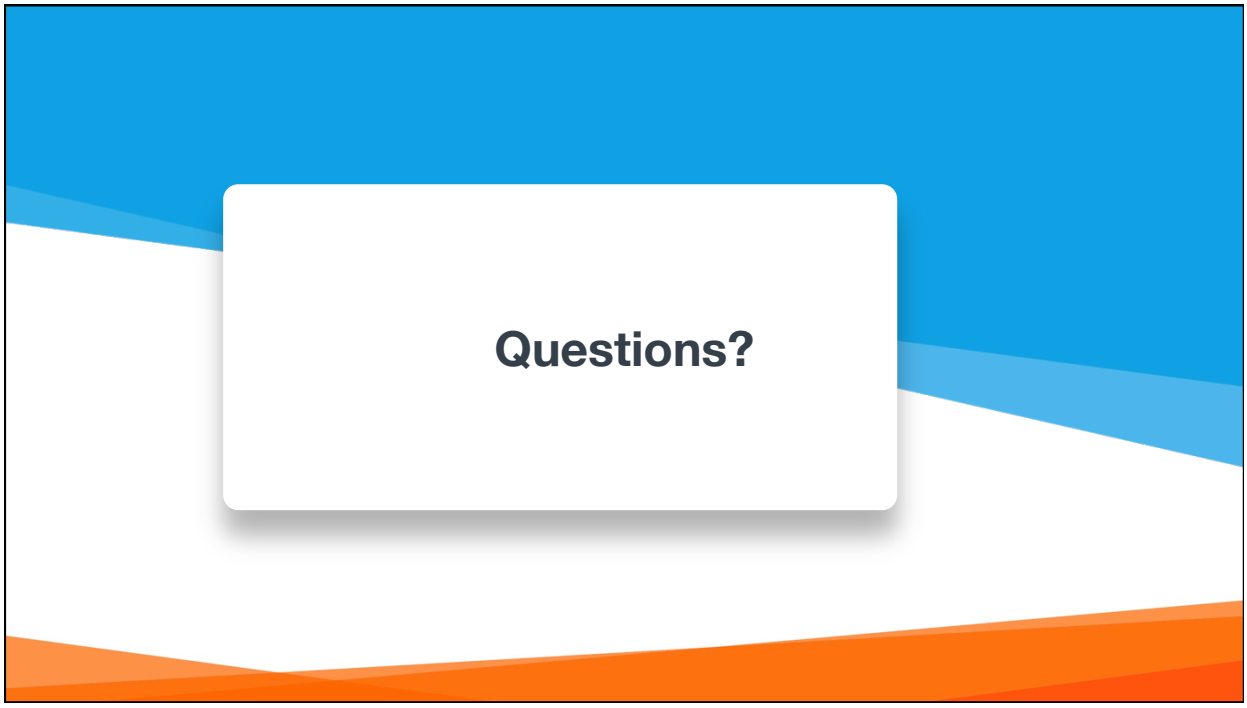
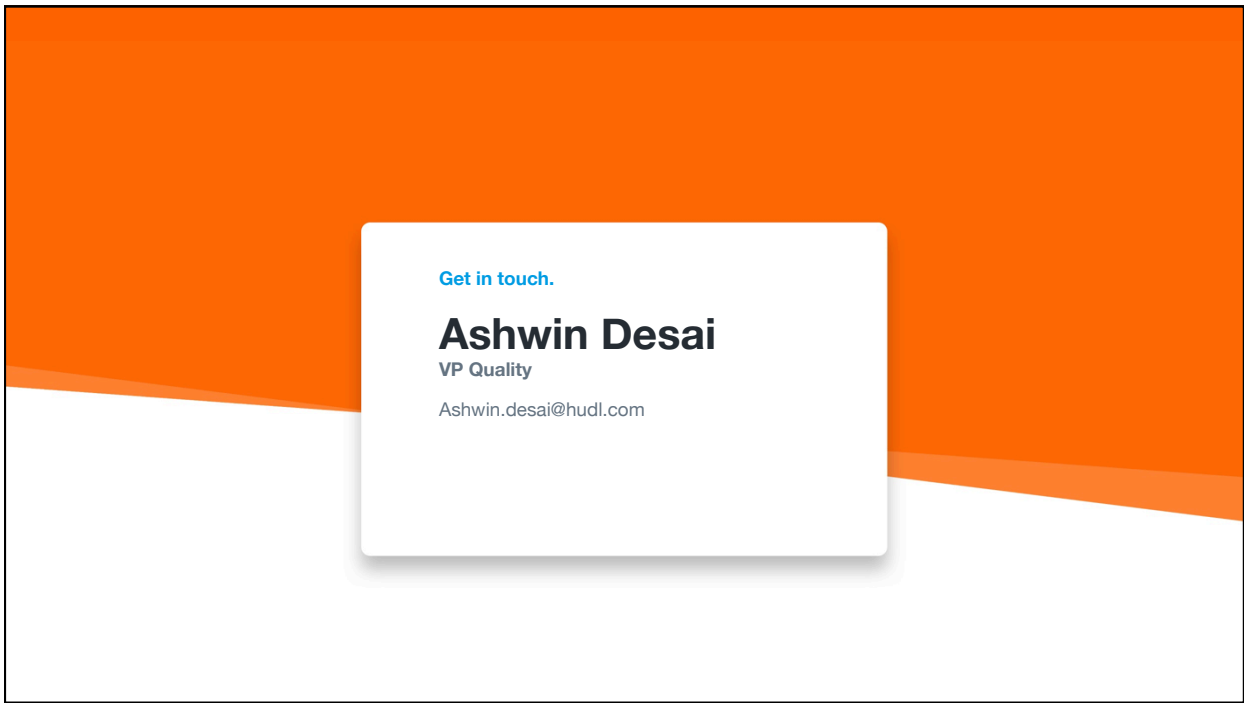

Questions?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