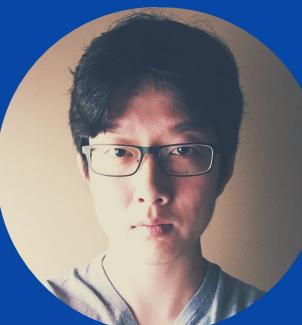




News Feeds, Notifications, Recommendations.

Is Collaborative Software Promoting or Hurting Employee Productivity?



DANIEL CHUNG | DATA SCIENTIST | ATLASSIAN

“

**A wealth of information
creates a poverty of
attention.**

HERBERT A. SIMON

**“Every day,
we create 2.5
quintillion
bytes of
data.”**

—IBM, March 5, 2014

Cambrian SaaS
Explosion of data.

“Content Shock”
Content production > content consumption.

Fight Data with Data.
Learn to better navigate.

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PROBLEM

1. We constantly create.

We produce a wealth of information but don't know where they exist or which is relevant ("FOMO").

2. We constantly communicate.

When does collaboration become a distraction?

The image displays two side-by-side screenshots illustrating communication challenges. On the left, a smartphone screen shows a video call interface with a woman's face. On the right, a desktop computer screen shows a Trello board titled "Editorial Calendar" and a Slack workspace for "Marketing". The Trello board is organized into columns: "Editing", "Making Graphics", and "Ready For Publishing". The "Editing" column contains cards for "The Invisible Problem Wrecking Your Productivity and How To Stop It" (due Jun 6), "How To Give Your Team Status Update" (due May 30), and "Activity Hacking Doesn't Exist" (due May 18). The "Making Graphics" column features a card with a brain icon. The "Ready For Publishing" column includes a card for "How We Translate Our Support Cases Now That We Have Gone International" (due May 9). The Slack workspace shows a channel with messages from team members like Nadia Garcia, Aakash Kapoor, and Eric Jones, discussing marketing assets and website updates. The desktop screen also shows a Jira integration and a list of team members in the sidebar.

Atlassian's Mission

From space travel and DNA sequencing,
to video games and nonprofits, our
mission is to **unleash the potential in**
every team and help advance humanity
through the power of software.



Search & Smarts?

We help people focus on the most important tasks and connect them to relevant collaboration as it happens.



How do we do this?

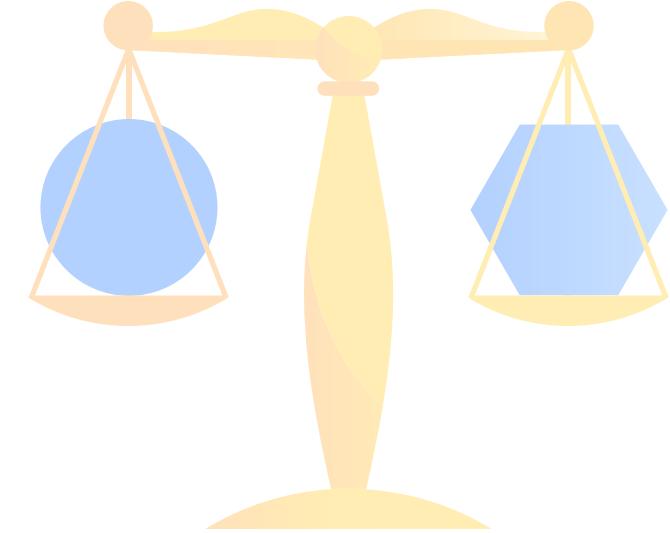


Content Discovery

Cross-product search,
recommendations,
notifications, etc.



Content
Understanding
Topic modeling, topic
prediction, etc.



Measurement and experimentation

CTR and Engagement



Productivity.

How do we do this?



Content Discovery

Cross-product search,
recommendations,
notifications, etc.



Content Understanding

Topic modeling, topic
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Measurement and experimentation

CTR and Engagement



Productivity.

How do we do this?



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Cross-product search,
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Productivity.

How do we do this?



Content Discovery

Cross-product search,
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Content Understanding

Topic modeling, topic
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Measurement and experimentation

CTR and Engagement



Productivity.

User Behavior Data



Content Management

- Created / updated page
- Removed page
- Created attachment
- Liked a page
- ...



Communication

- Messaged a user
- Mentioned a user
- Sent a file
- ...
-



Work Tracking

- Created / updated issue
- Viewed issue
- Closed issue
- Created comment
- ...

STOP.

How do we best
communicate
this to the
business?



Index Scores



Collaboration Index (CI)

Measures how frequently teams are collaborating.



Productivity Index (PI)

Measures the team productivity.

Methodology

Understand

Visualize

Model

Validate

Productivity

Creating (Active)

Responding
(Passive)

Engaging
(Active)

Consuming (Passive)

Collaboration

Methodology

Understand

Visualize

Model

Validate

Productivity

Creating (Active)

Created page

Created attachment

Added label

Created comment

Created mention

Engaging
(Active)

Liked

Messaged

Responding
(Passive)

Viewed page

Viewed issue

Consuming (Passive)

Collaboration

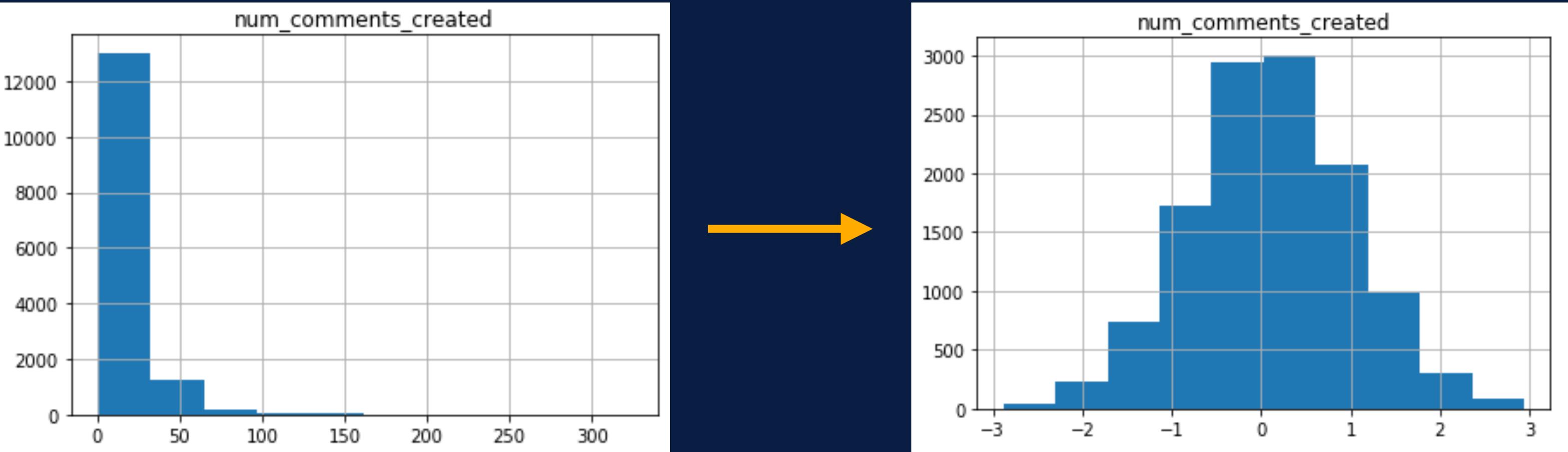
Methodology

Understand

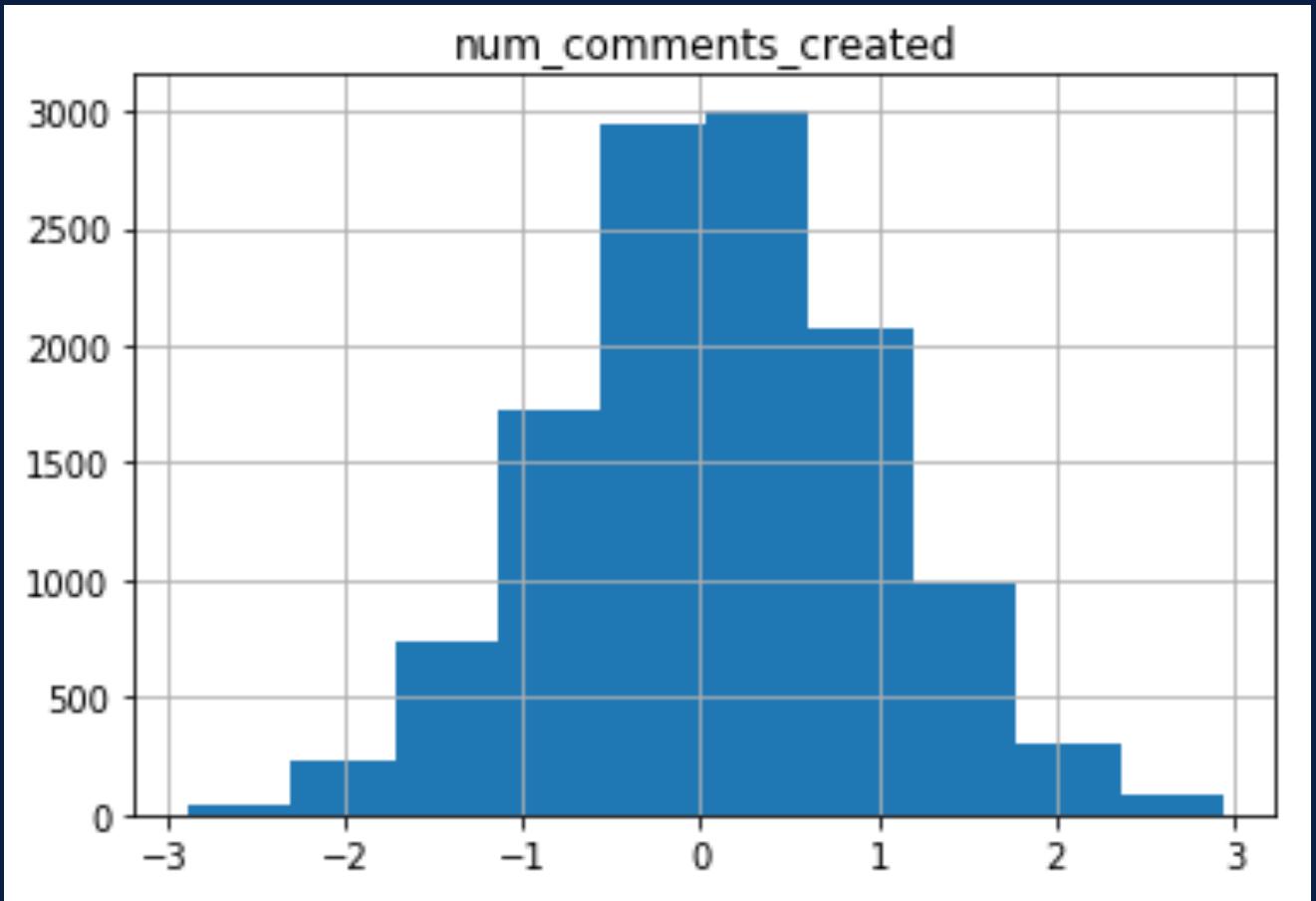
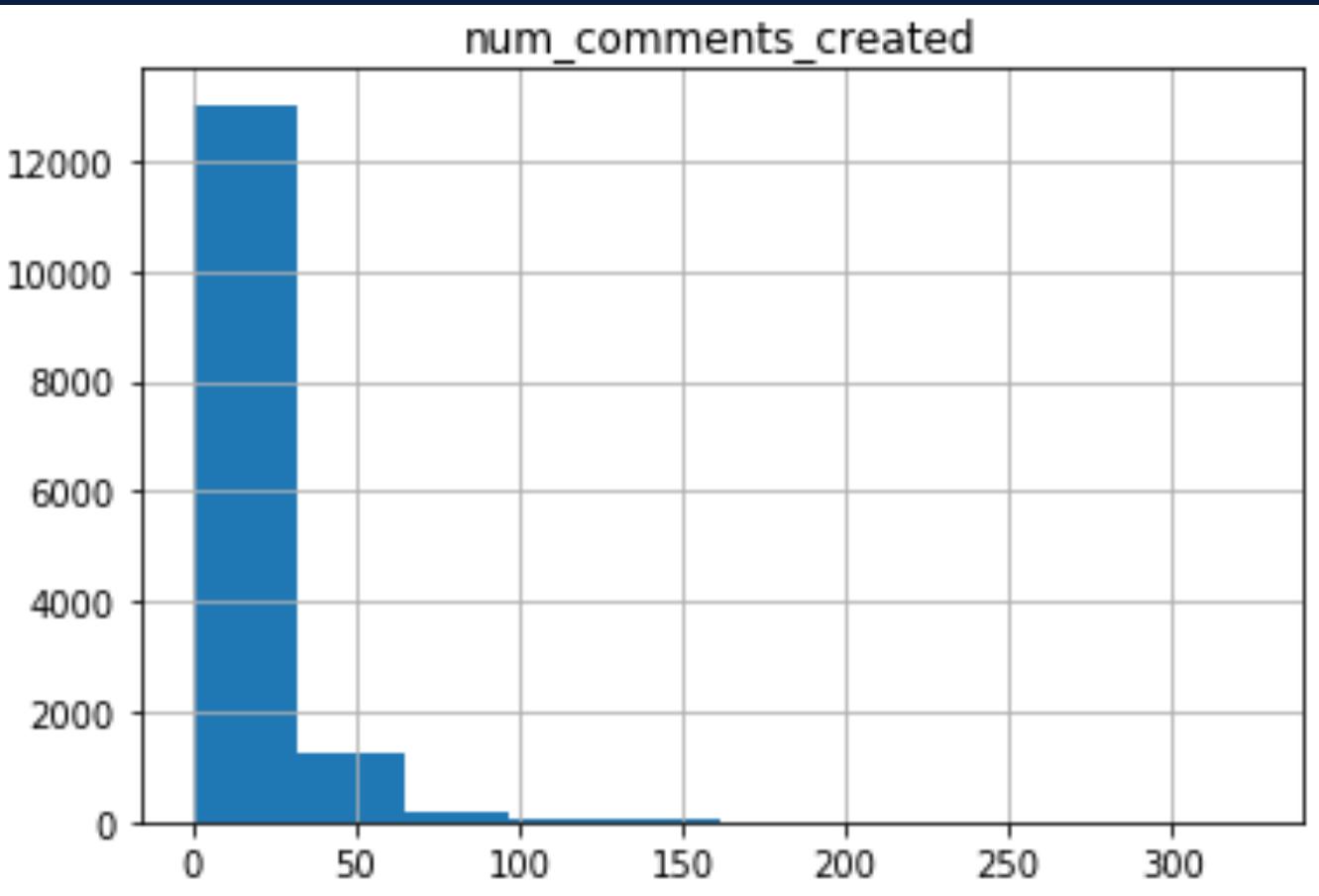
Visualize

Model

Validate



Methodology

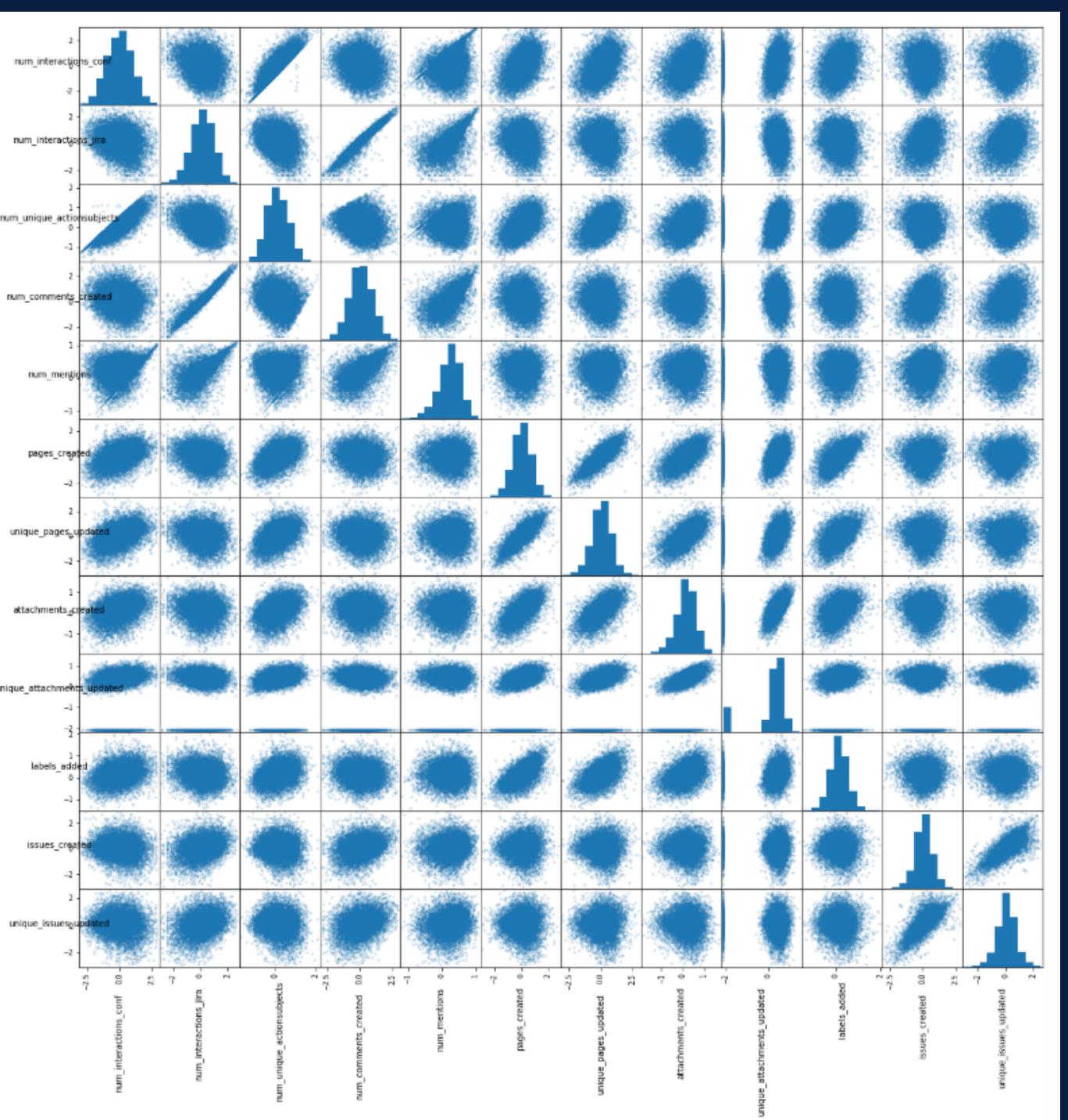
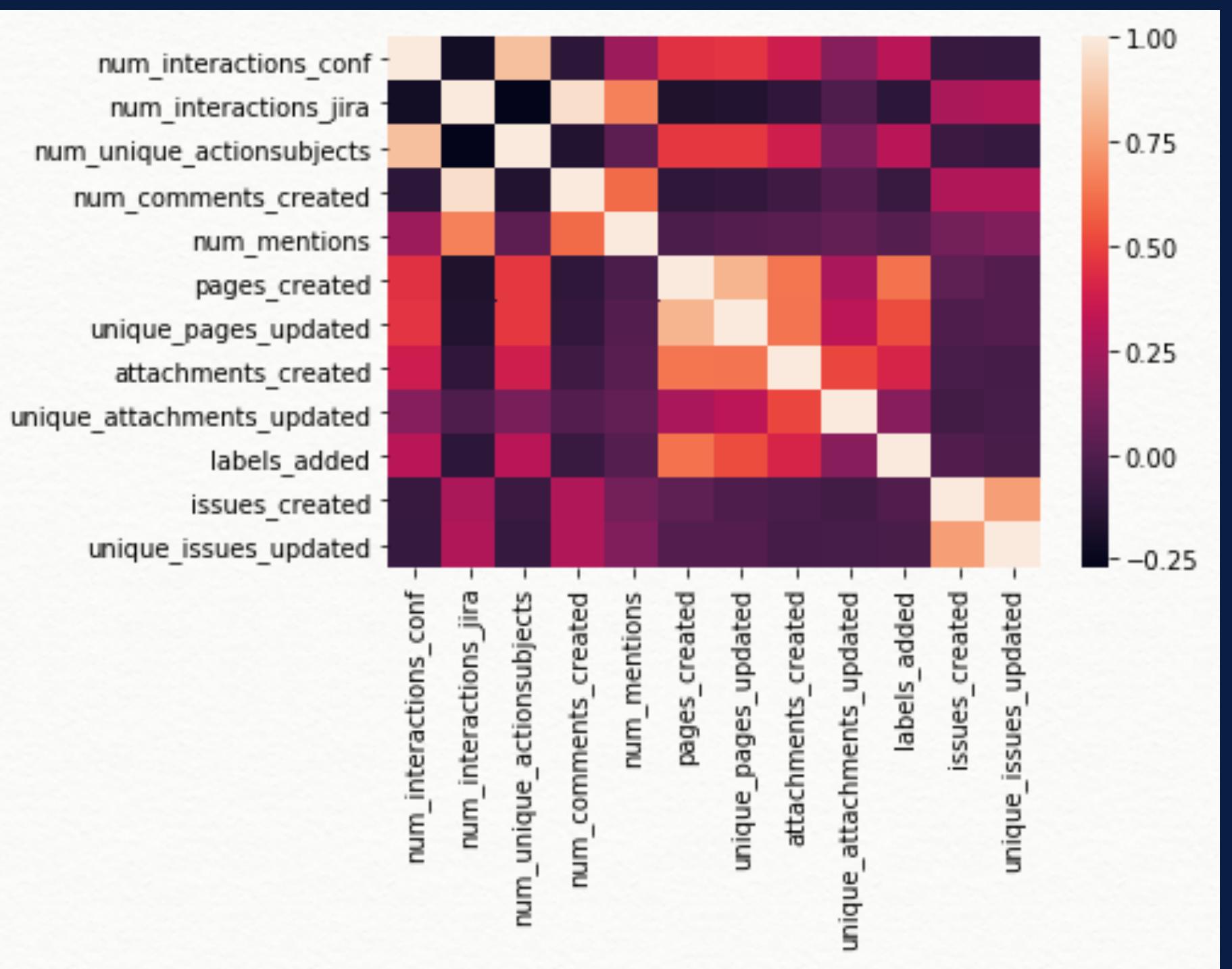


Understand

Visualize

Model

Validate



Methodology

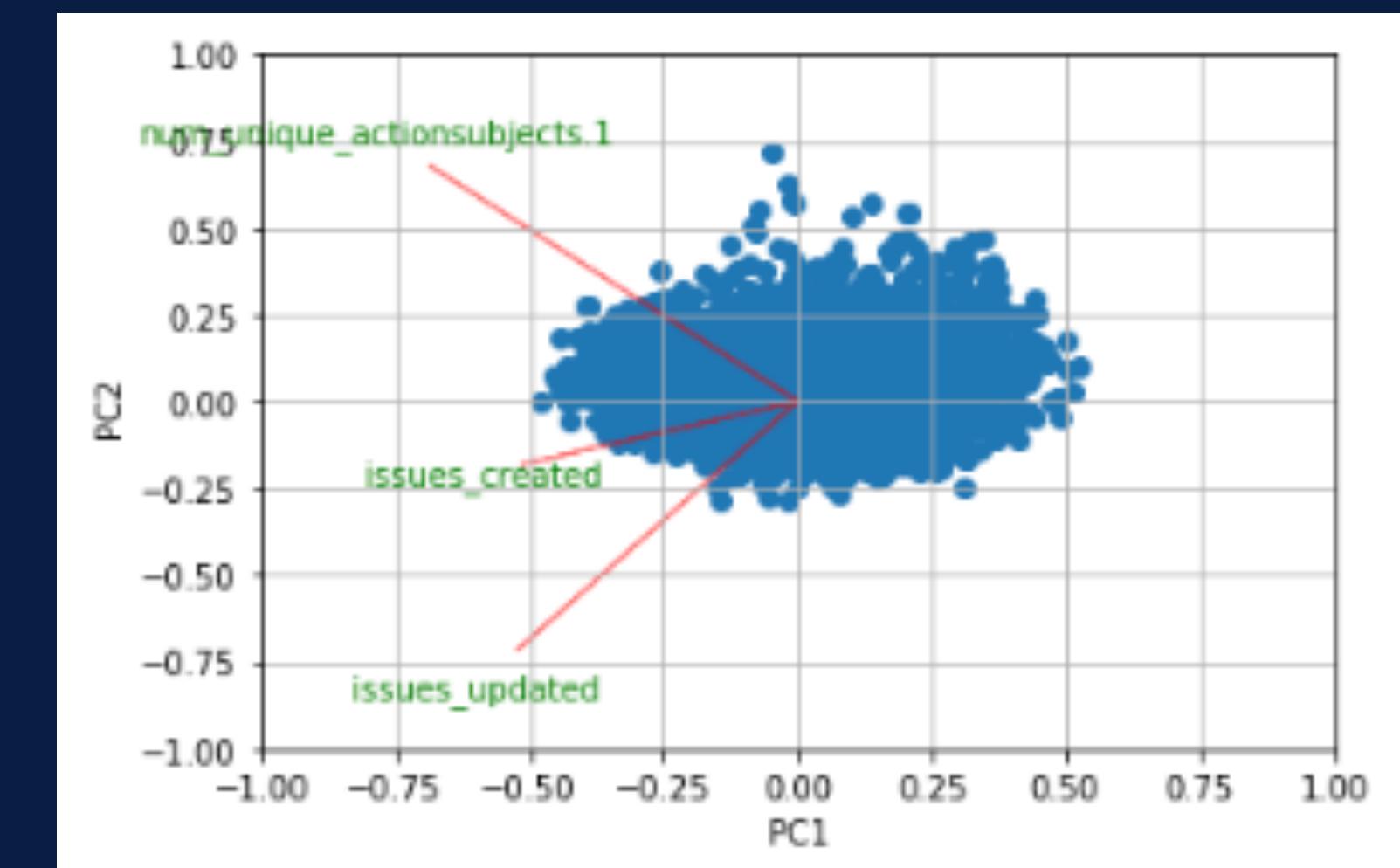
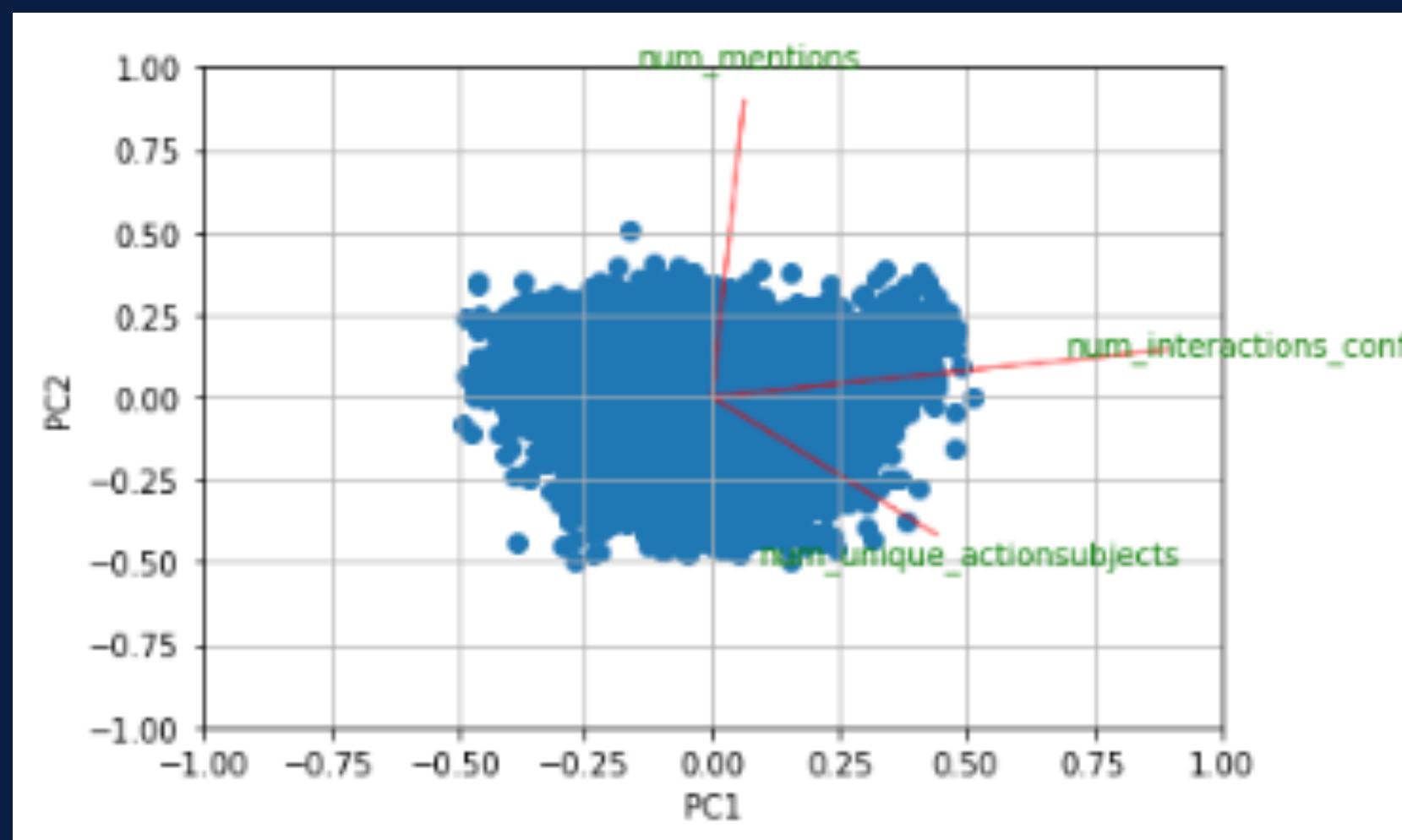
- Feature selection
- Dimensionality reduction via PCA
- Biplots overlay original features with components
- Explained variance ratio (Scree Plot)

Understand

Visualize

Model

Validate



Methodology

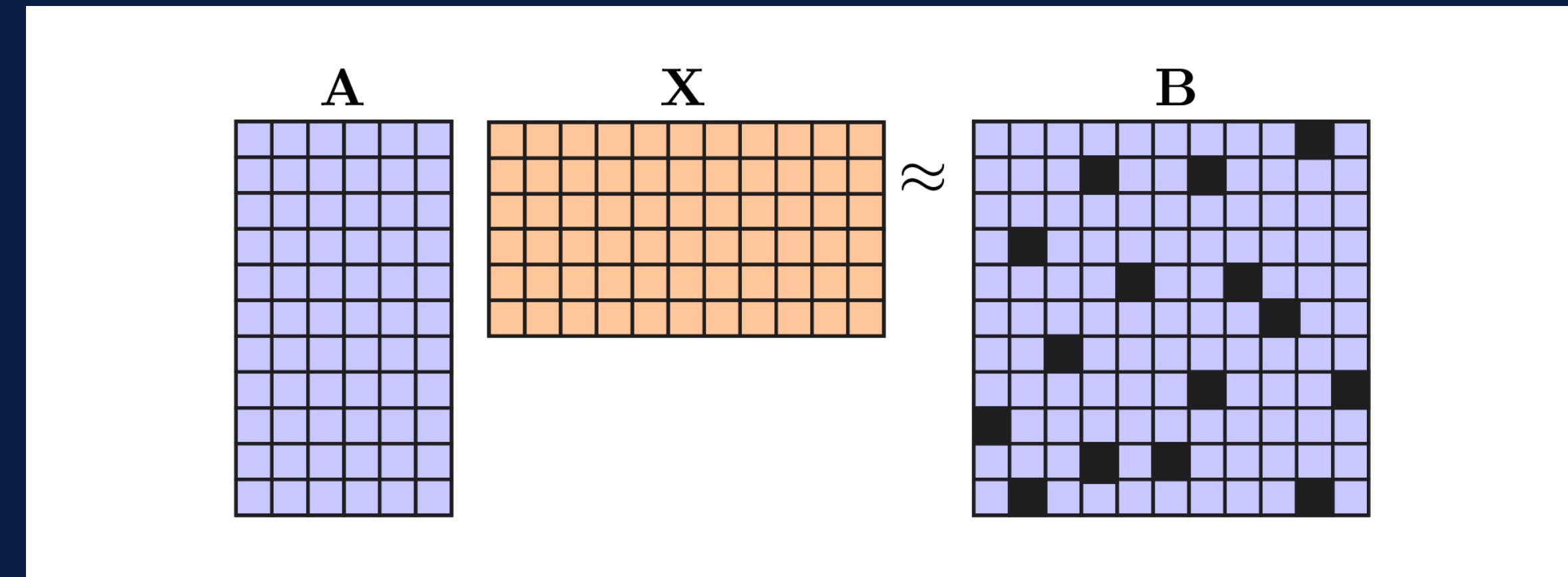
Understand

Visualize

Model

Validate

Element-wise cross-validation



	Collaboration Index	Productivity Index
Explained Variance Ratio	0.88	0.79
Component Loadings	$0.90 * \text{num_interactions_conf}$ + $0.44 * \text{num_unique_actionssubjects}$ + $0.06 * \text{num_mentions}$	$-0.68 * \text{num_unique_actionssubjects}$ + $-0.51 * \text{issues_created}$ + $-0.52 * \text{issues_updated}$
CV MSE	0.30	0.26

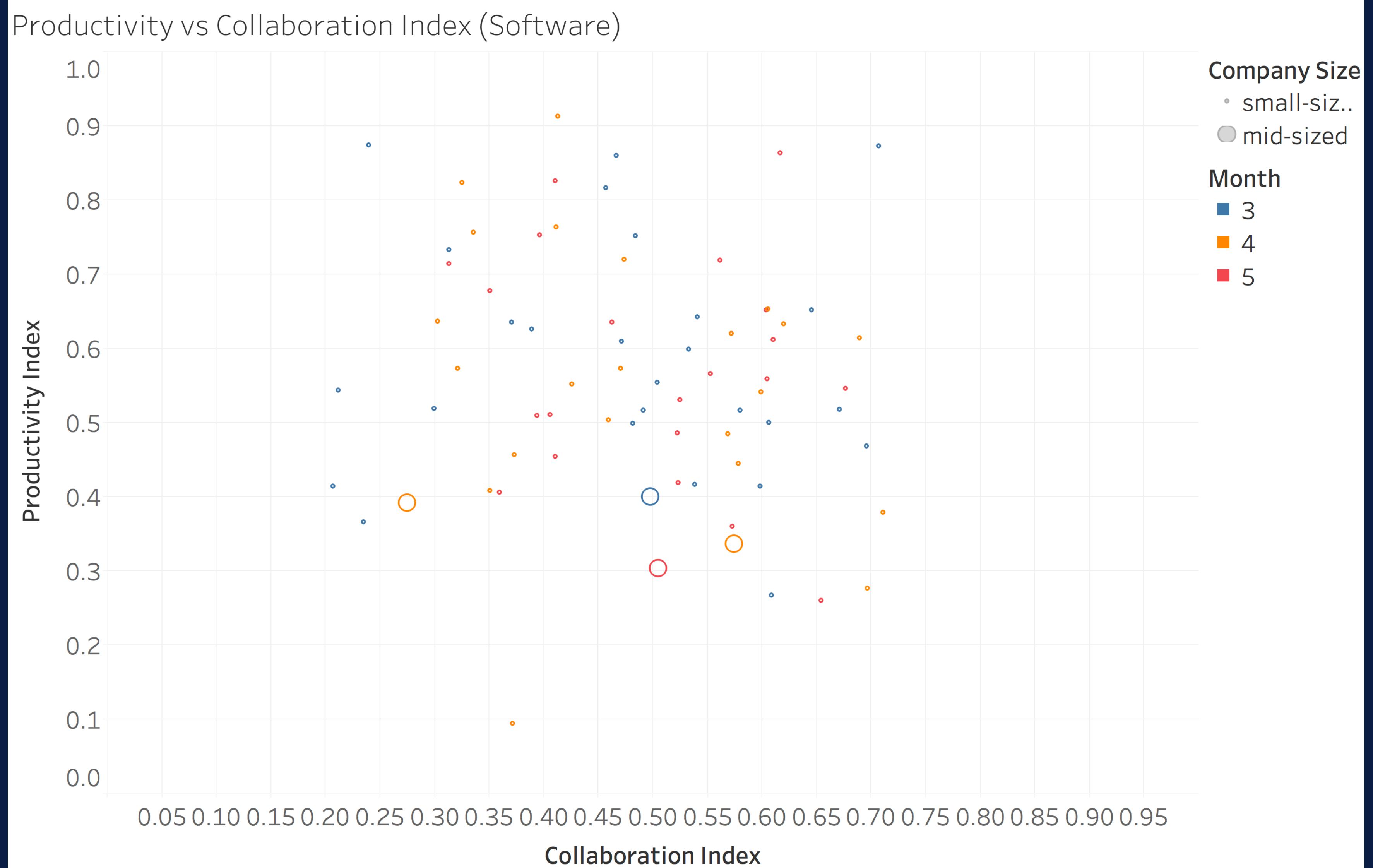
Methodology

Understand

Visualize

Model

Validate



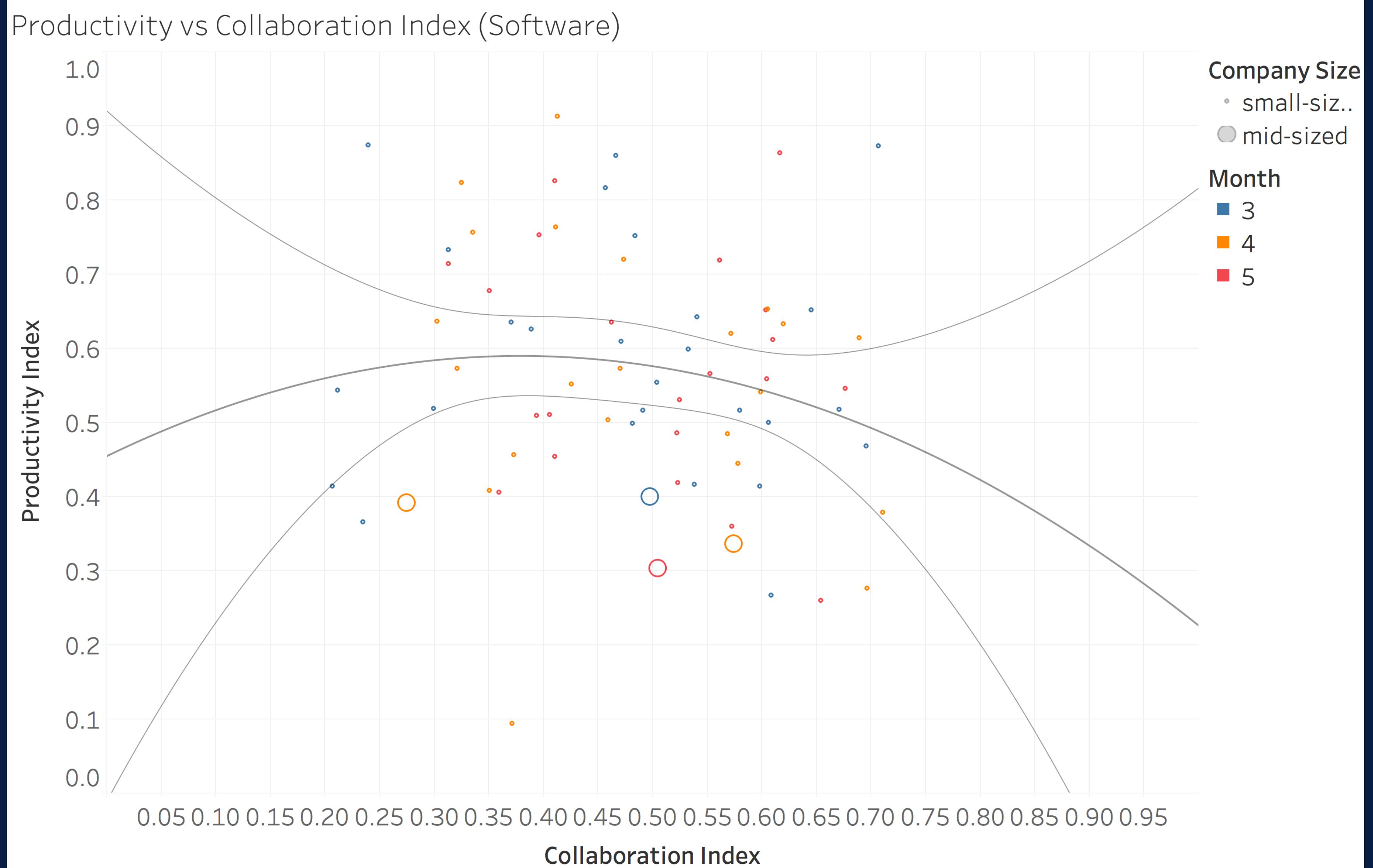
Methodology

Understand

Visualize

Model

Validate



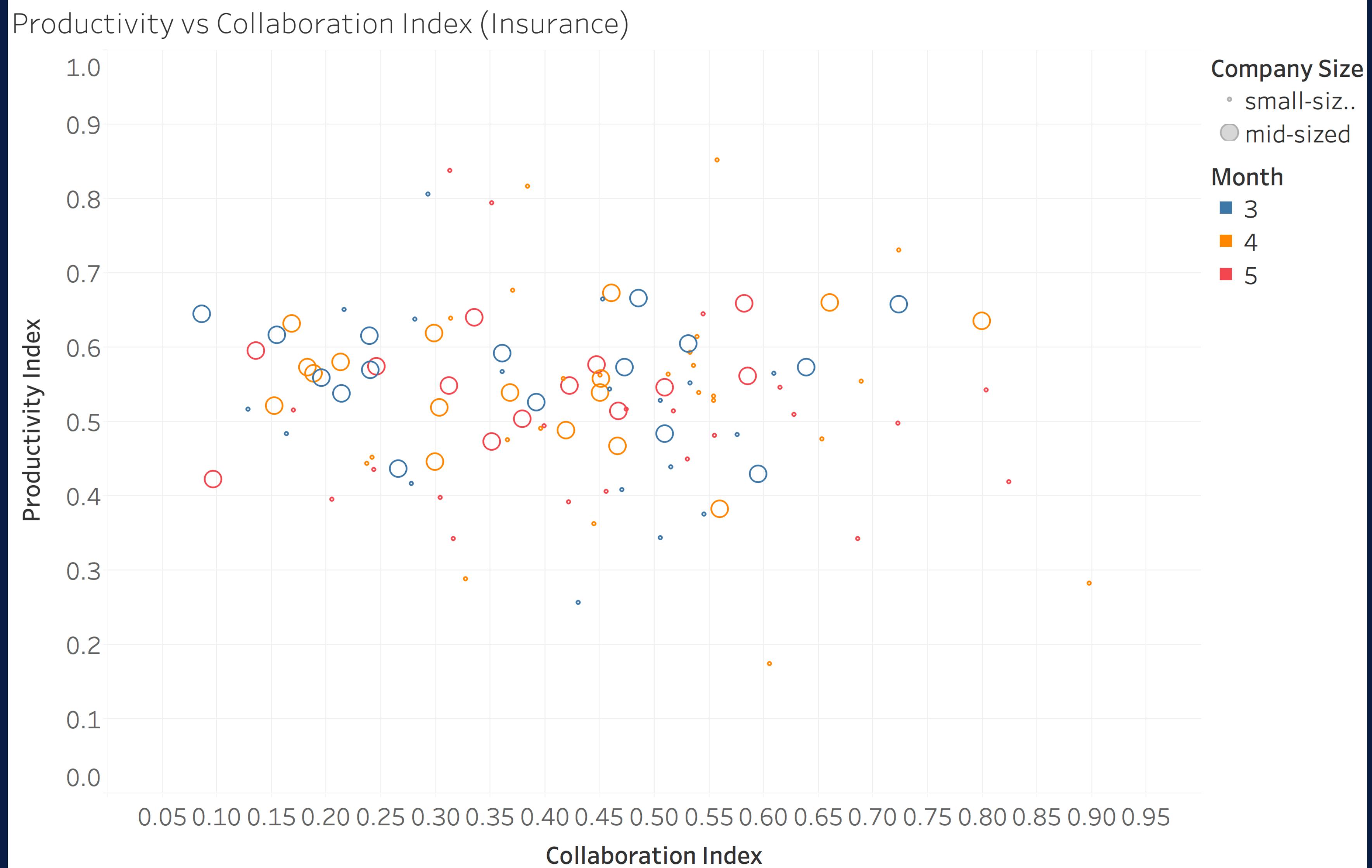
Methodology

Understand

Visualize

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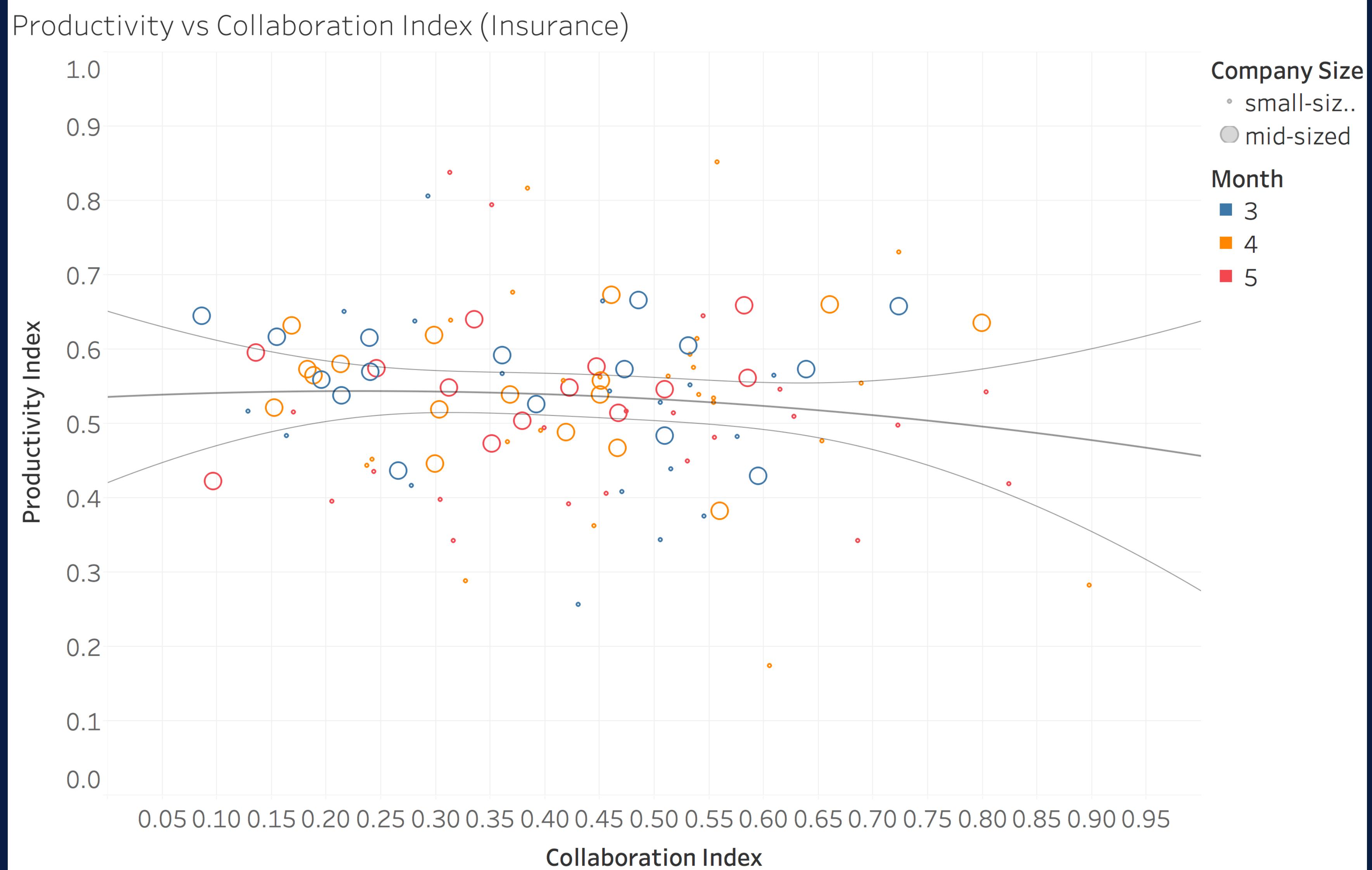
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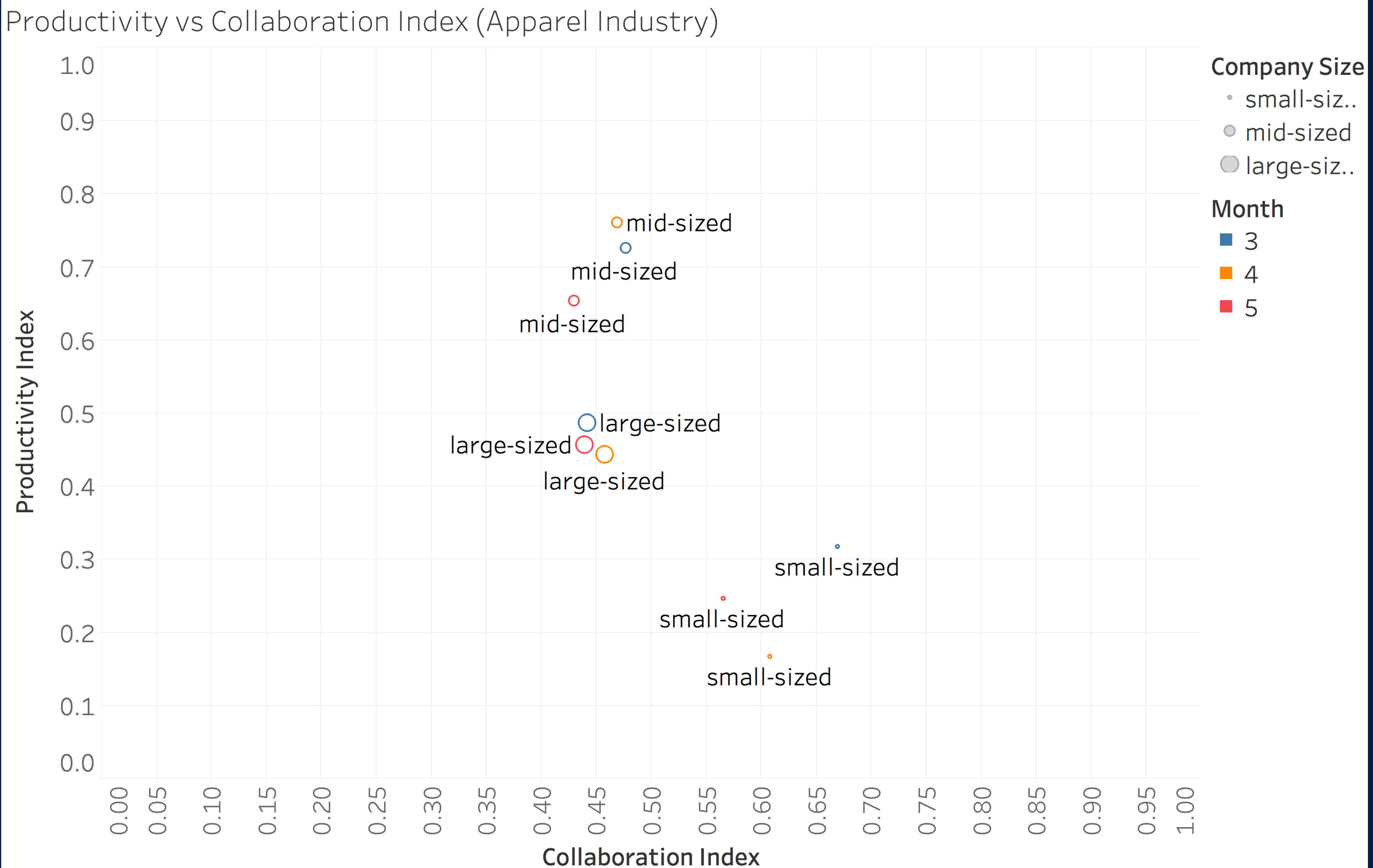
Methodology

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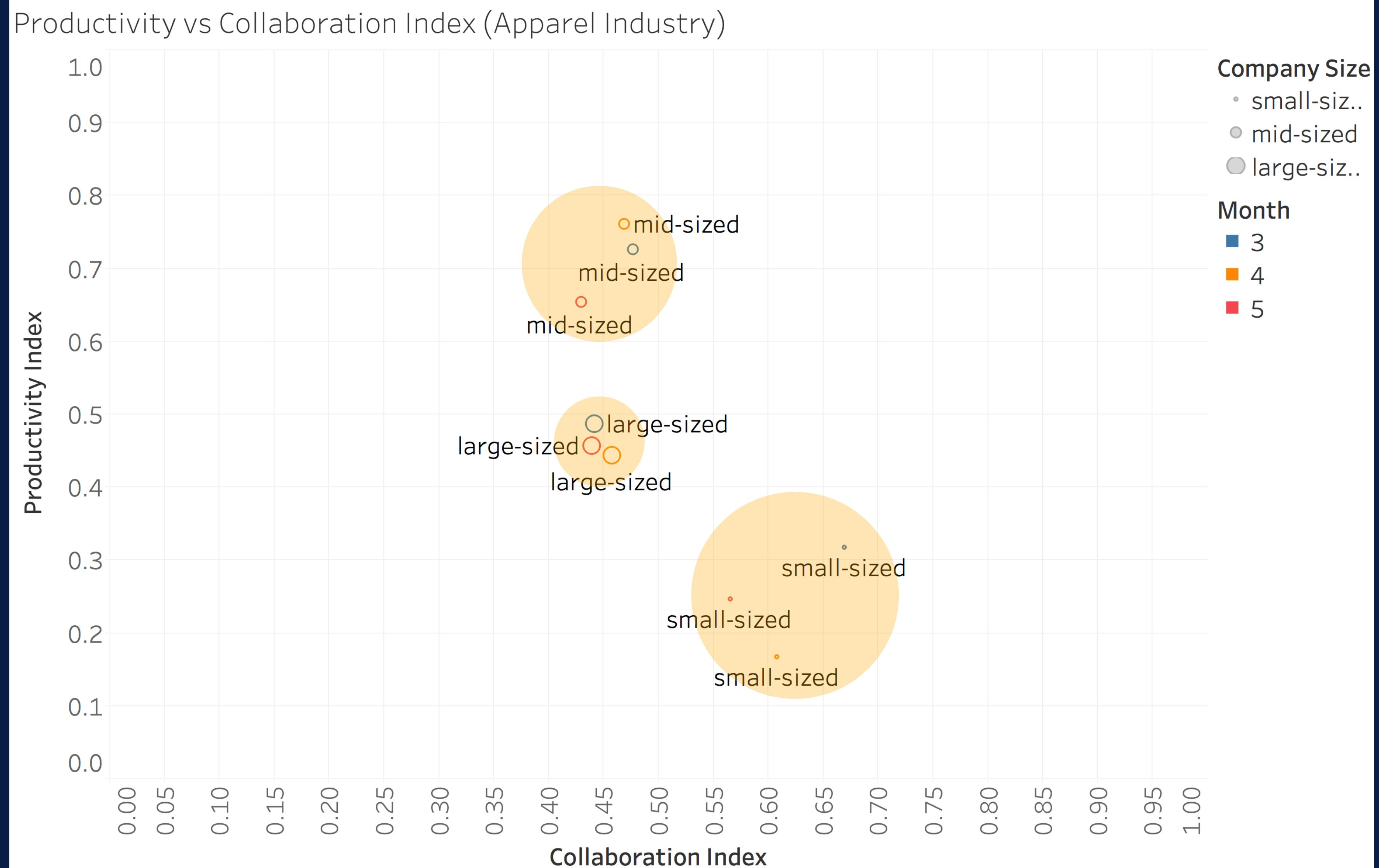
Methodology

Understand

Visualize

Model

Validate



Use Cases



Reporting

Detailed indexes and metrics
+ recommendations.



Playbooks

Project poster, project health
monitor, weather reports,
etc.



Experimentation

Track indexes in addition to
success metrics.

Use Cases



Reporting

Detailed indexes and metrics
+ recommendations.



Playbooks

Project poster, project health
monitor, weather reports,
etc.



Experimentation

Track indexes in addition to
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Reporting

Detailed indexes and metrics
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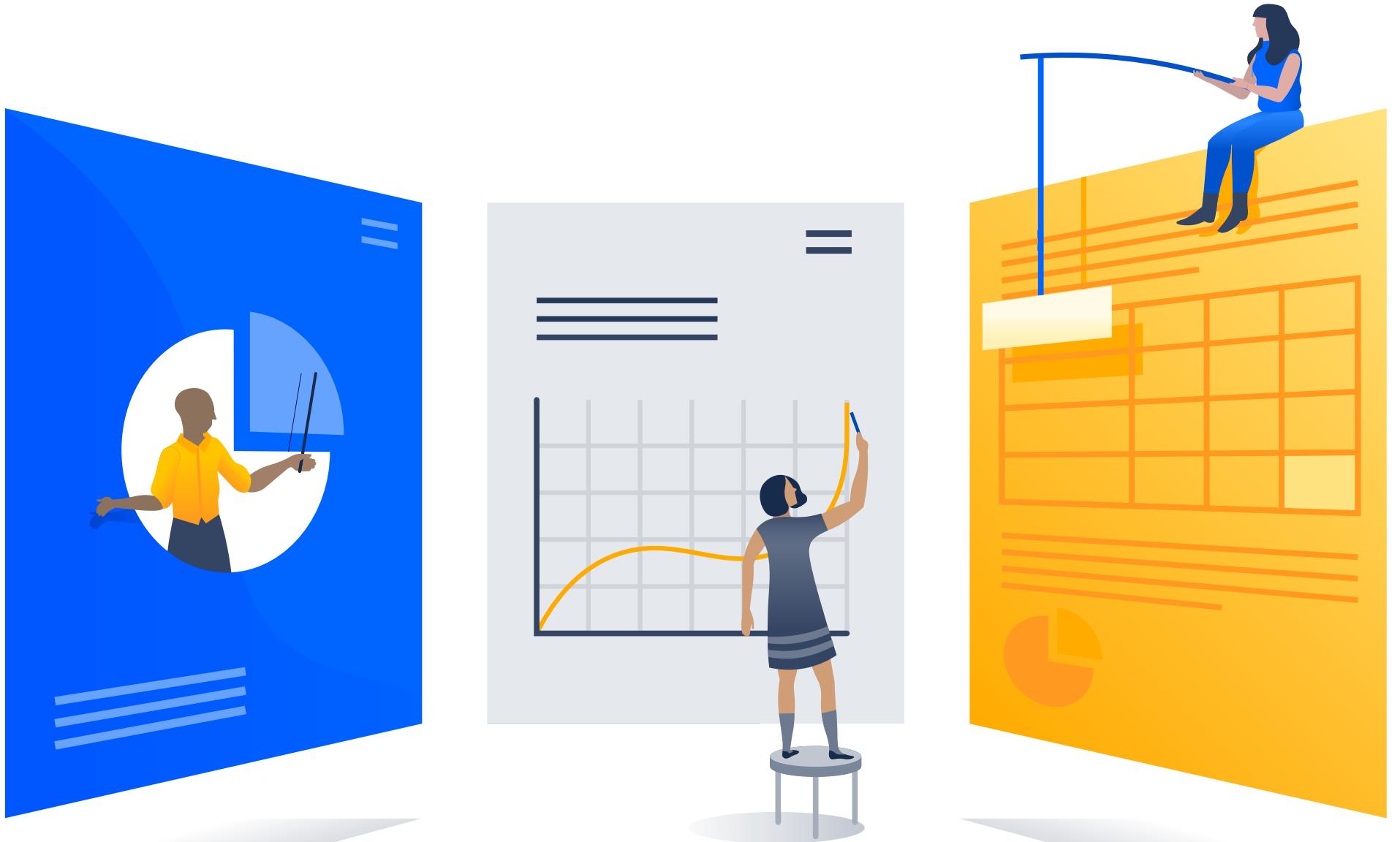
Project poster, project health
monitor, weather reports,
etc.



Experimentation

Track indexes in addition to
success metrics.

LEARNINGS



- 1. Know your data.**
- 2. Validate against the known.**
- 3. There is no one-size-fits-all definition.**

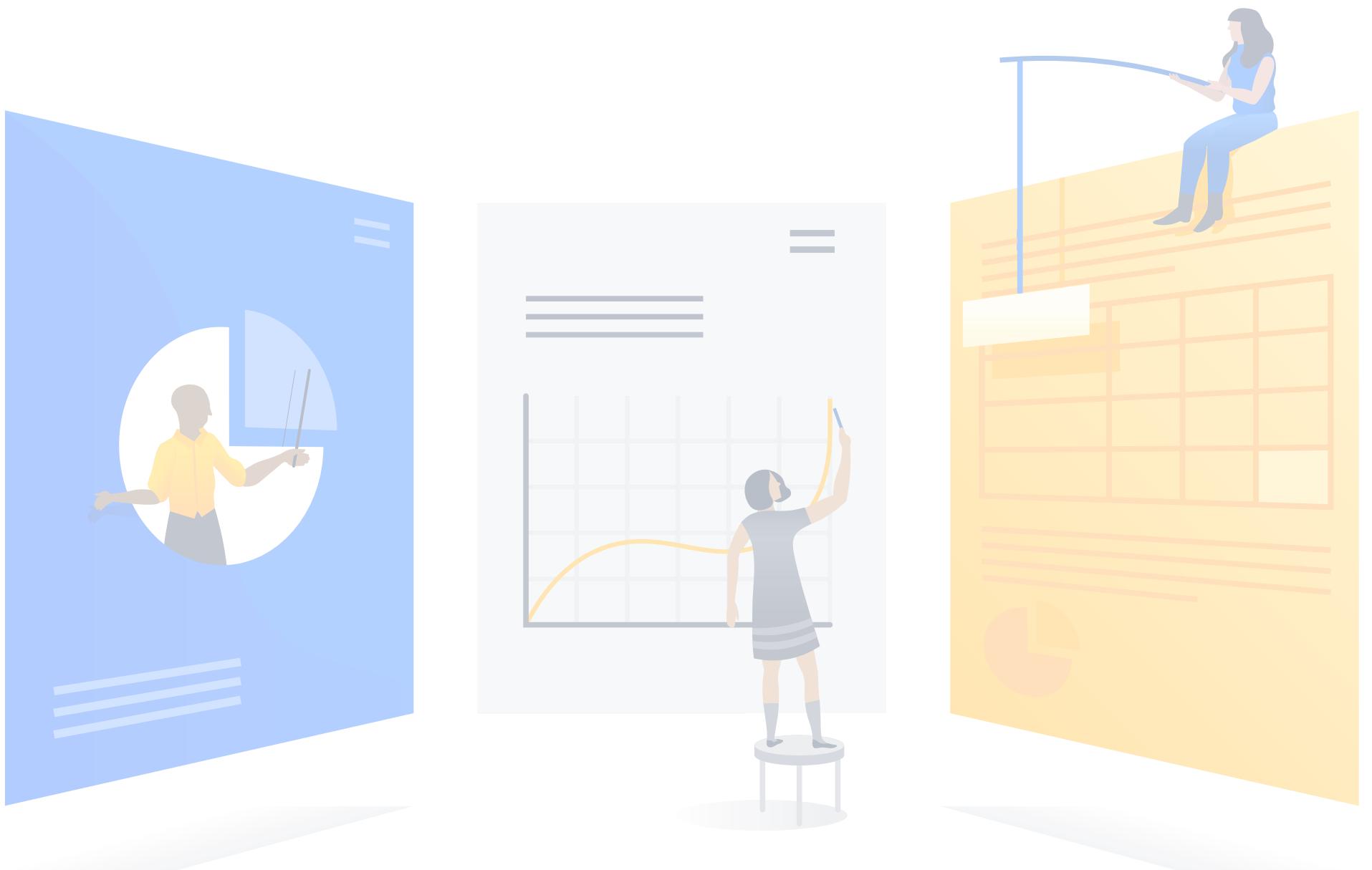
FUTURE CONSIDERATIONS

- 1. Inter- vs. intra-team metrics**
- 2. Classification of social vs work-related**
- 3. Organizational vs. virtual**

Work Graph: Applications



LEARNINGS



1. Know your data.
2. Validate against the known.
3. There is no one-size-fits-all definition.

FUTURE CONSIDERATIONS

1. Inter- vs. intra-team metrics
2. Classification of social vs work-related
3. Organizational vs. virtual

Work Graph: Applications



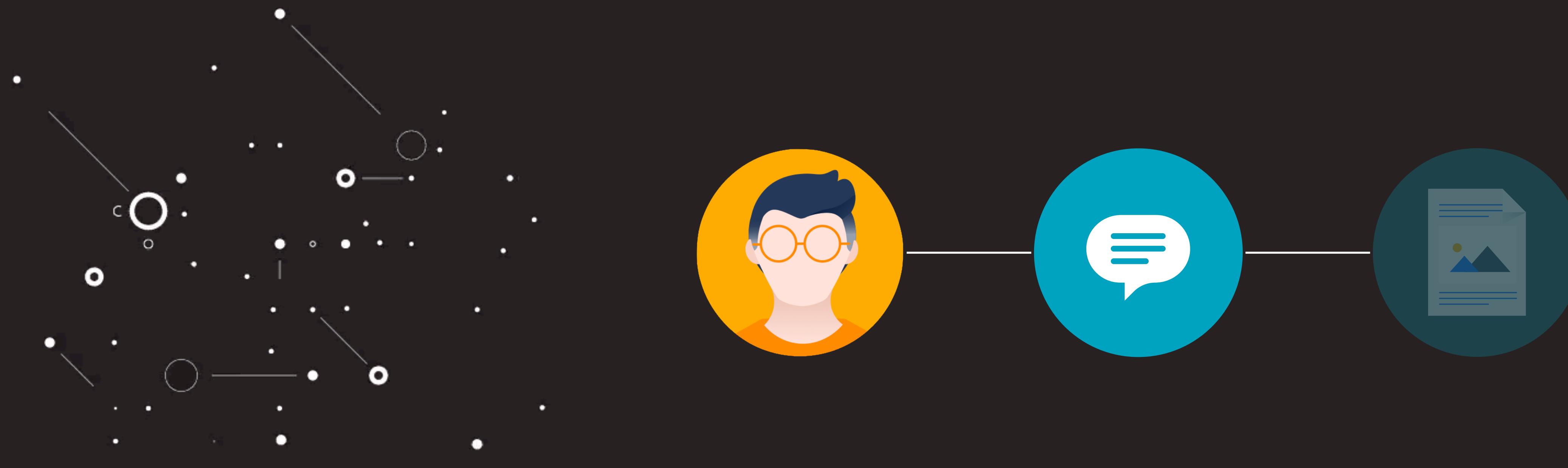
“

In the long history of humankind those who learned to **collaborate** and improvise most effectively have prevailed.

CHARLES DARWIN

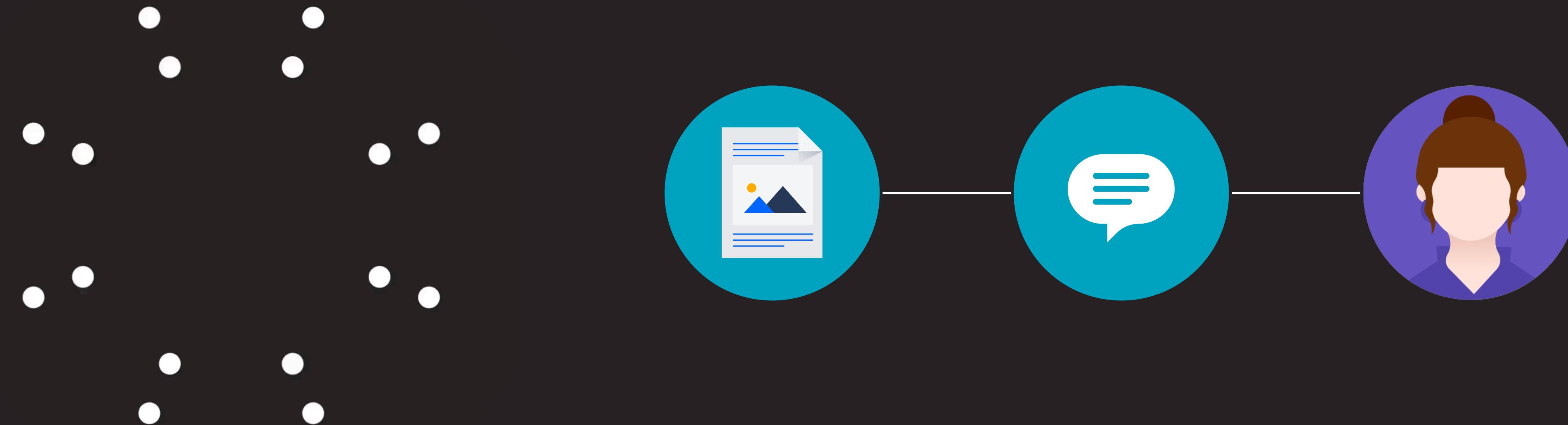
Appendix

User Action Events



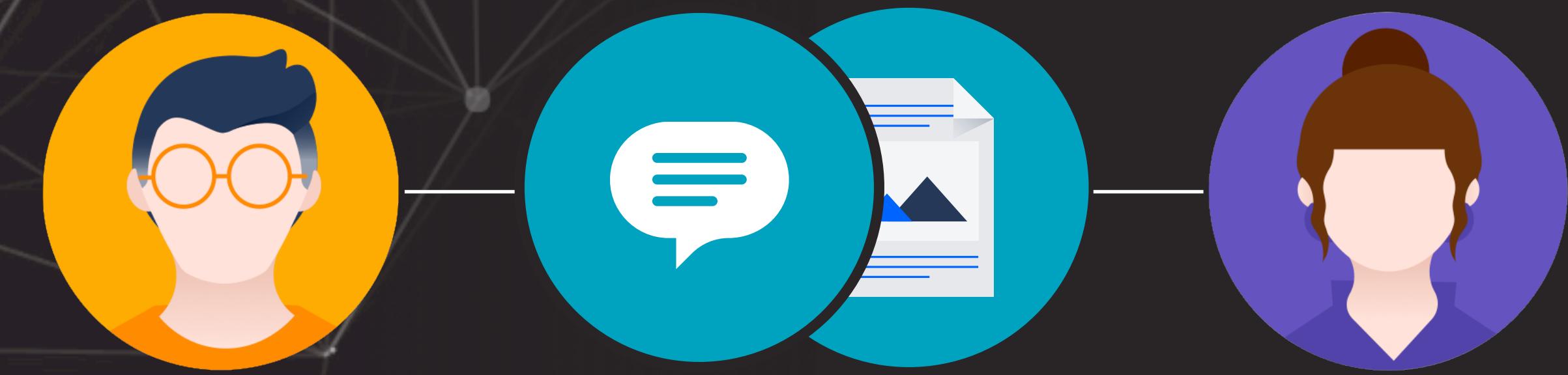
cloud_id	product	unix_time	user_id	event
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	1513987389392 557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e		pagecreate
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	1513987702321 557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e		pageupdate
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	1515112753904 557057:364ae7e0-b734-434c-bf77-490e9d5566...		pageview
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	1515108892464 557057:364ae7e0-b734-434c-bf77-490e9d5566...		pageview
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	1513987390470 557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e		pageview

Entity-centric Events



cloud_id	product	action	actionsobject	actionsobjectid	associated_user_id	timestamp
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	created	page	347472334	557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e	1513987389392
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	viewed	page	347472334	557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e	1513987390470
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	updated	page	347472334	557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e	1513987702321
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	viewed	page	347472334	557058:290f8e55-e457-4f58-8e4b-7f8a56086f1e	1513987703547
DUMMY-158c8204-ff3b-47c2-adbb-a0906ccc722b	confluence	viewed	page	347472334	557057:364ae7e0-b734-434c-bf77-490e9d55662b	1514349823077

Social Graph Events



cloud_id	product	unix_time	user_id	action	actionsobject	actionsobjectid	lookback_timestamp	lookback_action	associated_user_id
DUMMY-158c...	confluence	1515535608895	557057:2...	viewed	page	347344288	1514931238324	created	557058:19bc28c9-ed33-4ded-bde0-1df0e2eafe4b
DUMMY-158c...	confluence	1514931390286	557058:af...	viewed	page	347344288	1514931238324	created	557058:19bc28c9-ed33-4ded-bde0-1df0e2eafe4b
DUMMY-158c...	confluence	1515990552082	557057:6...	viewed	page	347344288	1514931238324	created	557058:19bc28c9-ed33-4ded-bde0-1df0e2eafe4b
DUMMY-158c...	confluence	1516148478561	557057:6...	viewed	page	347344288	1514931238324	created	557058:19bc28c9-ed33-4ded-bde0-1df0e2eafe4b
DUMMY-158c...	confluence	1515000419749	557058:af...	viewed	page	347344288	1514931238324	created	557058:19bc28c9-ed33-4ded-bde0-1df0e2eafe4b

COLLABORATION FEATURES

Feature	Data	Description
num_interactions	int	Total number of interactions across products.
num_unique_containers	int	Number of unique containers the interactions occurred on.
num_interactions_conf	int	Number of interactions in Confluence.
num_interactions_jira	int	Number of interactions in Jira.
num_unique_actionsubjects	int	Number of unique action subjects via which the interactions occurred.
num_comments_created	int	Number of comments created.
num_comments_updated	int	Number of comments updated.
num_mentions	int	Number of user mentions.
avg_current_time_previous_action_delta	float	Average time between interactions (measures frequency).

PRODUCTIVITY FEATURES

Feature	Data	Description
num_actions	int	Total number of actions across products.
num_actions_conf	int	Number of actions in Confluence.
num_actions_jira	int	Number of actions in Jira.
num_unique_actionssubjects	int	Number of unique action subjects via which the actions occurred.
pages_created	int	Number of pages created in Confluence.
unique_ / pages_updated	int	Number of (unique) pages updated in Confluence.
attachments_created	int	Number of attachments created in Confluence.
unique_ / attachments_updated	int	Number of (unique) attachments updated.
labels_added	int	Number of labels added to page in Confluence.

PRODUCTIVITY FEATURES

Feature	Data	Description
issues_created	int	Number of issues created in Jira.
unique_ / issues_updated	int	Number of issues updated in Jira.
issues_resolved	int	Number of issues resolved in Jira.

Topic Modeling

Topic Bubble Plot

