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WHO IS THE RIGHT INFLUENCER? A SOCIAL NETWORK ANALYSIS

In March 2023, Tina Lohn, Chief Marketing Officer (CMO) of Space Games Inc. (SGI), Singapore, was brainstorming with her team on a strategy to identify influencers for her new project. The project involved running an influencer campaign around the launch of SGI's latest game, 'Thrive in Space 5' – a new version of the 'Thrive in Space' game series that was due to be launched in about a month's time.

To create a buzz around the launch, Lohn wanted to collaborate with Twitch influencers who could garner attention from gamers belonging to the age group of 16 to 25. As the CMO of a relatively small gaming company, Lohn was aware that the senior management would be interested in knowing the cost of hiring influencers as well as the predicted return on investment (ROI) of the campaign.

But what worried Lohn the most was how to decide which influencers to collaborate with. Lohn contemplated the strategies she and her team could implement to shortlist the influencers. Should they make their decision solely based on follower count or should they focus on other metrics? Lohn was particularly interested in applying social network analysis (SNA), a method she had recently come across.

The Game: Thrive in Space

Thrive in Space was a multiplayer game first launched by SGI in Singapore in 2012. Back then, SGI was a five-member team with John Tee as its founder and Chief Executive Officer (CEO), Sarah Tee as its co-founder and Chief Technology Officer, and Lohn heading its marketing division.

The first version of Thrive in Space was a free-to-play multiplayer game, in which gamers could make in-game purchases using a virtual currency called Thrive. The game had a chat feature that enabled gamers to discuss strategies in the game and also compare their reviews of the game features. Gamers could adopt various avatars from the standard characters presented by the game or create their own. They could build their own houses, forts, and palaces in space, purchasing the required resources with Thrive to create unique interior experiences. Additionally, each avatar had different personality characteristics and superpowers.

The game was about players trying to establish a thriving township called 'Carden' in space. The township was built on a massive, artificial habitat that orbited a distant planet, and was home to thousands of humans from all walks of life. However, humans in 'Carden' were often attacked by aliens from other planets, and they depended on superhuman avatars (gamers) for protection. The avatars possessed incredible powers that allowed them to bend the laws of physics and perform miraculous feats. Some could fly through the vacuum of space without the need for a spacesuit, while

This case was written by Associate Professor Ernst C. Osinga, Associate Professor Sandeep R. Chandukala and Lipika Bhattacharya at the Singapore Management University. This is a fictional case story to demonstrate the social network analysis of Twitch sample data. The case was prepared solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

 Version: 2023-06-30

others could create force fields to protect Carden from incoming asteroids and alien spaceships. Humans and avatars also had their own spaceships in which they circled around Carden to keep a look out for intruders.

As some features in the game were more mature in content, there was an age advisory to playing the game; which was deemed suitable for players aged 16 years and above. However, as the content was aspirational, it suited younger players more than the older ones, and the first version garnered a lot of interest mostly from young male players aged 16 to 25. At the end of its first year, there were 250,000 gamers playing this game.

Encouraged by the response, SGI launched the second version in 2013, with an added feature of creating commercial complexes in space for running apparel and lifestyle stores. The second version managed to attract many female players as well, and by 2014, Thrive in Space had more than 500,000 players, with a gender ratio of 70% male players and 30% female players, all in the age group of 16 to 25 years. Female players were mostly younger and ranged in the age group of 16 to 19, whereas male players were distributed uniformly across the 16-25 age group.

In 2014, SGI launched a simplified version of the Thrive in Space game targeted at younger players between the ages of 12 and 15, named Build in Space. The game received a lukewarm response and was able to garner only 50,000 players in its first year. In 2020, the game was revoked due to security concerns and media backlash over its chat feature for younger audiences, where there had been instances of objectionable language use.

By 2021, Thrive in Space had released four versions, with the latest one featuring disco, ballroom, and carnival spaces, where players would receive special invitations and could rent futuristic designer clothes from international luxury brands that participated with SGI to attend such events. By then, the gaming platform had close to a million players.

The fifth version of Thrive in Space was ready for launch by the end of 2022; however, its first trial in December 2022 reported a bug that took almost two months to fix, and it was finally only ready to launch in March 2023. This version of the game allowed players to encash saved virtual Thrive currency in actual local currencies and transfer it back to their bank/credit accounts. Players could not only purchase, but also earn Thrive currency by renting their created spaces to other players.

Methodology: Social Network Analysis

Lohn wanted to run an influencer campaign for ‘Thrive in Space 5’ on social platform Twitch and use SNA to identify relevant influencers. She and her team had done an initial analysis of both the SNA methodology and the Twitch platform.

SNA allowed the investigation of social structures through the use of network and graph theories. It enabled an analysis of the relationships and connections among individuals, groups, organisations, and other social entities. The methodology involved mapping and analysing the relationships among nodes in a network, using measures such as centrality, density, clustering, and structural holes.[1] SNA could be applied to a variety of social networks, including personal networks, organisational networks, and online social networks. It could be used to analyse patterns of communication, information flow, influence, and power within social networks, as well as to identify key actors or groups within a

1 Evelien Otte and Ronald Rousseau, "Social Network Analysis: A Powerful Strategy, also for the Information Sciences", Journal of Information Science, December 2002, Vol. 28 (6), p441-453.

network.[2] SNA had been applied successfully to provide insights into social phenomena and enable informed decision-making in various fields including sociology, anthropology, psychology, economics, and information science.[3] In Marketing, SNA could be used to gain insights into consumer behaviour, develop effective marketing strategies, and to evaluate potential influencers (Refer to **Exhibit 1** for more details on selected SNA measures).

Lohn and her team had made a list of a few successful SNA implementations for marketing as part of their initial study on the methodology. One such example involved Microsoft, which had used SNA to analyse its employee network and identify opportunities for collaboration and innovation.[4] By mapping the connections among employees, Microsoft was able to identify individuals who were well-connected and had expertise in certain areas and facilitate collaboration among different teams. In another example, Airbnb had used SNA to analyse its host and guest networks and developed personalised recommendations for its users.[5] Also, using SNA, Airbnb was able to identify hosts who were well-connected and had positive reviews, and should recommend these hosts to guests.[6] Coca-Cola had also used SNA to analyse its customer network and develop targeted marketing campaigns. By analysing the relationships among consumers, Coca-Cola was able to identify influencers who were well-connected and had a high degree of influence over their peers, and target these influencers with appropriate marketing messages.[7] Another great example of SNA usage was at Deloitte, which had analysed its employee network to identify opportunities for cross-selling and collaboration.[8] Amazon had also used SNA regularly to analyse its customer network and develop personalised recommendations for its users.[9]

The Platform: Twitch

Lohn and her team were confident that understanding the social network dynamics of Twitch using SNA could provide valuable insights into how communities on the platform thrived, as well as how they could be leveraged for marketing, advertising, or social impact. They also made some initial notes on the platform to help them guide their analysis.

Twitch focused on live streaming video games and other forms of entertainment, and as such, it had some unique social network characteristics (refer to **Exhibit 2** for a brief background on Twitch). Firstly, Twitch's user base was skewed towards a younger demographic, with most of its users being in their late teens, twenties, and early thirties. However, overall, its audience was diverse and spanned across different age groups, genders, and regions. While the platform was focused on video game streaming, it also included other forms of entertainment such as music, talk shows, and creative content. Secondly, Twitch users could follow other users to receive notifications when they went live, and also track their viewership statistics. This created a hierarchical structure with some users having

2 Maksim Tsvetovat and Alexander Kouznetsov, "Social Network Analysis for Startups", O'Reilly Media, Inc., September 2011, p45.
3 Ibid.
4 Rob Cross and Andrew Parker, "The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations", Harvard Business Press Books, June 2, 2004, https://hbsp.harvard.edu/product/2705-HBK-ENG, accessed March 2023.
5 Timm Teubner, "The Web of Host–Guest Connections on Airbnb: A Network Perspective", Journal of Systems and Information Technology, Emerald Insight, Vol. 20(3), 262-277, November 2018, https://www.emerald.com/insight/content/doi/10.1108/JSIT-11-2017-0104/full/html, accessed March 2023.
6 Derek Thompson, "Airbnb and the Unintended Consequences of Disruption", The Atlantic, February 17, 2018, https://www.theatlantic.com/business/archive/2018/02/airbnb-hotels-disruption/553556 /, accessed March 2023.
7 Sean Cole, "Three Keys to Coca-Cola's Success on Social Media", Econsultancy, November 28, 2019, https://econsultancy.com/coca-cola-social-media-success-case-study/, accessed March 2023.
8 David White, "Using Network Analysis to Build an Agile Organization", Deloitte, https://www2.deloitte.com/us/en/pages/human-capital/articles/adaptability-in-the-workplace.html, accessed March 2023.
9 Dale Renner, "Transforming the Customer Experience: Personalization", Forbes, November 1, 2018, https://www.forbes.com/sites/forbestechcouncil/2018/11/01/transforming-the-customer-experience-personalization/, accessed March 2023.

larger followings and higher viewership than others. Thirdly, Twitch was community-driven, with users interacting through chat rooms, emotes, and donations. This created a sense of camaraderie and social connection among them, and led to the formation of sub-communities within the larger community. Fourthly, being entertainment-focused, Twitch had influencers who had a large following and could monetise their content through sponsorships and advertisements. This created a power dynamic, in which these influencers could have a significant impact on the platform and its users. Lastly, Twitch was highly data-driven, with users being able to track their viewership statistics and other metrics. This data could be used to optimise content and increase engagement (refer to **Exhibit 3** for more information on Twitch users).

Course of Action: Influencer Marketing

Lohn and her team wanted to use influencer marketing to promote 'Thrive in Space 5' due to a variety of reasons. Firstly, they felt that influencer marketing as a strategy was appropriate for reaching a targeted audience. Secondly, it could allow the firm to partner with streamers who had built up a loyal following and established trust with their viewers. This could help the brand to build authenticity and credibility with its target audience. Thirdly, influencer marketing campaigns on Twitch could be tracked and measured using a variety of metrics, such as views, engagement, and conversions, which could increase accountability. Moreover, data on the success of influencer marketing on other social platforms also provided additional reassurance.

Research reports suggested that Influencer Marketing was set to grow to approximately US$21.1 billion in 2023 and US$22.3 billion by 2025.[10] While Instagram was the dominant platform for influencer marketing, other platforms such as TikTok, YouTube, and Twitch, were also increasingly adopting influencer marketing strategies.[11] Reports also suggested that brands were increasingly turning to micro-influencers (influencers with a smaller following) as they had higher engagement rates and were more cost-effective, with predictions that micro-influencers would become more popular in the coming years.[12]

There were many companies that had successfully used influencer marketing as part of their marketing strategy. For example, beauty brand Glossier had worked with a network of micro-influencers to promote its products and build a community of loyal followers who shared their love for Glossier products on social media.[13] Global beverage company Coca-Cola had used influencer marketing in several campaigns, including its "Share a Coke" campaign, in which it partnered with influencers to create personalised Coke bottles with their follower names, driving engagement and social sharing. Coca Cola had later seen huge success in extending its brand name across several markets through influencer campaigns on social media.[14] Another famous success story was that of Daniel Wellington, a watch brand that had built its brand around influencer marketing. The brand had worked with a network of fashion and lifestyle influencers to promote its watches and had created a strong brand identity based on simplicity, elegance, and minimalism.[15] Vacation rental company

10 Werner Geyser, "The State of Influencer Marketing 2023: Benchmark Report", Influencer Marketing Hub, February 7, 2023, https://influencermarketinghub.com/influencer-marketing-benchmark-report/, accessed March 2023.
11 Ibid.
12 Ibid.
13 Glossier Lutz, "How Glossier Used Influencer Marketing To Build A Cult-Like Following", Forbes, April 3, 2019, https://www.forbes.com/sites/alisonlutz/2019/04/03/how-glossier-used-influencer-marketing-to-build-a-cult-like-following/?sh=3ef3a3b722f1, accessed March 2023.
14 Sean Cole, "Three Keys to Coca-Cola's Success on Social Media", Econsultancy, November 28, 2019, https://econsultancy.com/coca-cola-social-media-success-case-study/, accessed March 2023.
15 Stephen Pulvirent, "How Daniel Wellington Made a $200 Million Business Out of Cheap Watches", Bloomberg, July 15, 2015, https://www.bloomberg.com/news/articles/2015-07-14/how-daniel-wellington-made-a-200-million-business-out-of-cheap-watches#xj4y7vzkg, accessed March 2023.

Airbnb had also used influencer marketing to showcase its unique travel experiences. It worked with influencers to create content that highlighted the unique features and benefits of staying in an Airbnb property and had built a community of travellers who shared their love of Airbnb on social media.[16] Fitness apparel brand Gymshark had used influencer marketing to build a loyal following of fitness enthusiasts. It worked with fitness influencers to promote its products and had created a strong community of customers who shared their love of Gymshark's products on social media.[17]

However, there were several instances in which company collaborations with influencers were unsuccessful and led to negative publicity. For example, in 2017, Pepsi had released an ad featuring celebrity Kendall Jenner, in which she appeared to resolve tensions between protesters and police by offering a police officer a can of Pepsi.[18] The ad was widely criticized for trivializing important social issues and was seen as insensitive and tone-deaf. In another example, in late 2021, two Anheuser-Busch InBev executives, Pablo Firpo and Marcel Marcondes, had faced criticism for their handling of Bud Light's marketing collaboration with transgender TikTok star Dylan Mulvaney. The criticism stemmed from reports that Firpo and Marcondes had allegedly pressured Mulvaney to downplay his gender identity in the campaign in order to avoid offending conservative customers.[19] Lohn was wary of the pros and cons of influencer marketing and fully aware that public backlashes from a badly managed influencer campaign could do a lot of harm to a business; she, therefore, wanted to ensure that the influencer campaign for promoting 'Thrive in Space' would run smoothly. She knew that choosing the right influencers was the first step towards executing a successful influencer campaign.

Influencer Campaign: Thrive to Survive

Lohn and her team had named their proposed influencer campaign for 'Thrive in Space 5' as –'Thrive to Survive'. The plan was to initially run the Thrive to Survive campaign for one month. In this campaign, Lohn wanted to hire three influencers, with three unique channels, and brief them on the game, including key features, gameplay mechanics, and storylines. The influencers would play the game live on their Twitch channel, while engaging their audience and providing commentary on the game.

Lohn and her team identified open-source software Gephi to visualise and analyse the sample Twitch network data (refer to **Appendices I and II** for more details on the sample data and the SNA exercise). As a first step, they listed the questions that could help them analyse the data and select the influencers. Lohn was hopeful that the brainstorming session would help the team perform the SNA effectively and think about ways to complement SNA with other strategies for influencer selection (refer to **Exhibit 4** for further details on strategies for influencer selection). She listed down some key questions for the team to consider, which she thought could act as a guiding checklist to help plan a successful campaign. She jotted down on the whiteboard for her colleagues to note:

- What are the characteristics of the dataset provided?
- How does the network look? Is it dense? Or are the channels connected to only a few

16 Lindsay Kolowich, "9 Examples of Influencer Marketing Campaigns that Got it Right", HubSpot, June 12, 2017, https://blog.hubspot.com/marketing/influencer-marketing-campaigns, accessed March 2023.
17Jodie Cook, "How Gymshark Became A $1.3 Billion Brand, And What We Can Learn Forbes", August 17, 2020, https://www.forbes.com/sites/jodiecook/2020/08/17/how-gymshark-became-a-13bn-brand-and-what-we-can-learn/?sh=1f6b98276ed9, accessed March 2023.
18 Alelee Palacpac, "7 of the Biggest Influencer Marketing Fails Made by Brands", Spiralytics, January 27, 2023, https://www.spiralytics.com/blog/influencer-marketing-fails/, accessed April 2023.
19 Elizabeth Napolitano, "Bud Light Executives Put on Leave after Dylan Mulvaney Uproar, report says", CBS News, April 25, 2023, https://www.cbsnews.com/news/bud-light-dylan-mulvaney-transgender-anheuser-busch/, accessed April 2023.

other channels?
• Which SNA metrics are best used to select the potential influencers?
• What additional criterion (strategies) can be used to complement this selection?
• What will be the expected ROI from working with the selected influencers? How can expected revenues be calculated? And what would be the expected costs? What assumptions need to be made?

EXHIBIT 1: COMMONLY USED METRICS IN SNA

SNA Metrics	Measure
Degree centrality	Degree centrality measures the number of ties or connections that a node has in a network. Nodes with a high degree centrality are well connected within the network. In-degree is a measure of the number of incoming edges to a node, or the number of nodes that are connected to the node in question. Nodes with high in-degree are often called "hubs" and are considered to be important in the flow of information or resources through the network. Out-degree, on the other hand, is a measure of the number of outgoing edges from a node, or the number of nodes to which the node is connected.
Betweenness centrality	Betweenness centrality measures the extent to which a node lies on the shortest paths between other nodes in the network. Nodes with high betweenness centrality may act as brokers or gatekeepers within the network.
Closeness centrality rate at which info. is transfered from influencer to members.	Closeness centrality measures the average distance between a node and all other nodes in the network. Nodes with high closeness centrality are closer to other nodes in the network and may have greater influence.
Eigenvector centrality measure how my friends are influential,inherited.	Eigenvector centrality measures the influence of a node based on the influence of its neighbours. Nodes with high eigenvector centrality are connected to other influential nodes in the network.
Clustering coefficient if i am sending 1 opinion and all other amplify it .	Clustering coefficient measures the extent to which nodes in a network tend to cluster together. High clustering coefficient indicates that nodes in the network are closely connected to their neighbours.

Source: Stanley Wasserman, Katherine Faust, "Social network analysis: Methods and applications", Cambridge University Press, 1994, https://www.cambridge.org/core/books/social-network-analysis/90030086891EB3491D096034684EFFB8, accessed March 2023.

EXHIBIT 2: BRIEF BACKGROUND ON TWITCH

Twitch is a live streaming video platform focused on video game streaming that has expanded to include streams centred on music, talk shows, creative content, and more. It was launched in June 2011, and quickly gained popularity, with millions of users tuning in to watch streams and interact with streamers.

In 2014, Amazon acquired Twitch for US$970 million, and since then, the platform has continued to grow in both popularity and scope. By 2023, Twitch boasted over 140 million monthly active users and is available in over 230 countries and territories.

Twitch allows streamers to earn revenue through various means, including ad revenue, subscriptions, donations, and sponsorships. Streamers can also interact with their viewers in real-time through a chat feature, allowing for a highly interactive and engaging experience.

Source: Darren Geeter, "Twitch Created a Business around Watching Video Games — here's how Amazon has Changed the Service since Buying it in 2014", CNBC, February 26, 2019, https://www.cnbc.com/2019/02/26/history-of-twitch-gaming-livestreaming-and-youtube.html, accessed March 2023.

EXHIBIT 3: STATISTICS OF TWITCH USERS

Twitch Age Demographics (2022) in %	
Age	**Percentage of Users**
16-24	41
25-34	32
35-44	17
45-54	7
55+	3

Twitch Gender Demographics (2022) in %	
Gender	**Percentage of Users**
Female	35
Male	65

Source: TwitchTracker, Statistics, https://twitchtracker.com/statistics, accessed March 2023.

EXHIBIT 4: STRATEGIES TO EVALUATE INFLUENCERS

Reach and engagement metrics	One of the most common ways to evaluate influencers is by looking at their reach and engagement metrics. Brands can use these metrics to determine an influencer's potential reach and engagement rates with their target audience.
Content quality and style	Brands may also evaluate an influencer's content quality and style, looking for consistent quality and a style that aligns with their brand image and values.
Audience demographics and interests	Brands can evaluate an influencer's audience demographics and interests, looking for a match with their target audience.
Brand alignment	It is important for brands to evaluate an influencer's brand alignment; Brand alignment refers to the extent to which an influencer's values, interests, and audience match those of the brand.
Past performance	Brands may look at an influencer's past performance, including previous collaborations and campaign results, to determine his/her effectiveness as a marketing partner.
Authenticity and transparency	Brands may also evaluate an influencer's authenticity and transparency, looking for influencers who disclose sponsored content and who have a genuine connection with their audience.

Source: Author's own, adapted from Xabier Vicuña, "Choosing the Right Influencers: The Metrics that matter", Forbes, December 9, 2020, https://www.forbes.com/sites/forbesbusinesscouncil/2020/12/09/choosing-the-right-influencers-the-metrics-that-matter/?sh=408558e6709a, accessed March 2023.

Appendix I

Lohn and her team obtained data from Twitch adapted from Rozembercki, Allen, and Sarkar (2021). The dataset can be obtained online (https://ink.library.smu.edu.sg/cases_coll_all/440). The dataset contains two files, Twitch_nodes and Twitch_edges and the files were adapted from a previous publication.[20] Both files are in csv format and listed under the Additional Files section in the link above. The dataset provides information on over 7,000 Twitch streamers. All Twitch streamers in the dataset stream in English.

The first file, Twitch_nodes, contains information about the Twitch streamers, i.e., the streamers' attributes. The interpretation of the columns is as follows:

- **ID**: A unique ID of each Twitch streamer. These IDs correspond to those in the Twitch_edges file discussed below.
- **Days_active** - The number of days the streamer has been active on the platform until the moment of data collection.
- **Mature_content** - Whether the streamer's Twitch channel features mature content. FALSE is when mature content is not featured and TRUE is when mature content is featured. Mature content refers to submissions which contain content that may not be suitable for some audiences, especially children, such as swearing, crass language, sexual content, violence, aggression, and gore.[21]
- **Views** - The number of views of a particular Twitch channel until the moment of data collection.
- **Affiliate** - Whether the streamer is in the affiliate program or not. FALSE is when the streamer is not enrolled in the affiliate program and TRUE is when the streamer is enrolled in the affiliate program. A streamer is invited to join the affiliate program when the following criteria are met:[22]
    - At least 500 total minutes broadcast in the last 30 days
    - At least seven unique broadcast days in the last 30 days
    - An average of three concurrent viewers or more over the last 30 days
    - At least 50 followers

  Affiliates can have subscribers start earning revenue on their channels and receive a share of the revenue generated from any video ads played on their channels. Moreover, affiliates will receive US$0.01 per Bit used to Cheer in their channel.[23]
- **Channel_ID** - Each streamer's Twitch Channel ID. You can use this ID to find the streamer on Twitch. To do so, first go to https://twitchemotes.com/channels/XXXXXXXX, where you replace XXXXXXXX with the streamer's Channel ID. This will show you the streamer's username, e.g., Channel ID 51251752 belongs to streamer Gendrome1. You can click the username to go to the streamer's Twitch page. Here you can obtain more information about the specific streamer by clicking "About".

The second file, Twitch_edges, describes the relationships among Twitch streamers. Specifically, the file contains two columns, **Source** and **Target**, where the streamer in the Source column follows the user in the Target column. For example, user 6194 is the source and follows user 255 (the target).

20 Benedek Rozemberczki, Carl Allen and Rik Sarkar, "Multi-Scale Attributed Node Embedding", Journal of Complex Networks, Vol 9 (2), April 2021, https://doi.org/10.1093/comnet/cnab014, accessed May 2023.
21 Beaulah Sahana, "How to Enable Mature Content on Twitch", All Things How, May 5, 2022, https://allthings.how/how-to-enable-mature-content-on-twitch/, accessed March 2023.
22 Twitch, Affiliate Program, https://help.twitch.tv/s/article/joining-the-affiliate-program?language=en_US, accessed March 2023.
23 Ibid.

Appendix II

DETAILED QUESTIONS AND INSTRUCTIONS

1) Describe the dataset. For example, provide the number of observations and means of relevant variables. Also consider using bar charts, pie charts, or other charts to visualise the variables. Indicate what we learn from these numbers and charts. You can use any software you want.

For the next two questions, you will work in Gephi, which is a free software to analyse and visualise network data. You can download and install Gephi from https://gephi.org/. Gephi is available for Windows and Mac systems. Mac users may receive a message saying that Gephi cannot be opened because the developer cannot be verified. Please refer to this page for a solution: https://support.apple.com/en-sg/guide/mac-help/mchleab3a043/mac. Additional information and introduction videos on Gephi can be found on YouTube.[24]

Open Gephi and import the Twitch data files. Go to File → Import spreadsheet. Select the Twitch_edges file. In the next screen, ensure that you import this file as "Edges table". Click Next and Finish and OK. Again go to File → Import spreadsheet. Select the Twitch_nodes file. In the next screen, ensure that you import this file as "Nodes table". Click Next and Finish. Now select "Append to existing workspace" (which is not the default option) and click OK.

At the top of your screen, you can toggle between "Overview" and "Data Laboratory". In the Overview screen, you can view the network graph and run analyses. Analysis tools can be found under "Statistics" at the right-hand side of your screen. You can calculate in-degree and out-degree by clicking "Average Degree" and closeness and betweenness centrality by running "Network Diameter". To obtain eigenvector centrality scores, run the more intuitively titled "Eigenvector Centrality". In the Data Laboratory screen, you can view your raw data and any new measures that you create (such as centrality measures).

2) Visualise the network of Twitch users. Include the graph in your report and explain what we learn from the graph. Some tips:

   - You can change the colour and size of the nodes in the appearance tab (top left in the Overview screen).
   - Initially, your network graph will probably look like a black square. You can improve the layout by choosing "ForceAtlas 2" in the Layout tab (bottom left in the Overview screen). After selection, click Run for a while and then press Stop when the graph layout does not change much anymore, typically after 10 seconds or so. You may use other Layouts as well (e.g., ForceAtlas or Fruchterman Reingold) but these may require a longer run time.
   - You can assign node labels by clicking the  button at the bottom right of your graph screen. Go to the labels tab and click "Configure" to select the attribute you wish to use as labels. You may wish to set the size to "Node size". You can further adjust the node size using the slider under the font.
   - You can filter your graph by using the Filters tab (top right in the Overview screen). Choose "Attributes" and then choose e.g., "Equal" or "Range". For example, to display only nodes with a certain number of views, select "views" under "Range" and drag "views" to the box below. Now use the slider to set the desired range. Finally, click the

24 jengolbeck, "Updated Gephi Quick Start Tutorial for v 0.9", YouTube, June 10, 2018, https://www.youtube.com/watch?v=371n3Ye9vVo&list=PLk_jmmkw5S2BqnYBqF2VNPcszY93-ze49, accessed March 2023.

"Filter" button with the green arrow to apply the filter.
- Please refer to https://gephi.org/users/quick-start/ for more detailed instructions and feel free to apply more advanced options than the ones described above.

3) Select **three** potential influencers for your firm's new video game. Clearly describe *how* you picked these three users. Which metrics did you use and why? Briefly describe each of the three influencers. Some tips:

   - You can select users from the graph (Overview screen) and/or from the data table (Data Laboratory screen).
   - You can export the data table to process it with other software such as Excel.
   - You can right mouse click a user in the graph and click "Select in data laboratory" to highlight that user in your Data Laboratory screen.
   - Recall that you can look up a user on Twitch through the Channel ID.

4) You would like to calculate the expected profits from working with each of the three influencers. How would you calculate expected profits? Which numbers do you need? List the information needs and indicate how you could obtain these numbers. Note that you are not expected to obtain the numbers. Finally, write down any assumptions that you would make.