CASE STUDY OF DATA ANALYSIS AS A TOOL TO IDENTIFY BOTTLENECKS AND PROBLEMS IN AGILE TEAMS

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Abstract. *This paper is about a case study of a Data Intelligence team that uses data analysis also in team management to identify bottlenecks, blockades, and problems in the process or in the scope. The metrics are exposed in a Power BI dashboard and shows indicators about speed and quantity of the delivery of tasks and mood tracking. The project will also present the next steps to measure the quality of the delivered work. The paper discusses the importance of measuring not only task delivering speed and quantity but also how the team members are feeling doing their jobs and how well the work is being developed.*

1. Introduction

In the industrial revolution, people tried to find a way to develop and deliver a product in a fast and large-scale way, and there were all kind of products that machinery could do. Afterwards, with the computer and software development popularization, the industrial production was not enough anymore, people in this area wanted to develop and deliver in a fast, and effective way, and it started a several attempts to create assertive work method to deliver quality, and speed to the companies.

First came the traditional software development method, but the process was not enough to follow the market requirement of quick and effective changes during a development process. That is why, in recent years, the agile development methods have been proposed. Between various frameworks created, there is one that is going to be related in this work, it was thought and written inspired by an article of Takeuchi and Nonaka: The Scrum, it was fully implemented in 1993 in Easel corporation by John Scumniotales and Jeff McKenna.

As the Scrum has philosophical foundation in the empiricism, there was a need to meter the work discovered, developed, and done in the team. It seemed to be a huge step in product development, so people now understand the speed and strength of the team, so the work could be prioritized an organized to optimize time, workload and labor force.

Seeing this empirical background, the data driven team context and the metrics we could take from it, we developed indicators to help the Product Owners and the chapter leads to using supply to make data-based decisions, our goal is that our stakeholders have this mindset, so it was important that we also have it.

2. Scrum

According to Schwaber and Sutherland in the SCRUM GUIDE (2020): “Scrum is a lightweight framework that helps people, teams and organizations generate value through adaptive solutions for complex problems”. Not only to do things in a fast way, but also

bring value to the project in development.

In accordance with the same guide (SCHWABER AND SUTHERLAND, 2020), the basis of this methodology is the empiricism and the lean thinking, the first one is the knowledge theory that states that the knowledge is made of experiences and experiments and the decisions are based in the observation instead of theory, the second, the lean thinking, is about reducing wastes and focusing on the essentials. Therefore, scrum can provide intelligence and speed to a project by constant iteration.

2.1. Scrum Cerimonies

Scrum is an iterative methodology, so in each cycle is used a time block to contain four formal ceremonies to check and adjust the scope of the tasks, it is called Sprint. These events are a way to warrant the empirical pillars: transparency, inspection, and adaption. (SCHWABER AND SUTHERLAND, 2020).

These ceremonies are essential to plan, review, adapt and identify bottlenecks and problems to solve them in the next iterations, creating an efficient and fast process of discovery, development, and delivery. So, the planning is the ceremony to plan the next sprint for the whole team to debate about the tasks that need to be done and organize the next steps. In the Review, usually at the end of the sprint, the sprint is reviewed and given the status of each project in development, at the end of the sprint it happens also the retrospective, a ceremony where is discussed the good events and the points of attention in the process in order to identify action plans to improve those points. Every day happens the Daily, a short meeting to list the tasks worked and to be worked on that day and possible obstacles during the sprint or even already found, this process is very important in case of the need to adapt during the cycle, or in posterior sprints.

2.2. Metrics

To support the decisions, as mentioned, the empiricism believes in observation, therefore, a great way to observe the progress of the project is using data. Nowadays, these metrics are not hard to obtain, most of the agile project management *softwares* provide them in their own interface, usually are indicators such as burn down charts, burnup report, big numbers of tasks concluded in a sprint, sprint conclusion rate, team velocity and more. In the Following figures (1 and 2), it is pictured examples of metrics usually provided by agile projects management software.

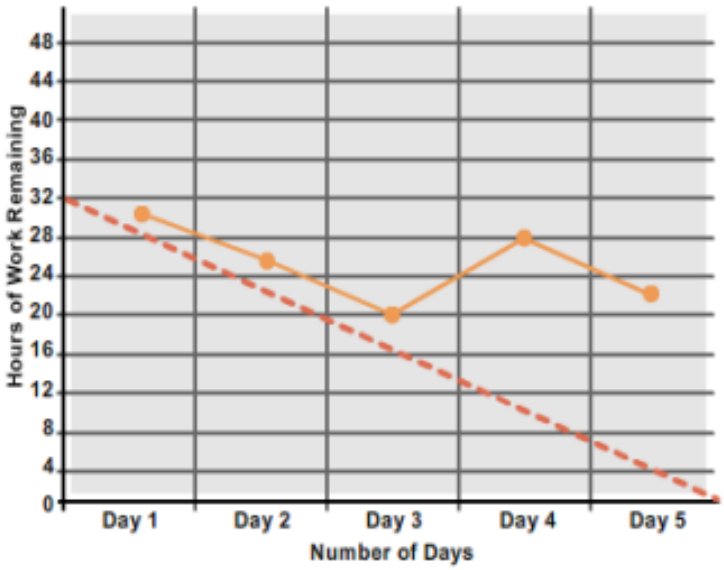

Figure 1. This figure is an example of a burndown chart, it represents the number of days of Sprint versus the number of hours of work left.

Source: (Agarwal and Majumdar, 2012)

Figure 2. This figure represents a Sprint progress rate showed in a Jira Software, that means, how much of the stimmed work was done.

Source: (Self)

According to Agarwal and Majumdar (2012. pg 102) "Many of the challenges for Agile are also present in traditional methodologies. However, Scrum will make them visible early in the project. Early visibility of problems is good from a management view point because team member can take appropriate corrective actions.". Data is a very interesting tool to have early visibility of the bottlenecks and problems, because you obtain more information, such as compare time block, people, task quantity, story point estimate, and several other analysis to get insights and support decisions.

3. Mood Tracking

As Rivera-Pelayo et Al. (2017) mentioned in their work about mood tracking at work: "Mood is in the top five of the most popular items tracked by Quantified-Selfers [Choe

et al. 2014] and there are numerous applications for mood tracking . Research [Boud et al. 1985; Choe et al. 2014] as well as practical approaches [Carmichael 2012; Cousins 2010] has shown the potential of mood to trigger reflection and support learning. In HCI, mood tracking to support awareness and reconstruction of the emotional memory has been addressed from a design perspective [Church et al. 2010; McDuff et al. 2012; Stahl et al. 2009; Sundstr ˚ om et al. 2007].” Therefore, tracking the mood can be a very useful tool to identify and understand how healthy the amount work and the environment are. Nevertheless, measuring this is normally mixed up with the atmosphere research usually made by the human resources team.

Pritz (,2016 pg. 132) believe in a difference between “feelings”, “emotions” and “mood”, however, they are usually used as synonyms to what is called mood tracking that can be confused with sentiment analysis that is a data science tool of text classification which is used to identify positive, negative, or neutral sentiment. In this study we are using a very simple, but very powerful, mood tracking tool. Also, SCHERENBERG AND ERHART (2020) cite Pritz (2016, p. 132) when they affirm that because of help of mood tracking apps, current mood, emotions, and feelings can be registered, recognized, consciously perceived and the stress rate be self-critically reflected.

4. Case Study

This paper is about a case of the Data Intelligence team where I work. Our team has the goal to bring a data driven culture into the whole group company and use intelligence and autonomy for the stakeholders to work and make data based quick and assertive strategical decisions. Currently, the team uses a powerful data visualization tool such as Power B.I. for our bigger deliveries and an open-source self-service BI tool called Metabase to produce quick reports.

4.1. Team Organization

The team is composed of squads, tribes and chapters based in the Spotify model (KNIBERG & IVARSSON, 2012), but adapted to our context.

The squads are the minor part of the tribe, it looks like a self-organized scrum team formed by multidisciplinary members. Tribes are a set of squads, that’s why the whole Data Intelligence team is a tribe inside the company group. To connect the squads inside the tribes, there are the chapters, that according to Kniberg and Ivarsson (2012, pg. 9): “The chapter is your small family of people having similar skills and working within the same general competency area, within the same tribe.” That means that the members with similar skills are able to share doubts, situations, bottlenecks even problems and blocks to solve it quickly and effectively by the orientation of a Chapter Leader. The following figure shows the Spotify model organization as mentioned above.

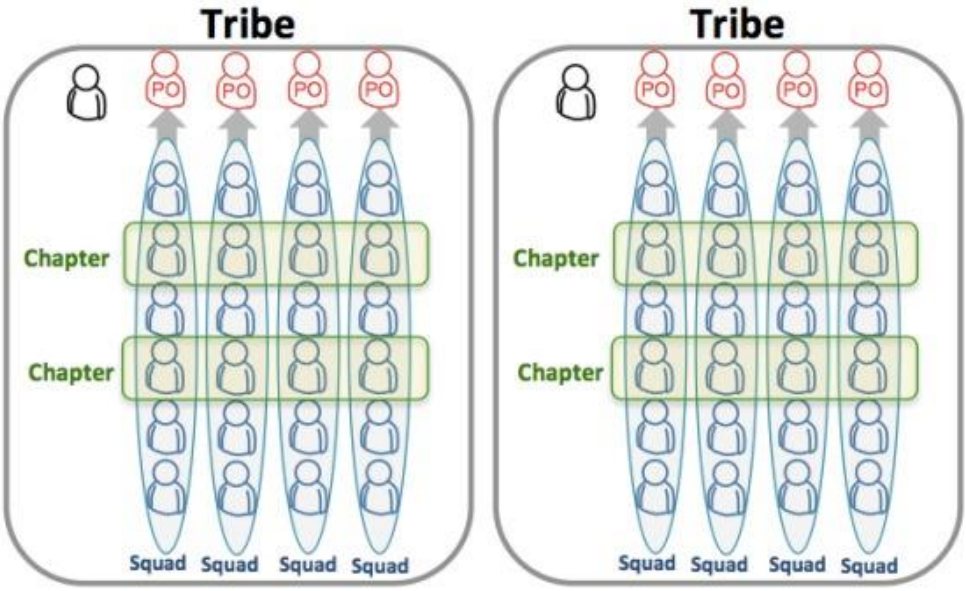

Figure 3. Spotify model
Source: (Kniberg & Ivarsson, 2012)

In the company analyzed case, there are four chapters: Data product, data analysis, data engineering and data science, each squad corresponds to data intelligence team of each company or product in the company group. The Data Product chapter corresponds to the Product Owners, so each squad has one member of this chapter and at least one member of the other chapters, forming a multidisciplinary team.

4.2. Metrifying the delivery of the team

When the Data Intelligence team started, we used to measure only the progress of the task, such as burnup and burndown chats, sprint conclusion rate, and metrics provided by the Jira Software, but as a data intelligence team, we realized that those metrics were not enough, we knew we could provide much more intelligence to our work as we do it to our customer areas.

As we already had some metrics in Jira, but they were separated from each squad and some visions were not so clear, we decided to unify them in one place, bringing it to the Power B. I. and dive a little deeper in that data. To compose the dataset, the product owners fill google sheets or excel document weekly when the sprint is over, and an R script reads it weekly to refresh the dashboard.

First, we started measuring the planned versus the executed tasks and scrum points, by the status, if it is “done”, the task is concluded, however, if it is another variable, it is not completed. the task conclusion rate and the number of tasks done by stakeholder area is also provided.

Figure 4 represents the planned versus executed panel in the dashboard, on the left are the executed tasks by area, the big numbers are the number of Scrum Points executed (340) and the number of tasks done (145). The graph on the top is planned versus executed o scrum points, the gray bar shows the conclusion rate, the black line indicates the scrum

points planned and the pink line the scrum points done. The dotted lines are the mean of planned and executed. The second graph is the same, but about task. It is filtered in 5 sprints of one squad.

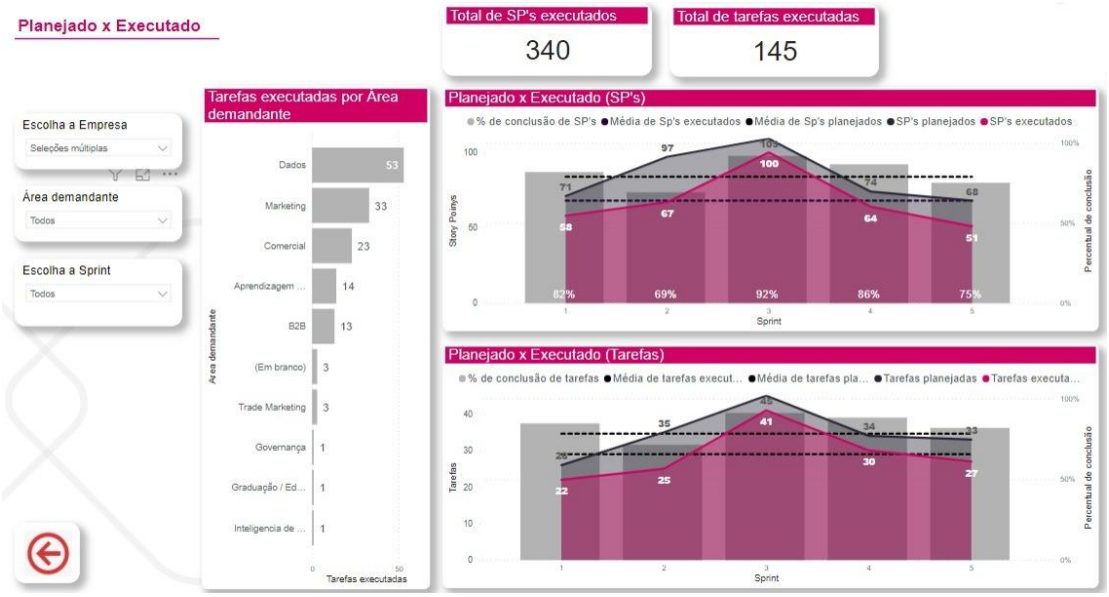

Figure 4. Panel of planned versus executed tasks, calculated and filtered as mentioned above. The dashboard is in Portuguese (Brazil).

Source: (Self)

Then, information concerning the technical area can be observed, as mentioned they are the chapters: data analysis, data science and data engineering. There the executed tasks can be see which mean tasks with done as status, and the tasks conclusion rate as well as the mean of execution calculated by a simple mean of the planned versus the tasks done.

Figure 5 shows in gray the number of tasks done, and in red the task conclusion rate, each graph corresponds to a chapter (Subarea), in this case, the first is Data Analysis and the second Data Science, and they are filtered by 5 sprints and one squad. The big numbers are the mean execution and the figure 6 is the second part of this report.

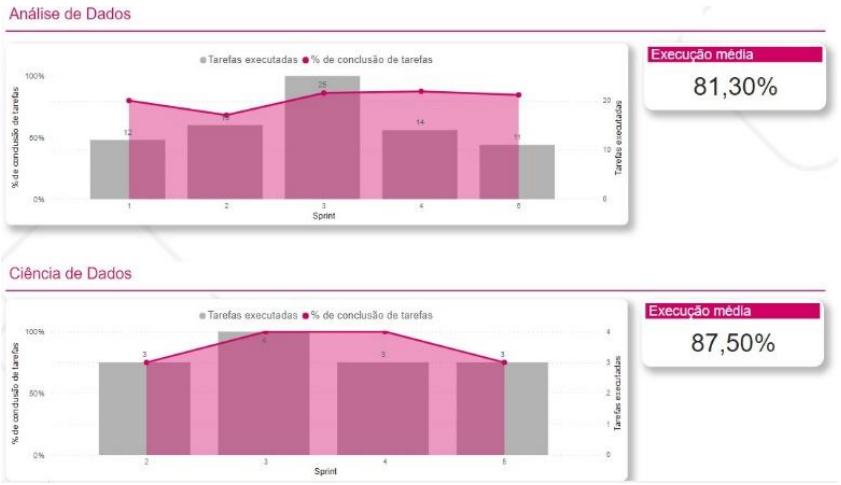

Figure 5. Graphic divided by subarea in the team. The dashboard is in Portuguese (Brazil).

Source: (Self)

Sub-área	SP's planejados	SP's executados	% de conclusão de SP's	Tarefas planejadas	Tarefas executadas	% de conclusão de tarefas
⊞ Ciência de Dados	41	37	90,24%	15	13	86,67%
⊞ Engenharia de Dados	149	124	83,22%	63	55	87,30%
⊞ Análise de Dados	229	179	78,17%	95	77	81,05%
Total	419	340	81,15%	173	145	83,82%

Figure 6. Second part of the graphics, in the end there is a summary of all subareas.
Source: (Self)

As it is clear, each team member is an individual person, and the team realized that is also important to have a single view per person too, the metrics are almost the same, and it is possible to see how it is shown in figure 7, the metrics are calculated by counting points and tasks and having a mean of execution, so it is important that the Product Owner looks at it and considers it to plan the sprint according to each person's best.

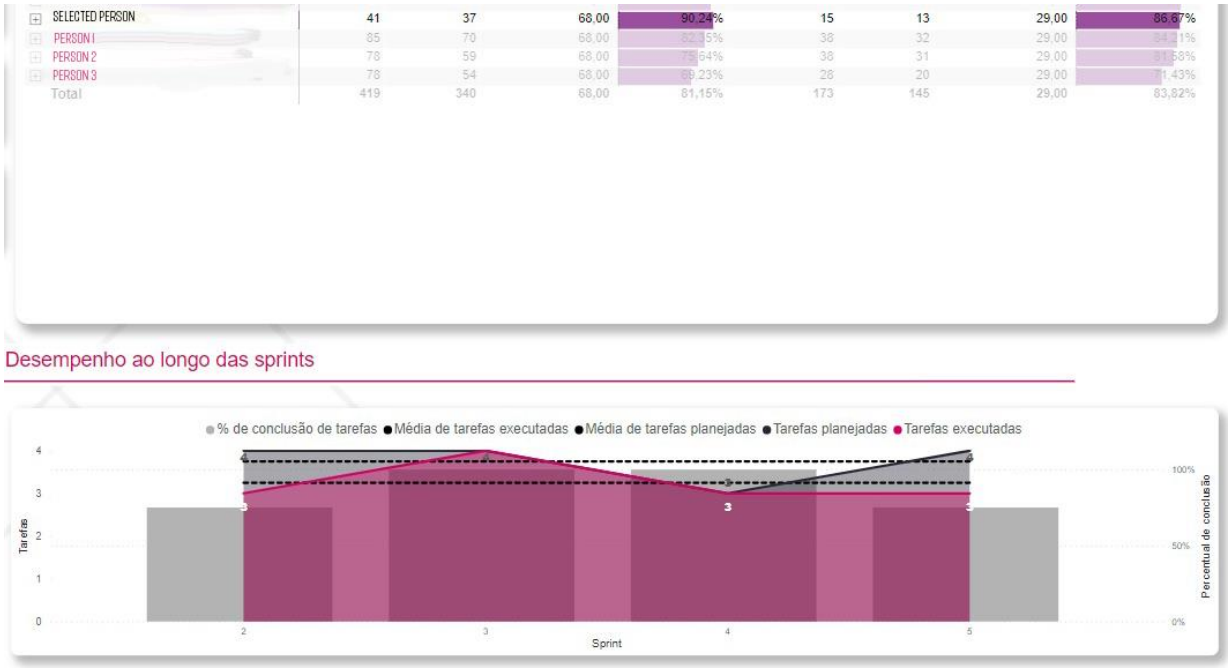

Figure 7. View per person, the graphic below changes to the person filtered and is equal the planned versus executed. The dashboard is in Portuguese (Brazil).

Source: (Self)

In order to constantly up the work to dated, the goal is to try not to work 100% on new requisitions and look inside its architecture improving it often, so, there is a label in Jira of new requests and technical improvements, measuring its rates, with the goal of at least 80% new requisitions and 20% technical improvements as seen in Figure 8.

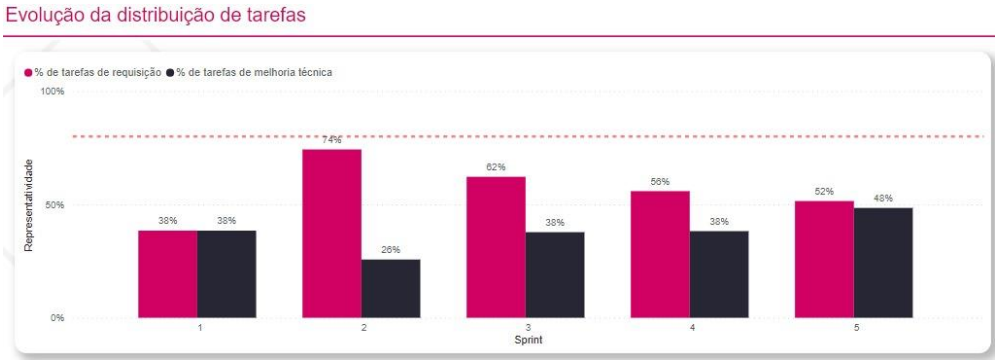

Figure 8. This graphic shows a count of tasks by the labels and shows if achieved the goal.
Source: (Self)

These metrics have already helped with problem identification and solving, but sometimes, it was realized that measuring only delivery was not the best way to identify bottlenecks and problems.

4.3. Metrifying the mood of the team

In general, people feel uncomfortable or unsatisfied and usually do not say anything to

the leader or even to the pairs not to demonstrate weakness, unsatisfaction or even disagreement of a situation, process, or culture. Often people can feel exposed when they reveal who they are and talk about something delicate or even talk about feelings in the work context.

In the team case, it was decided to collect data about people's mood anonymously because they could feel in a safe place to express themselves about how they are feeling concerning the work amount and quality, teammate relationship, company satisfaction, or not or even an event in their personal life. The purpose was to ensure that the team was working with joy and brightness in their eyes to reach the objective and if all members looked forward to the company, personal and career growth. So, a formulary was developed as shown in figures 9 and 10, where there is an explanation of the mood options, and each person should answer it about their current sprint.

In the retrospective ceremony, the link of the survey is sent in the chat, and the people fill it according to their mood in the week. It is the checkpoint to remember the team members to fill it. an automation is available in Slack, to send in the group of the Data Intelligence team a reminder of the form with the link, every Friday by the end of the day.

Figure 9. Header of the formulary with the explanation of the mood's meanings – Translated by google, the original form is in Portuguese (Brazil).

Source: (Self)

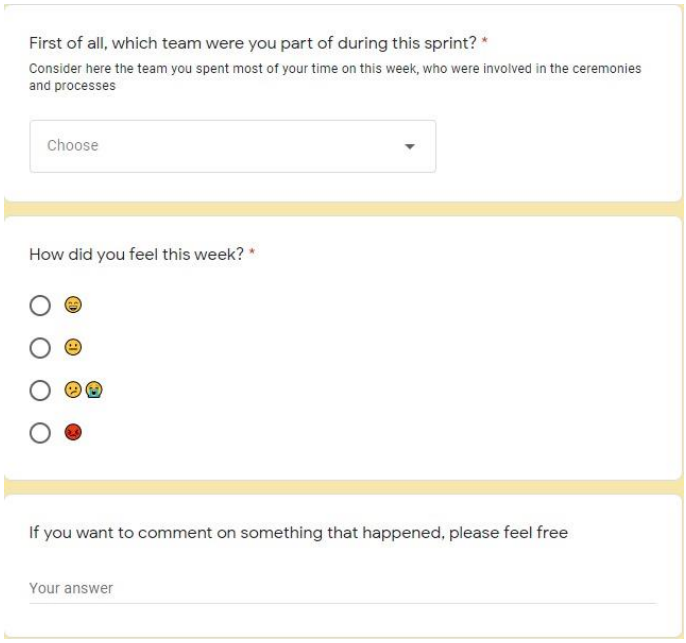

Figure 10. Questions of the formulary – Translated by google, the original form is in Portuguese (Brazil).

Source: (Self)

To transform it into a metric in power BI (figure 11), a scale of 4 levels of feeling was considered, the happiest: most things in the week went well, and the results are satisfying, the more or less: the sprint was not happy neither sad, it is a neutral vote; sad means that something did not go well and the person feels sad and demotivated because of it and the anger: something makes the person feel frustrated most part of the sprint. values were applied to calculate the team´s happiness rate: 😡 is 0, ☹️😭 is 1, 😑 is 3, 😄 is 5. And the count is a simple average, where the index goes from 0 to 5, where 0 is the worst and 5 is the best. We also look at how many answers we received.

Figure 11. The graphics show in gray bars the responses and the pink line and dots show the average of all squads, and down the page, the rate of each squad, on the right side the comments are available to read, remembering, that all the answers are anonymous. The dashboard is in Portuguese (Brazil).

5. Conclusion

Observing and using the metrics for 4 months, the scrum concept of empiricism was

already very evident and helped us with rapid decision making and identifying bottlenecks and problems present in the squads. If in such a short amount of time we already had many insights, these metrics in a long term can bring even more intelligence in the process.

Measuring the delivery rate and the individual progress in the sprint, helps to understand the amount of work the whole team is able to take on and deliver without problems, it helps in planning the sprints and the roadmaps, and also to understand who is able to help when any trouble comes up, or when determined client requests something with high priority. It is also useful to identify if the blockades are perturbing the roadmap and requests flow, which means we need to take an action above it and unlock any door so the team runs freely.

By measuring the mood, we were able to identify people in initial stages of psychological problems because of the COVID-19 pandemic or intense work, then we were able to talk and direct to professional help and, nowadays, they are showing recovery. It also helped us to map flow troubles, sometimes many people complain about crossed demands then, we improved our requisition entry process. Another path we acted on, refers to when the team feels distant from the leaders, when the Human Resources team is summoned to create ties and strengthen the attendance of the leaders in the ceremonies.

Both metrics are extremely helpful in team management process, because it gives the panorama of the whole group and also the individuals we are working with, we are talking about people, we all deserve attention and preoccupation in different parts of our lives, having people worried and thoughtful to help is a benefit that few teams have, and it is clear that the teammates feel glad and valued knowing that there is someone who cares about them.

It also can be very useful in team management, so the problems and unsatisfaction can also be solved with training and educating to our team. Each discovery made by this data analysis could result in very diverse solutions and alignments, this tool can be simple, but the supply that it provides to the Data Product chapter and the chapter leaders, it is extremely powerful to set the direction of the whole Data Intelligence team.

6. Next Steps

Now, it is planned to add a new metric to this report. The feedback rate is in process of building the metric and researching the best path to measure how much value our delivery is bringing to the company, not only revenue, but also how this influences the insights and speed in the decision-making process.

Another metric to be implemented is in the mood board, it is an evolution of the responses to create the answering rate. It can be calculated knowing the total numbers of members of each squad and the number of respondents, then calculating the rate of the answers from the total. But as the team is scaling, an automation to update the number of members automatically is expected, without the need to alter it in the source code.

The three metrics evaluate if delivery is well done (with quality) and the amount is enough and healthy for the squad members. The quality will be measured with feedback and dashboard access rate, the amount already measured using the Jira data in the dashboard, and the health measured the mood with our forms and the metrics in the report.

If in such a short term (4 months) a lot of insights were observed with the two indicators working together, adding a third could bring even more raw material of intelligence to our process and team management quality to the crew.

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