



**Harnessing the power of Digital Social Platforms to shake up makers and manufacturing entrepreneurs towards a European Open Manufacturing ecosystem**

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<b>Deliverable Title</b>	Social Impact Memes
<b>Work Package Leader</b>	BOUN



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## DISCLAMER

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## EXECUTIVE SUMMARY

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The aim of this deliverable is to provide details on the work being done for Open Maker Digital Social Platform on the evolutive information flow identifiable as discreet packages interchanged to support the community efforts for addressing social challenges and creating impact.

The quantity of data gathered on this platform has not reached the desired levels due to various challenges associated with constraints elaborated through this deliverable. Most significantly among them are associated with the collective learning curve experienced by the partners associated with mapping the diverse maker communities. As a result, much has been learned on what is working and what not in user engagement through various tools and algorithms. The core tools and algorithms to monitor and evaluate the success of the project based on KPIs of online follow-up of off-line activities are developed and remain to be tested at scale as a critical take-up level of the DSP is achieved with the necessary resourcing. The outputs of these tools are demonstrable in the InSight module and the ad-hoc analysis included in this deliverable to be included in the final version of InSight before the end of project.

The DSP has a modular design with UI-UX/Analytics/Harvesting capabilities loosely coupled via API's. The whole integrated system with the modules Explorer/ InSight/ Watchtower serves as an integration hub that harvests and integrates information from social networks already used by the target-groups.

The design fosters engagement of influencers with users through content and event recommendation as well as community monitoring by social network interactions. The design is aimed at augmenting the capacity to reach a wide critical mass, and supporting scalability and growth. The mechanisms for the attraction of new members and users are in place and special attention and resources has been allocated to the development of an effective user journey.

- a) tracing, measuring and assessing relations and trends within the community;
- b) analysing which factors enable or limit highly connected interactions and augment the size of the community;

- c) analysing how and to what extent offline community engagement activities are able to augment the scale and the scope of the online community;

The DSP continuous feedback system is constantly reviewed and improved upon. As actions level activities will be tracked en masse the features of the interactions that influence desired outcomes will be identified and system wide recommendations improved.

The OpenMaker projects provide an evidence-based methodology to harness the collaborative power of digital networks to create collective and individual awareness, which can be scalable to other communities and transferable to other sectors and industries. This is made possible with an extensible Conceptual Framework design as detailed in Deliverable 2.3. As such, much work has been done to demonstrate the utility of studying value systems in play in our communities and interactions and this deliverable outlines how memes, as both seemingly static building stones and dynamic expressions of values, propagate and influence the impactfulness in addressing social challenges especially around collaborative innovation in the case of Open Maker.

## GLOSSARY OF TERMS

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API	Application Programming Interface
DSP	Digital Social Platform
Explorer	DSP front-end user Interface for onboarded members
GDPR	General Data Protection Regulation
IF	Interface
InSight	Backend analytics service of DSP
KPI	Key Performance Indicators
LES	Local Enabling Spaces
MVP	Minimal Viable Product
OM	Open Maker
OMbot	Open Maker bot (Chat/ Text bot application)
PSS	Pilot Support Scheme
SS-NMF	Semi-Supervised Non-Matrix Factorization
WatchTower	Backend data harvesting service of DSP

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## INTRODUCTION

This deliverable describes the implementation of impact measurement through data analytics/ meme discovery and monitoring of social media activities of onboarded members of openmaker. The key challenge is identified as monitoring the information extracted from social data across various platforms, which is challenging due to its highly distributed nature spanning across geographical regions, cultures and languages. Based on an earlier Deliverable 3.1 (Impact Evaluation) it was also revealed that we need internal analytics and reporting on social impact of the DSP which also ties in with the KPIs of the project as a whole. This deliverable illustrates the nature of the data analysed by the InSight module through various example use cases.

The core of this deliverable is to identify the memes that are effective in achieving desirable outcomes: fostering meaningful social impact through collaboration and co-creation among makers and traditional manufacturers. As this is a rather broad and ambitious final goal, additional social impact measures have been identified and studied during the lifetime of the project, such as methods and tools for meme extraction, individualized memescapes, network graphs, and value-based scoring of articles and their related memes have been developed. Due to the time constraints of the project and the lack of sufficient data, at present, the traction on the platform is not sufficient to deliver the full power of the developed functionality as the data bandwidth is increased by more users. However, the foundational mechanisms necessary to deliver the desired functionality have been implemented and a prototype system has been built<sup>1</sup>. The backend components were developed as APIs - one for monitoring the external social media (WatchTower)<sup>2</sup> and one for monitoring the characteristics and relations among the OM community members (InSight)<sup>3</sup>.

The core of our approach to gaining insight about the community is the integration of a) mapped user profile data that is based on demographics, skills and interests (in terms of keywords in a dictionary) with b) their perceptions extracted via values-based psychometric scoring such as the importance of soft skills with respect to the success or failure of projects

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<sup>1</sup> <https://explorer.openmaker.eu/>

<sup>2</sup> <https://watchtower.openmaker.eu/>

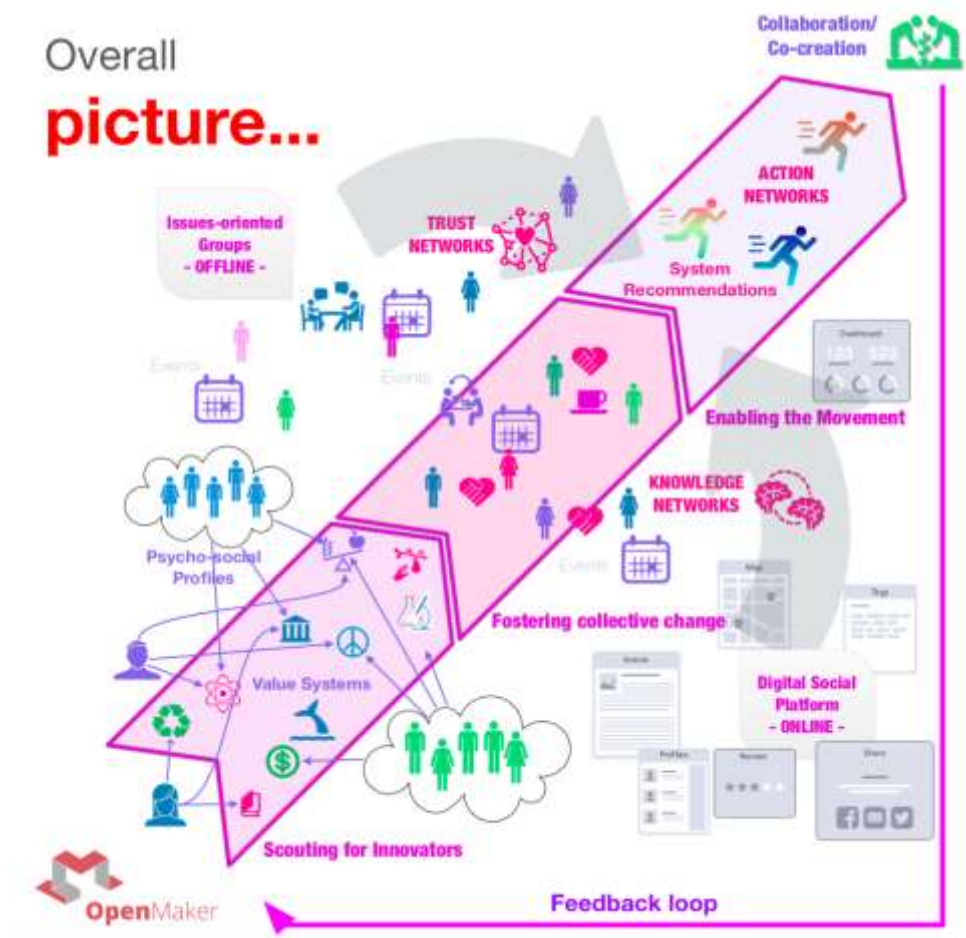
<sup>3</sup> <https://insight.openmaker.eu/>

(via SS-NMF, a statistical method developed in the project) and c) social media influencers and propagated influential memes (community spirals).

This approach enables insights into the social impact intentions through the focus on social innovation. Objectively speaking, collaboration between makers and manufacturers are not geared towards social impact per se, but have inherent potential, and some collaborations may even have social impact as a core focus. As such, the DSP prototype can be used to study communities based on information gleaned from vast amounts of unstructured data contributed on social media. It can further be utilized to disseminate information related to social impact focused projects and challenges, by providing feedback and reinforcement regarding personalized recommendations based on the memes that drive the actualization of movements. The following functionalities are implemented

- News and resource recommendations
- Event tracking
- Dissemination of projects and challenges
- User matchmaking to facilitate collaboration

These functionalities reveal information about user activities and can serve to entice others to participate in the maker movement towards an outcome of common good.



The conceptual framework above on which the entire OM project is based relies on the following components (as defined in Deliverable 2.3)

**Knowledge Network Component.** data harvesting, preprocessing, aggregation, post-processing, captures community-relevant content, profiles, demographics, news articles, information about maker events and organizations.

**Value Systems Component.** Psychosocial profiling, mapping users general (Schwartz) and makership specific value systems. Examples: importance of social inclusion of disadvantaged people, the importance of open hardware; social, economical and environmental sustainability of new technologies. Communicating community values, identifying common ground by locating similarities and complementarities.

**Recommender, Reputation and Trust Component.** Machine learning modules in the back-end and user interaction in the front-end. Generate user specific recommendations:

relevant news articles, modes of action (based on user values, issues/ challenges and preferences), influencers to follow within the geographic proximity.

**Action Network Component:** Tracking and monitoring of actions of the registered members and presents statistical summaries as member profiles. The component helps to observe value-consistent engagements (e.g. does the self-declared interests match the activities on social media) and contributions of the members to the community. The information rendered via the modules of this component is further used within recommendation and reputation related modules.

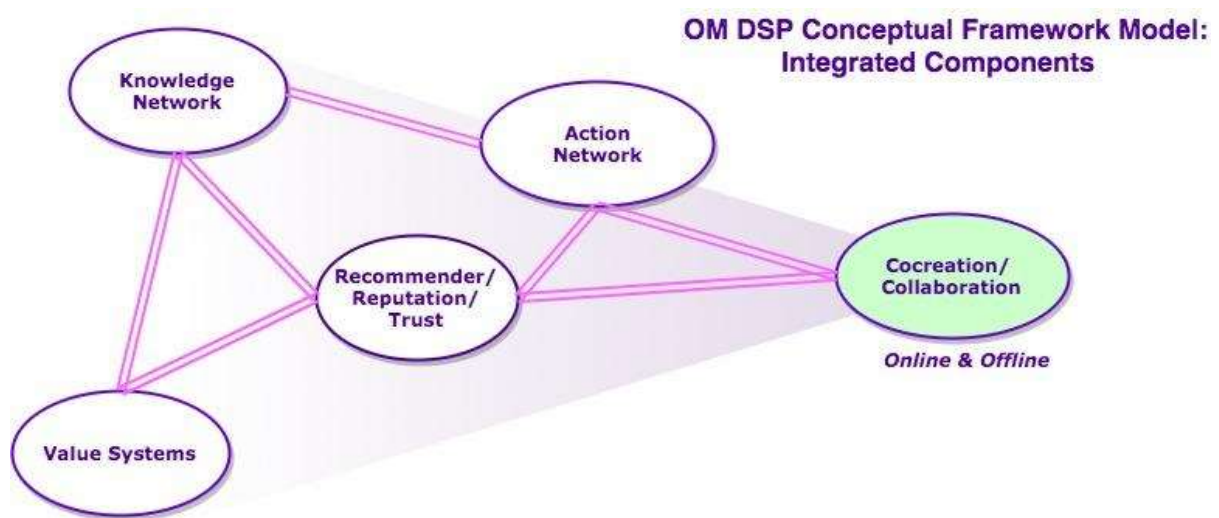


Figure 1: Open Maker Digital Social Platforms Components

The Knowledge/ Trust / Action Networks components act as a bridge for the Value Systems of the users and their communities to turn into desired actions and outcomes, in the case of OM-DSP it is Open Makership and social manufacturing.

## EVENTS IMPACT ANALYSIS

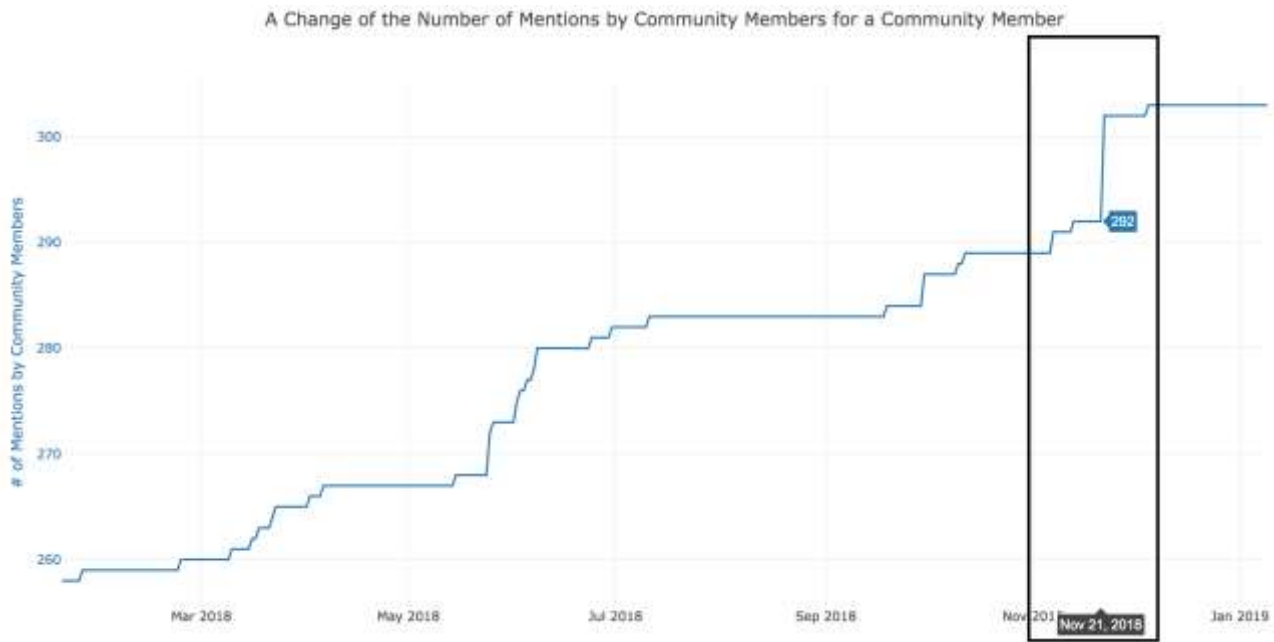
The OM consortium and especially the LES' organize offline activities with the goal of bringing Makers together. Towards this goal, an important challenge of the DSP is to add additional parameters in quantifying the impact of such activities and to investigate the community building potentials indirectly from the information shared by members on social media.

Offline activities (such as organizing workshops, gatherings and meetups) are time consuming and difficult to organize. Hence, such activities are relatively rare when compared to online interactions, that are spread over longer time frames. In contrast, offline activities are based on limited resources, and occur at a physical location and specific time of a much shorter duration. Additionally, the learning experiences are difficult to share between different LES and it is difficult to quantify what works and what not in engagements with the community.

The events around the OpenMaker project act as a trigger of social impact. Exactly, 110 events by LES in UK/Spain/Italy/Slovakia and by third parties 45 events, with a total of 2951 participants, as detailed in Deliverable 1.8 Enabling Programme Report. As a concrete example of the type of analyses that can be carried out on the DSP, below we show the activities that result from two example events organized by OM and illustrate quantitative measures for estimating potential impact. The following are two sample effective events on the OM community members (registered and onboarded):

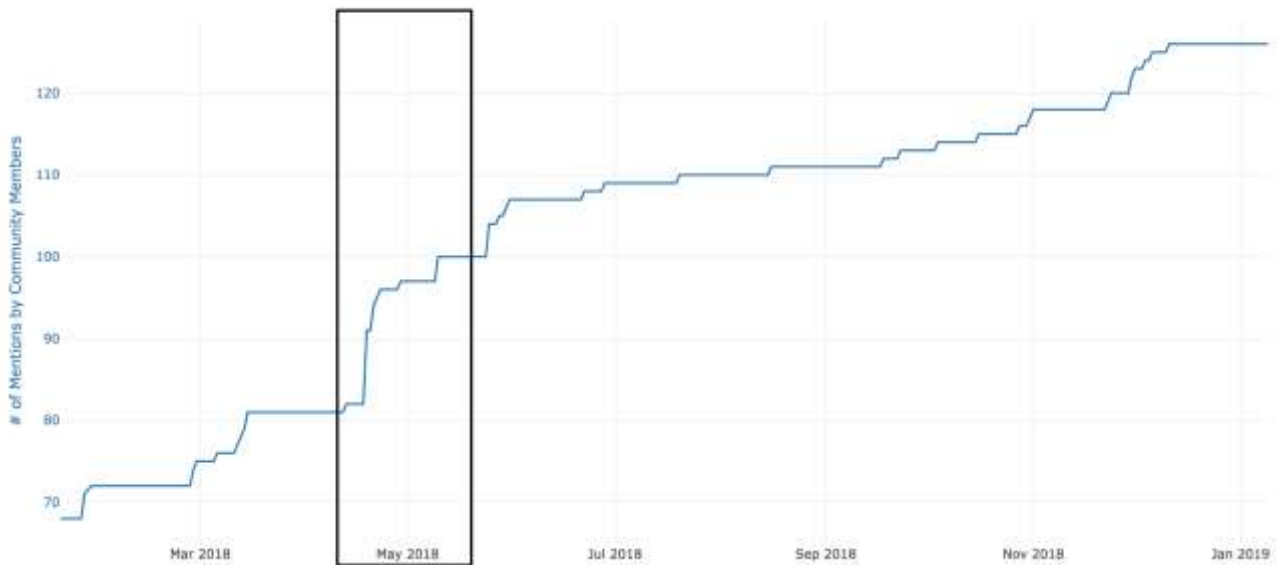
- Policy Event on Future of Maker at Brussels, 22 May 2018
- Final Event at Bratislava, 21 November 2018

In the figure below we show the number of mentions as a function of time of a chosen community member. At the date of the Final Event at Bratislava event we can see the jump in the number of mentions;

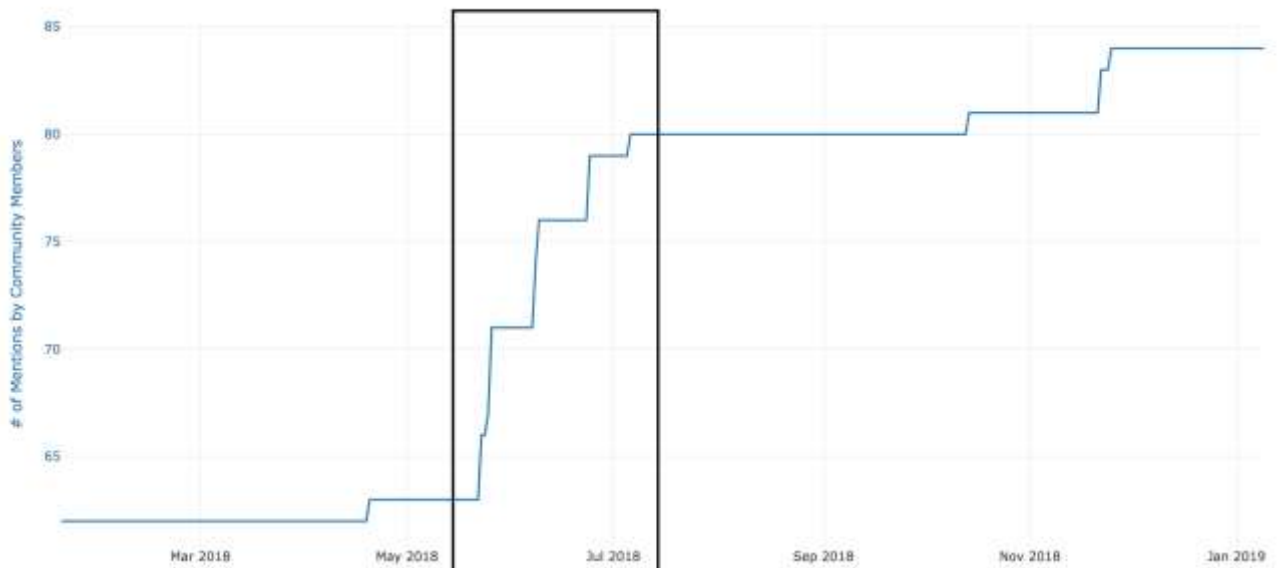


When members and audience mention and tweet about events and related activities, the visibility of the events increase. From dynamic data monitored from social media, we can empirically observe that the benefits are reciprocal: users that spread the word are also experiencing a positive effect by getting mentions and new followers. While it is an ongoing research topic to infer direct causal relations between events and social media behaviour, nevertheless highly significant changes, visible at first glance signal us the presence of such links. We observe that this behaviour is common, as shown in the following two figures, where abrupt changes coincide with the known events. The detection of such changepoints can be automated using machine learning, and the DSP has the capability of carrying out statistical analysis of data resulting from social media activities.

A Change of the Number of Mentions by Community Members for a Community Member

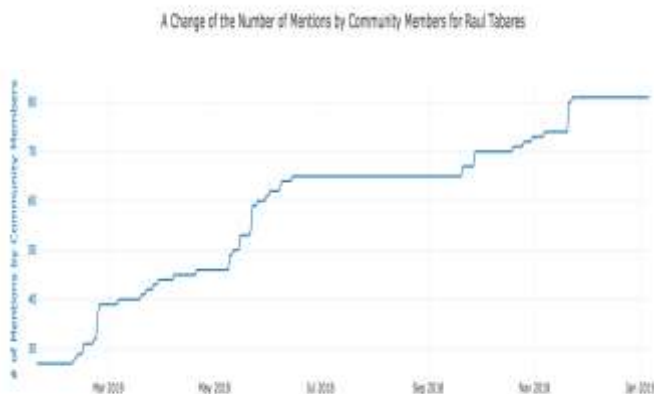
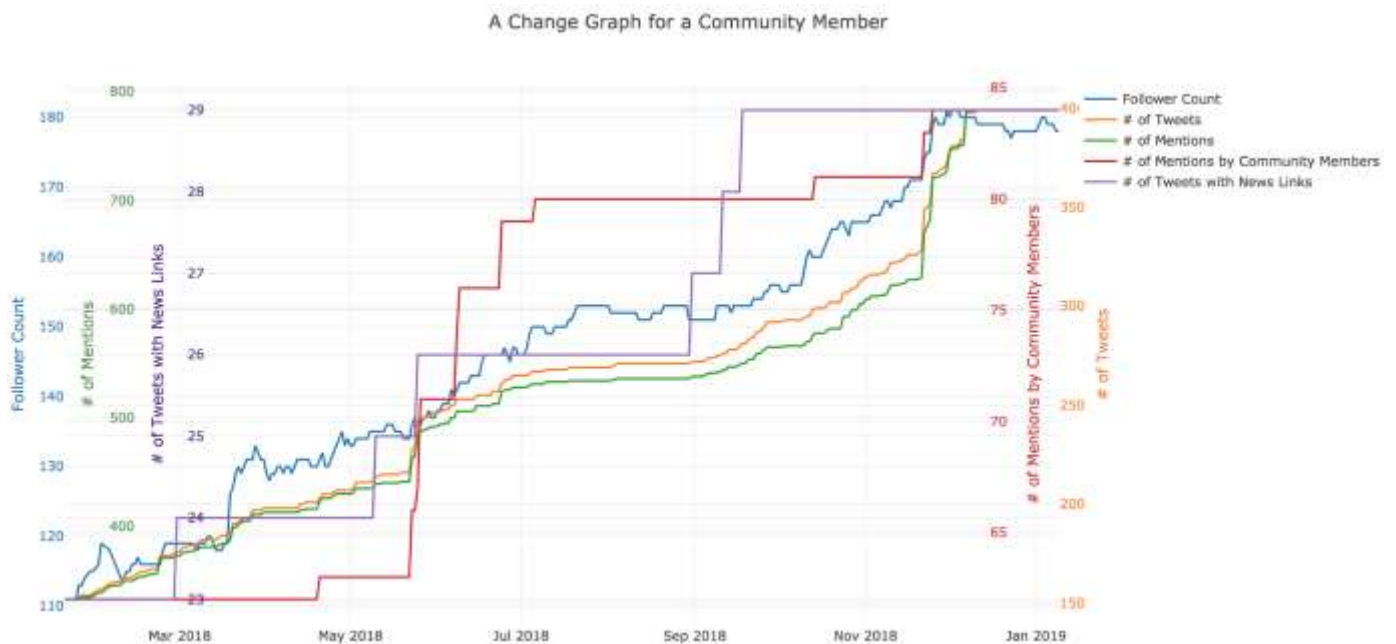


A Change of the Number of Mentions by Community Members for a Community Member



More precisely, the relevant activities are tracked in the InSight module. The dynamical behaviour of follower and friend counts, tweeting activity, mentions by other users or those specifically by the community members are key proxy indicators for social impact that we analyze. Other abrupt changes in activities signal us to events not known to us, such as detecting relevant articles, keywords, memes. This is a continuous self-reinforcing procedure where we detect semi-automatically changes and understand the causes.

All activity indicators (such as the number of tweets, likes, follower count) are dynamically collected and analysed as can be seen in the figure below. Here, the data related to a particular member can be broken down as needed to understand inter-community interactions as well as out of the community interactions. Such dynamic and multivariate data is valuable for network analysis and related network metrics.





## MEMBER AND COMMUNITY ANALYSIS

The Insight module constantly monitors social media activities of onboarded members. These activities generate vast and unstructured data. Considerations of legal (GDPR) and ethical concerns forces us to use only information from onboarded members that fill the appropriate consent documents. Nevertheless, a systematic analysis of this data reveals certain patterns that are eventually of interest, and are offered to the enablers or the registered users of the platform.


































The following table shows a sample of the individuals and organizations who are reacting to the effective posts of events that are released from OpenMakers social network accounts; Twitter and Facebook. We segment the individuals and organizations into three groups in terms of details shared:

Group-1) Explorer members sharing their Twitter account details,

Group-2) Explorer members not sharing Twitter details, and

Group 3) Other Twitter users not registered to the Explorer.

The basic rationale of such a segmentation is to distinguish intra-network activity and outside impact. It is possible to automatically generate reports of the form below.

	Policy Event 22.05.18	Final Event 21.11.18	Group1	Group2	Group3
Community Member 1			✓		
LES Member 1	 	 	✓		
Community Member 2	 	 	✓		
LES Member 2			✓		
Community Member 3			✓		
Community Member 4			✓		
Community Member 5	 		✓		
Community Member 6		 		✓	
Community Member 7				✓	
Social Network User 1					✓
Social Network User 2					✓
Social Network User 3	 				✓
Social Network User 4					✓
Social Network User 5					✓
Social Network User 6					✓
Social Network User 7					✓
Organization 1			✓		
Organization 2					✓

In the following, we give an analysis example that can be generated from data collected by the InSight module. The activity on a user's twitter account is automatically monitored starting from the date the user consents to share her/his twitter account to the Explorer

system. From the dynamically collected data, we can derive and visualize the following statistics:

- Follower Changes
- Number of Tweets
- Number of Mentions
- Number of User Mentions by Community Members
- Number of URL links

Note that such timestamped data is not directly available from the standard Twitter interface; it is necessary to run a continuous monitoring system with own timestamping and log mechanism. InSight implements such a system that can also be adopted to other social platforms other than Twitter. The following examples visualize changes in time, rather than cumulative numbers: Changes in the Number of followers over time (blue), The number of tweets over time (orange), the number of user mentions by community members (red).

The following snapshots are taken from the actions of Community Member 1 (In this report, we exclude names for privacy; on the actual system this information would be accessible to an onboarded user). The activities also coincide with OM events -- for this particular case the event is on 18th of April, when European Maker Week (EMW) Announcement. The user tweeted (14 times), and mentioned (9 times) more than his/her typical average. This way, for each member we can automatically detect an activity and by integrating over users we detect potential impact memes in the in-community mentions as related to in-community event.

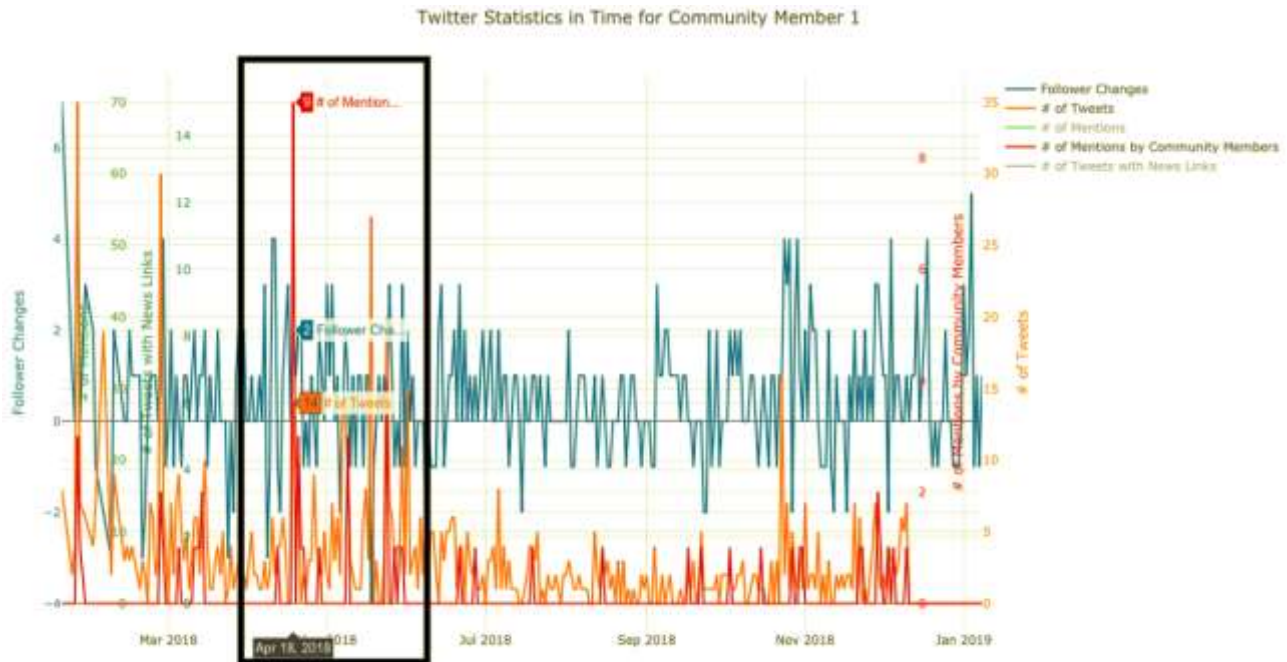


Figure: Some of the Twitter statistics on the 18th of April is highlighted for Community Member 1. The number of mentions are 9, he tweeted 14 tweets and two people started to follow him.

Another example is detecting negative impact on the change of the followers. Here, this particular member lost 4 followers on 18th of May. The statistics reveal that this change occurred after a relatively high tweet activity (27 in a day) without in-community mentions. Close inspection reveals an event not related to the Open Maker community. A possible reason for the decrease of follower number can be the unrelated high tweet traffic of the user.

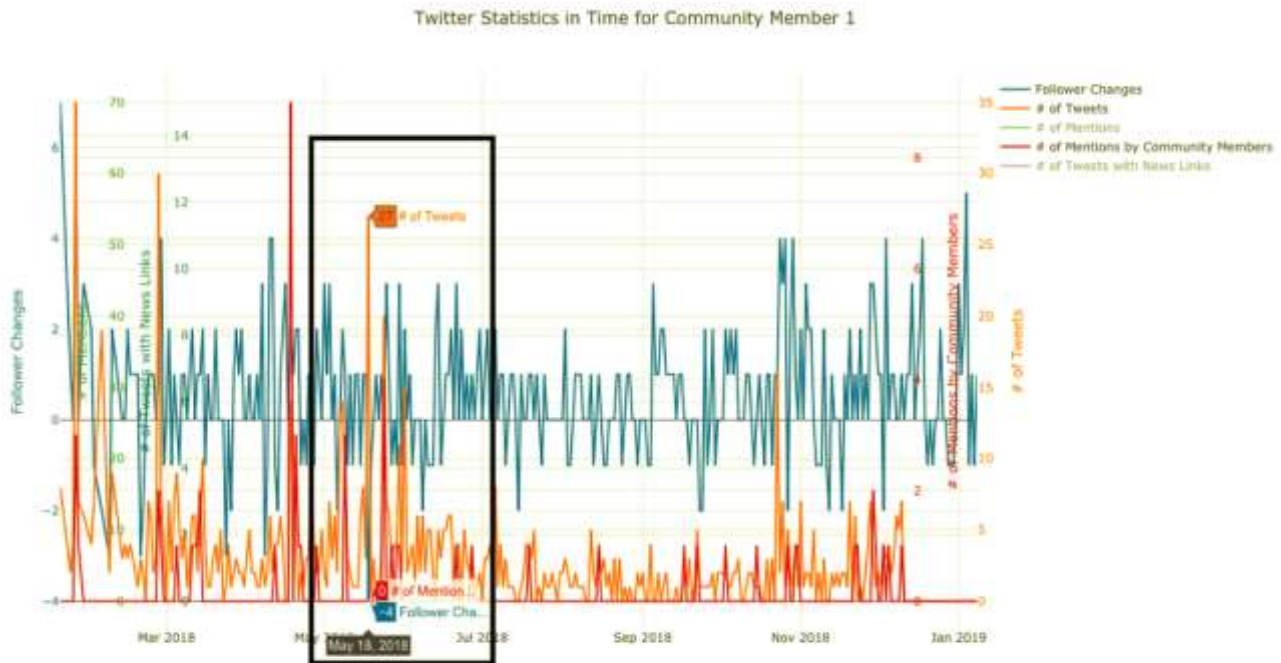


Figure: Some of the Twitter statistics on the 18th of May is highlighted for Community Member 1. He tweeted 27 tweets and four people stopped following him. There is no one in the community, who has mentioned him.

The following graph snapshots are from the twitter account of LES Member 1. The first graph shows an increase of 7 people on the follower count on 18th of March. When we check the other statistics, we see that he did not tweet that day and there are no in-community mentions on him. This is an example of a salient action where it is difficult to explain. We checked the tweets just before that date. On the 17th of March, he retweeted an event, also related with Open Maker community. This may be the cause of the increase of the followers.

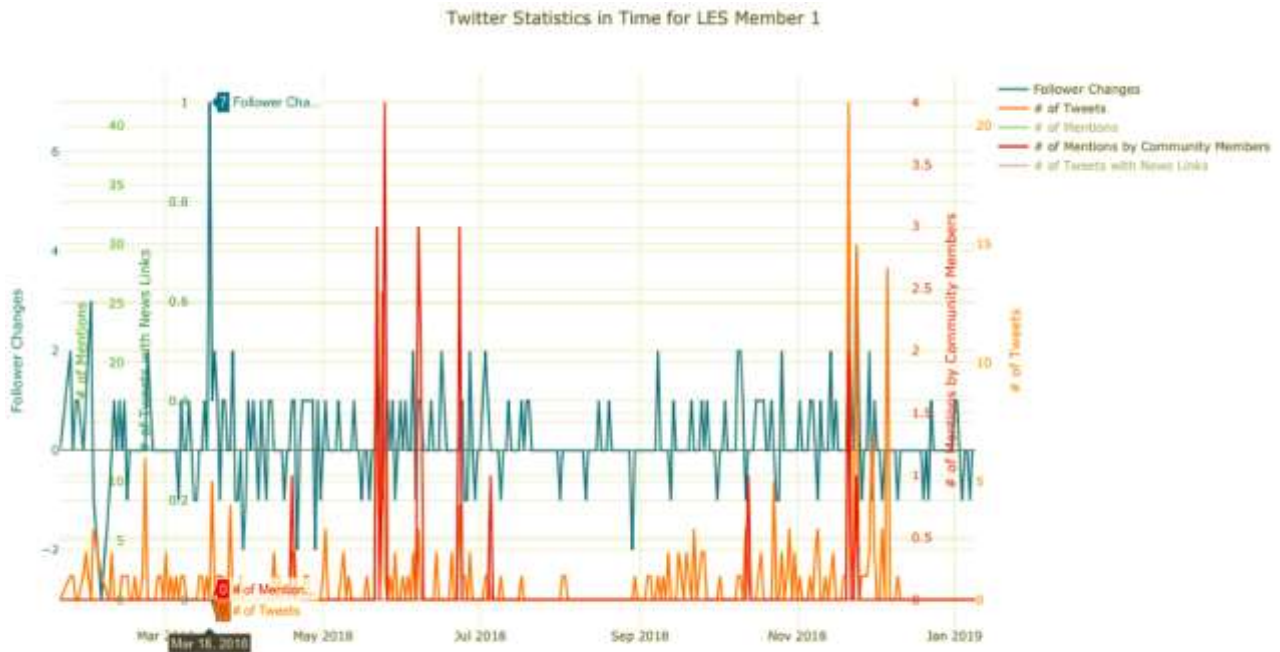


Figure: Some of the Twitter statistics on the 18th of March is highlighted for LES Member 1. Seven people started to follow him. There are neither mentions nor tweets.

The second and third graphs show the movement on the number of in-community mentions for LES Member 1 on the 22th and 25th of May, just after the Policy Event on future of maker at Brussels. On the 22th of May, he tweeted and got mentions from the community members and on the 25th of May, the mentions reach to its highest value even though he tweeted just once, and this does not affect his follower count.

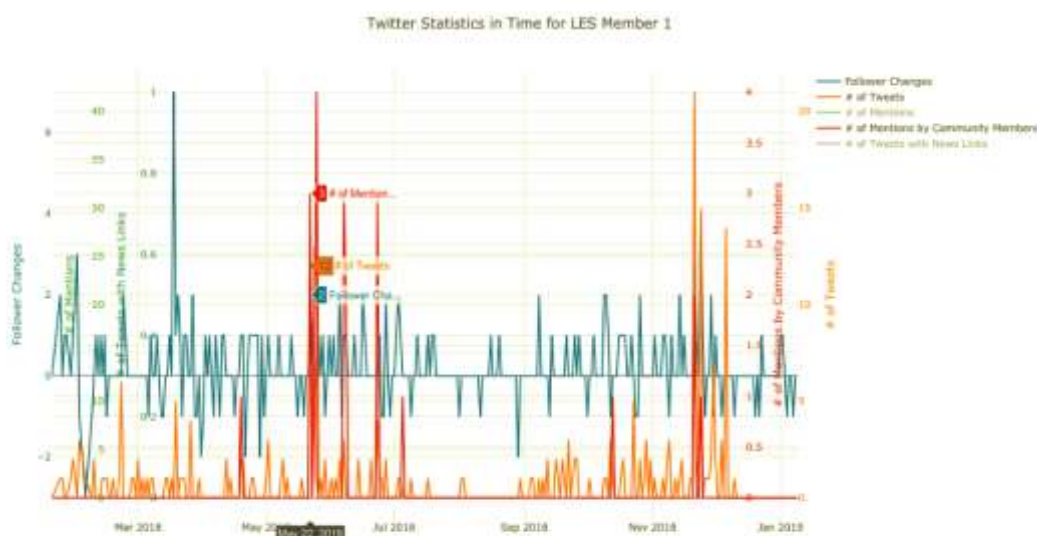


Figure: Some of the Twitter statistics on the 22th of May is highlighted for LES Member 1. There are 3 mentions of him, he tweeted 12 times and two people started to follow him.



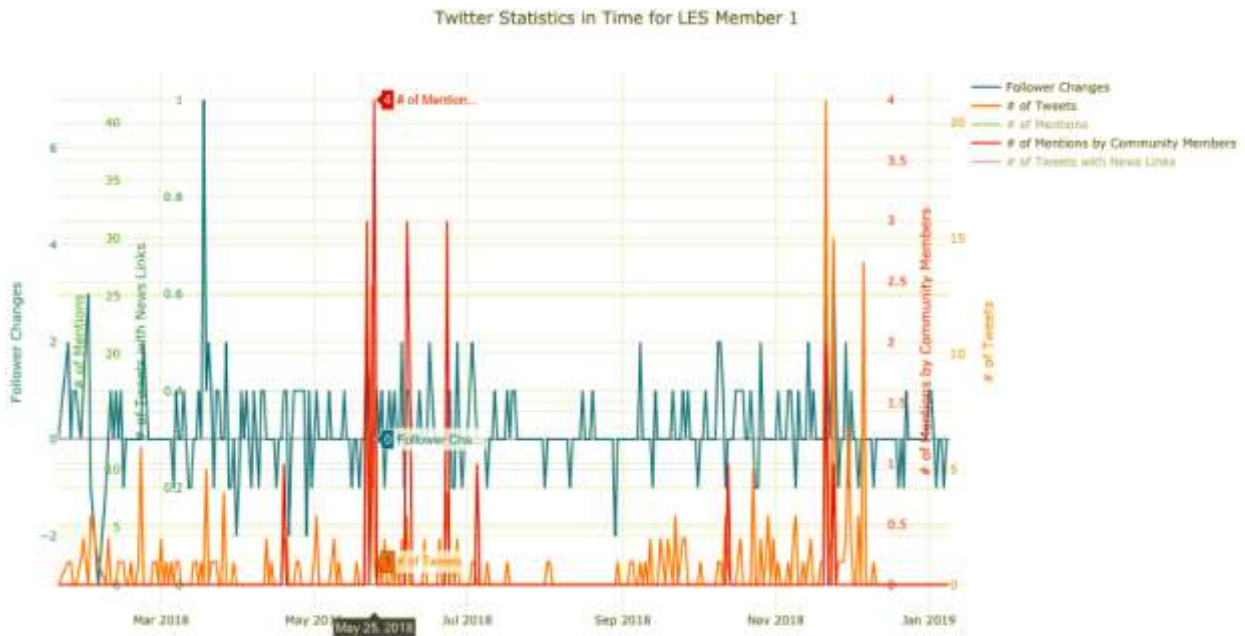


Figure: Some of the Twitter statistics on the 25th of May is highlighted for LES Member 1. There are 4 mentions of him, he tweeted once and there is no change on the followers.

In the last figure of LES Member 1, the effect of event, the Final Event at Bratislava, can be seen on the graph. The number of tweets are at the peak. An inspection of the graph of changes for this user, suggests the likelihood of some event around 21<sup>st</sup> of November.

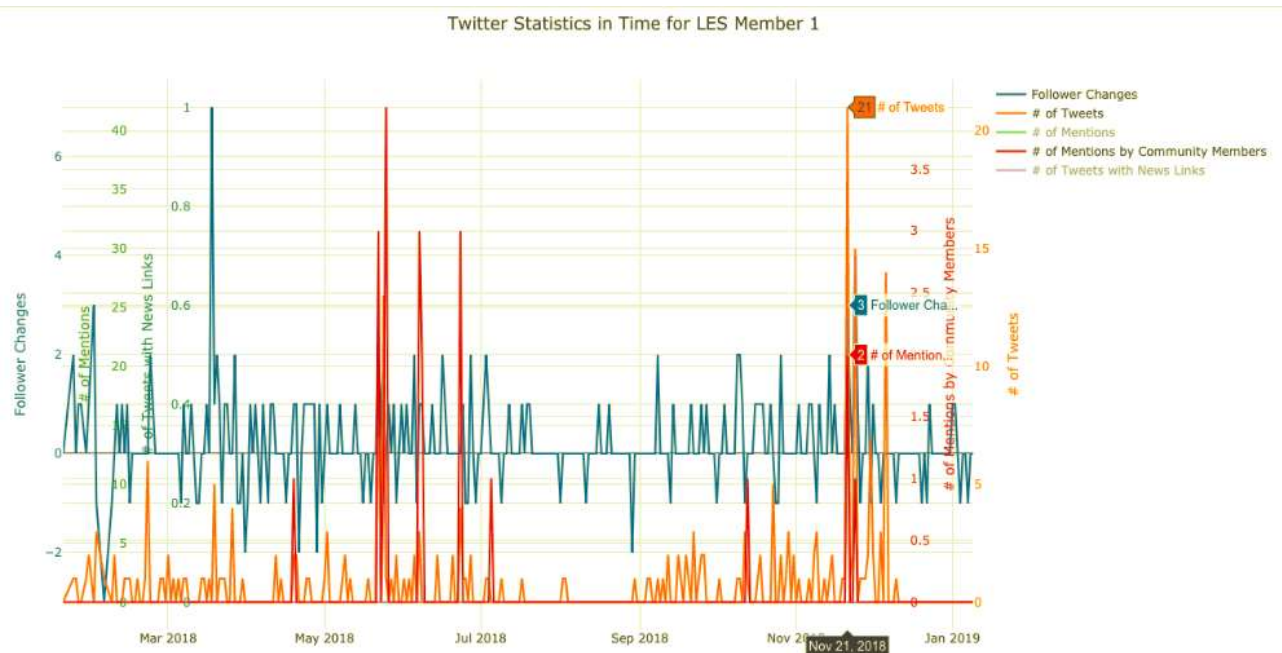


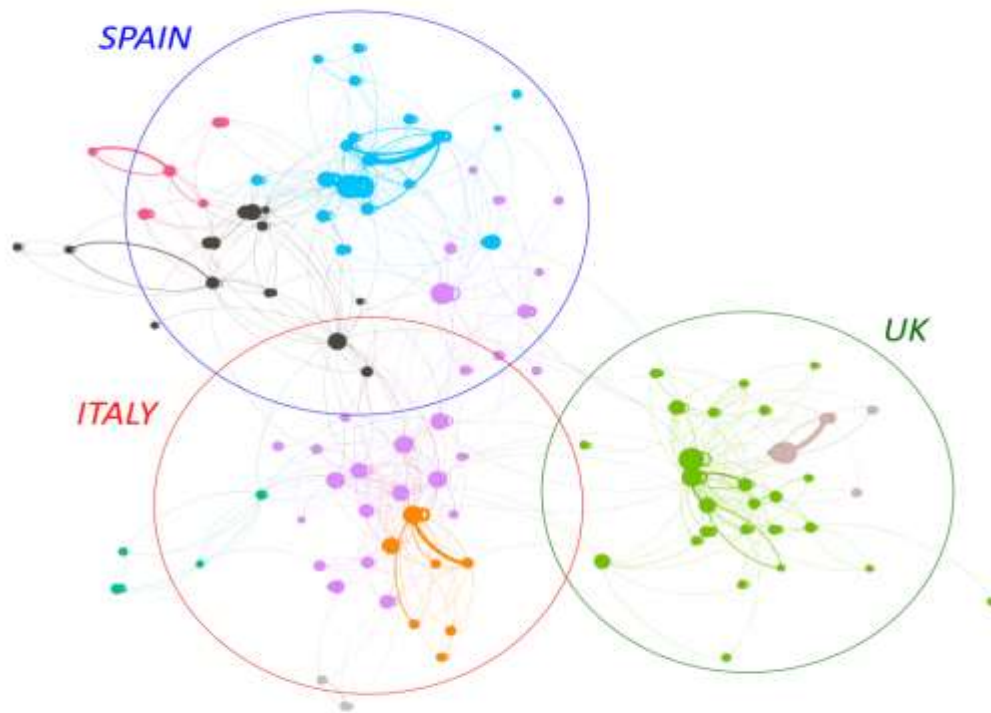
Figure: Some of the Twitter statistics on the 21th of November is highlighted for LES Member 1. There are 2 mentions of him, he tweeted 21 times and three people started to follow him.

We are also able to log all the interactions and activities of the members. Below, Twitter mention graph of the OM members is shown. Nodes represent members, directed edges represent mention relation, the thickness of the edges are determined by the number of mentions and nodes are coloured in a way to highlight grouped nodes that have high mention rates in between. Also when we made a deeper analysis, we found that same coloured nodes indicates close groups in real life, usually people from the same countries.

As the above scenarios illustrate, InSight facilitates detection of changes and provides side information to reveal possible causes of such changes. While the full causal discovery is beyond the current scope, by simple analysis of textual and connectivity data we are able to bring the associated information to the attention of an OM-DSP user.

The following graph shows the mention graph of the OM Community. The nodes represent OM members who have shared their twitter accounts. The edges are directed and indicate that a member has mentioned someone in the community. The size of the node is proportional to the number of times they were mentioned (in-degree). The larger the node the more they have been recognized by the community members. The colours show modularity class, where members in the same module are more connected to each other in comparison to others in the network. Finally, the members from different countries are enclosed in a circle. In this graph we can see that there are modularities within countries, which is not surprising as there are likely people who are interested in different aspects and that are aware of each other. This graph also shows connections among countries, which is useful to know with respect to spreading the movement.







the context of information retrieval and natural language processing. In particular, we have developed a semi-supervised approach based on topic modelling<sup>4</sup>.

The model is trained in InSight using textual data obtained by news feeds served from WatchTower. The textual is harvested by tracking keywords related to the following concepts:

- 3d Printing
- Arduino
- Bio Technology
- Drones
- Home Automation
- Internet of Things
- Openhardware
- Raspberry Pi
- Robotics
- Sensors
- Solar Energy
- Urban Farming
- Wearable

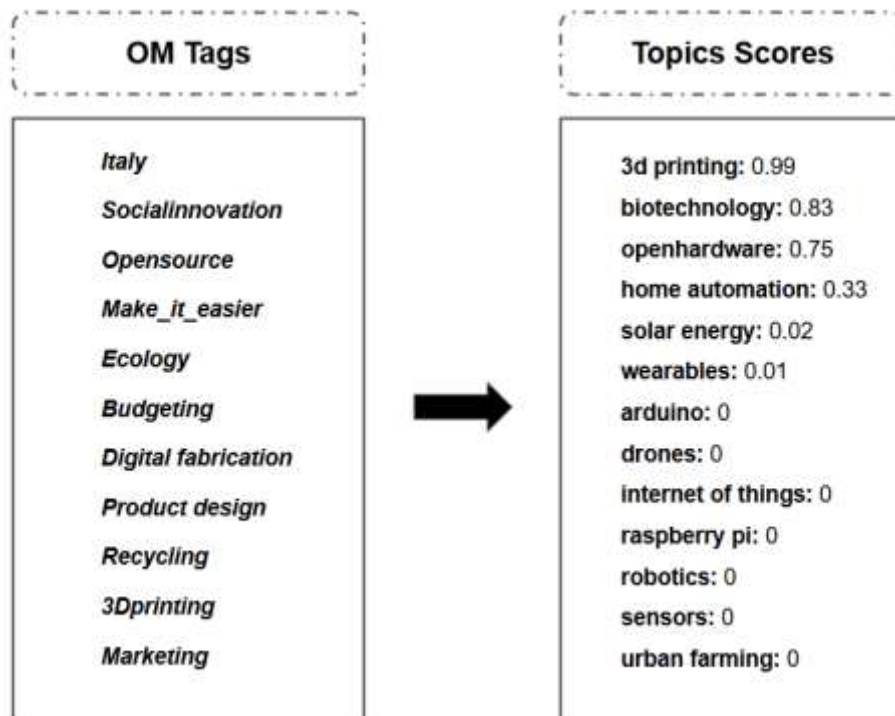
The vast amount of text data is dynamically tracked and filtered by the Watchtower data harvesting module. The related documents are provided via an API to the InSight platform.

Using a statistical model and associated inference algorithms (SS-NMF), we can evaluate scores of any textual artifacts provided by the WatchTower API. Effectively, the system returns a soft score between 0 and 1 for each meme for the given textual artifact. Below are two examples: evaluating topics scores of OM tags and Tweets.

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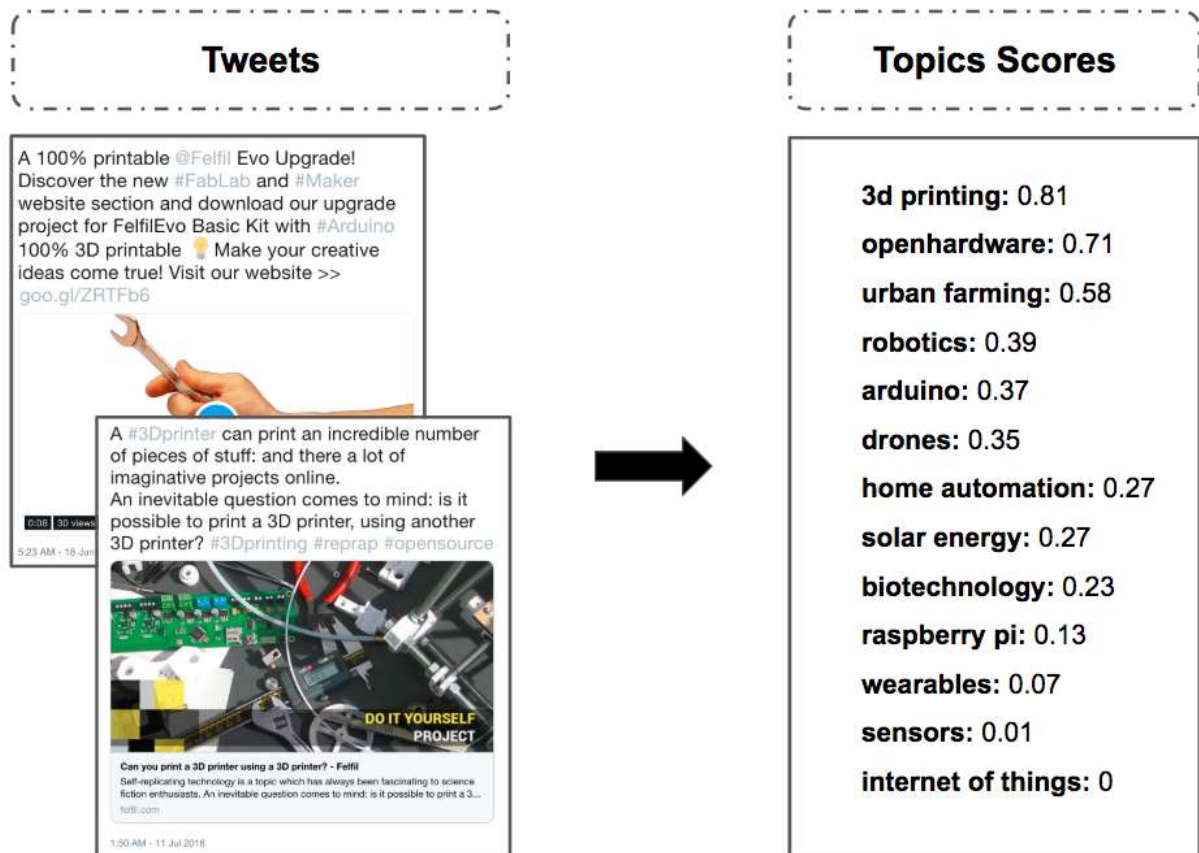
<sup>4</sup> Suyunu, B and Ayci, G and Öğretir, M. and Cemgil, T. and Uskudarli, S and Zeytinoglu, H and Özel, B. and Boyaci, A. "A Semi-Supervised Psychometric Scoring of Document Collections", In Data Mining (ICDM), SENTIRE Workshop. 2018 IEEE International Conference, November 17-20, 2018. Singapore

The topic scores evaluated from the OM tags of a user:



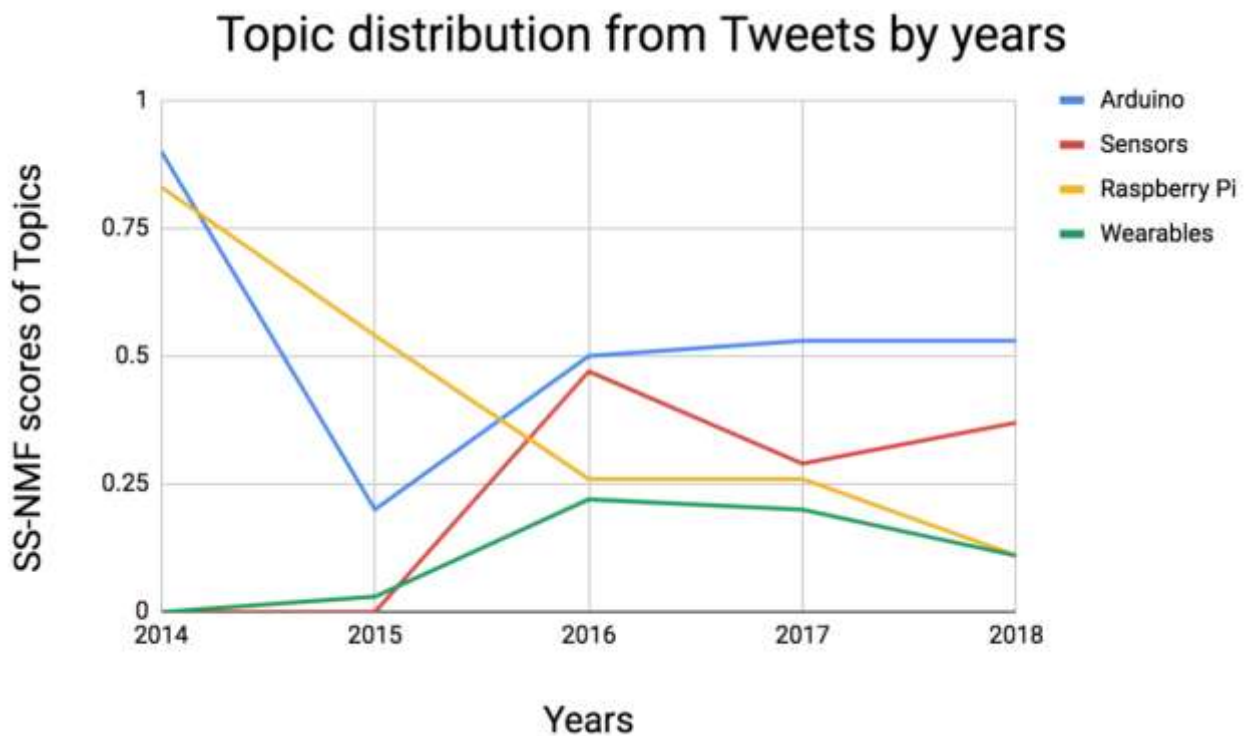
Here, we fed all the OM tags of a user as a text to our semi-supervised model and got topics scores. According to our model these tags are mostly related to **3d printing**, **biotechnology** and **openhardware**.

The topic scores evaluated from all the tweets of a user:



Not only user tags but also any kind of textual artifacts like tweets can be evaluated by our semi-supervised model. In the above figure, topic scores are evaluated using all the tweets of an OM user.

By combining every evaluation of each textual artifact of a user, we want to find the user's topics scores so that we can recommend related users, news, events in terms of these topics scores.



This above plot is another utilization of Twitter and our model that shows how one user's interest over 4 topics (**Arduino**, **Sensors**, **Raspberry Pi**, **Wearables**) changes over years. We observe that the user write less about **Raspberry Pi** every year on Twitter.

### Cross Language Aspects

Open maker is an international community, which brings the issue of languages to the forefront. It must be inclusive and also handle language specific content. The Figure on language distribution shows the distribution of languages used in the tweets of OM members. The most widely used languages are English, Spanish, Italian, Turkish and French. The most commonly used languages are English and Spanish. As for, Turkish and Italian tweets, there are more Turkish tweets, however there are more links in Italian. We can observe that members often share links in other languages, which indicates openness and appreciation of content beyond their language of comfort.

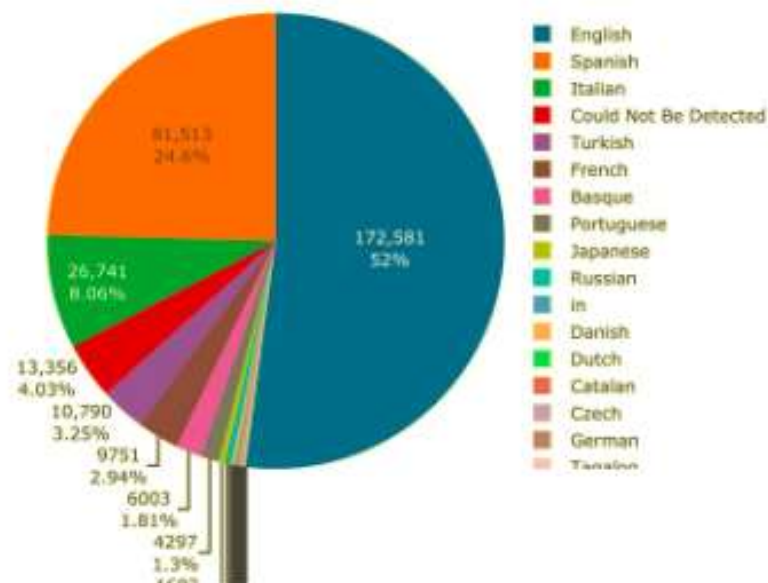
Open Maker is a multilingual community, but when we look at situations where people use multiple languages, 39% of twitter users in the community share single-language URL links. When we look at the tweets, we see that only 16% of them use only one

language. Since the community partakes in International contexts, it is common to find English tweets by those who predominantly post in their local language. This is a common practice for dissemination purposes and is not surprising.

The following analysis is performed with 245 Twitter users who have shared their Twitter profiles when registering to OM-DSP. The total number of tweets of these users is approximately 332,000 . The tweets in the languages that represent less than 0.05% of all tweets (~170) are ignored. Also, the tweets of users who tweeted less than 5 times are ignored, and the length of the text is filtered to be greater than 100 words.

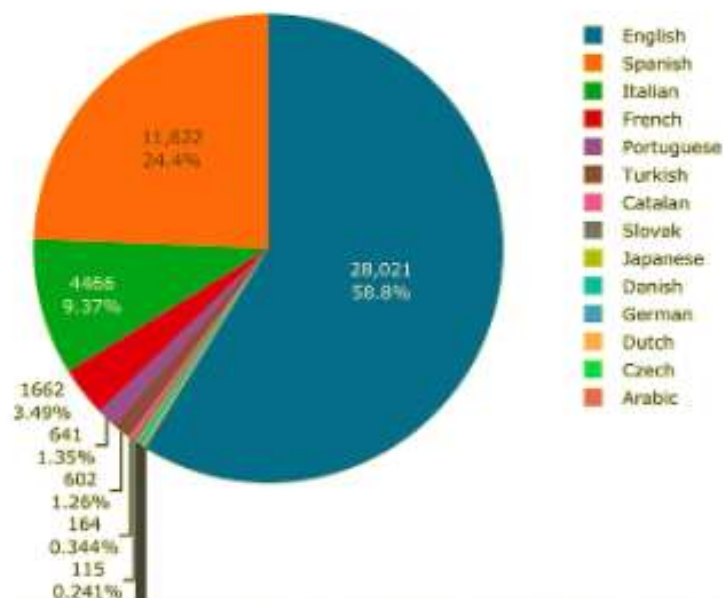


Language Distribution of Tweets



- a) Language distribution of the community according to the language use in Tweets. The first lines on the pies are the number of the tweets, the second lines are the percentage.

Language Distribution of Shared Links

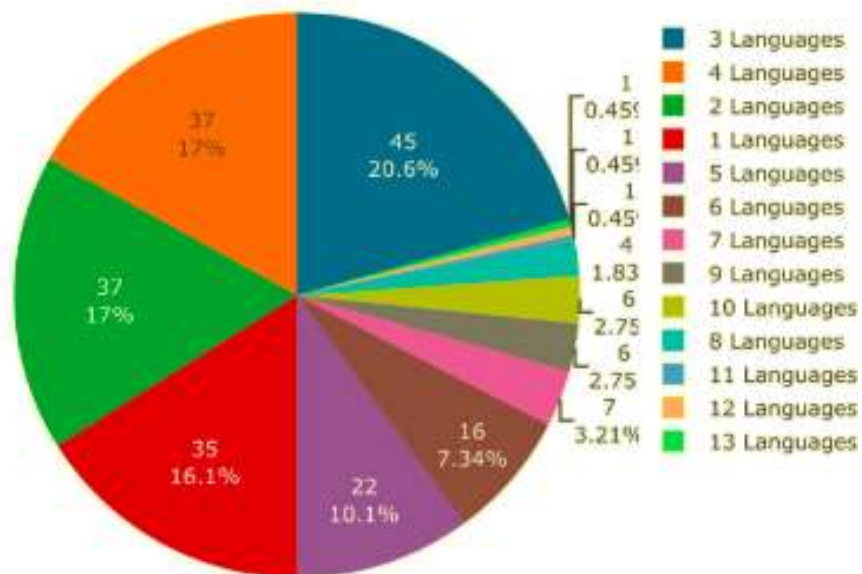


- b) Language distribution of the community according to the language use in shared links.

Figure: Language Distribution

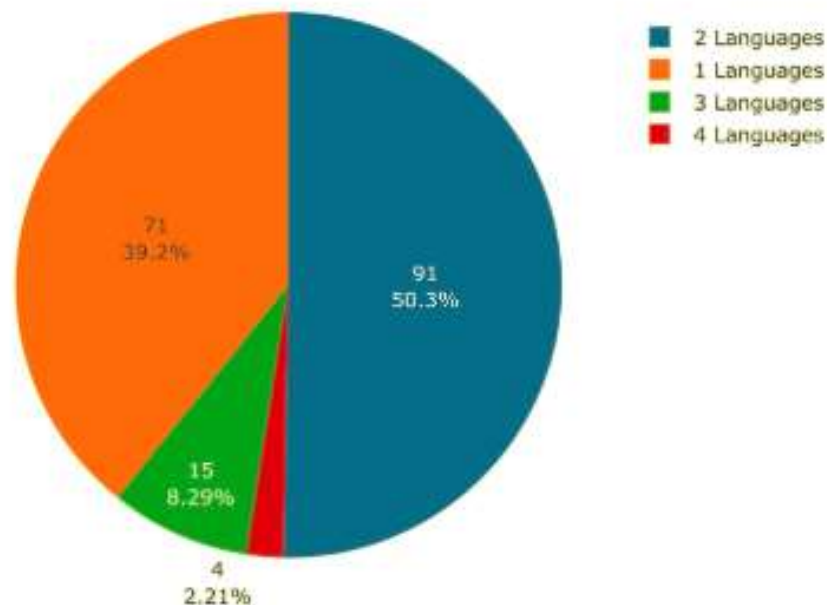


Multilingual User Distribution (Tweet Languages)



- a) Multilingual user distribution of the community according to the language use in Tweets. The first lines on the pies are the number of the users, the second lines are the percentage.

Multilingual User Distribution (Shared Links' Languages)

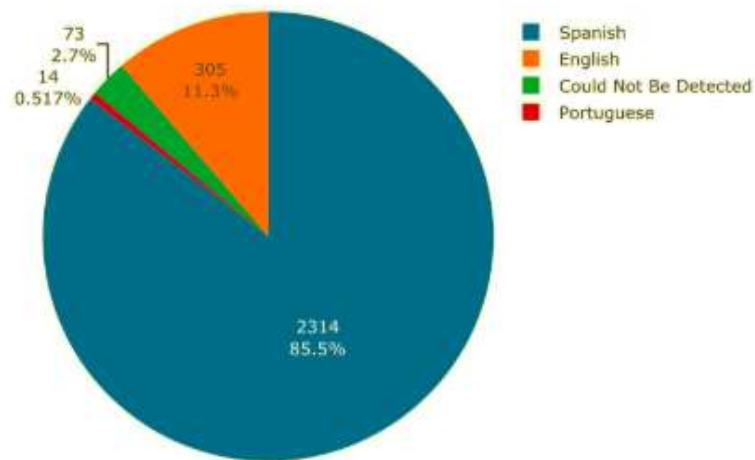


- b) Multilingual user distribution of the community according to the language use in shared links.

Figure: Multilingual User Distribution

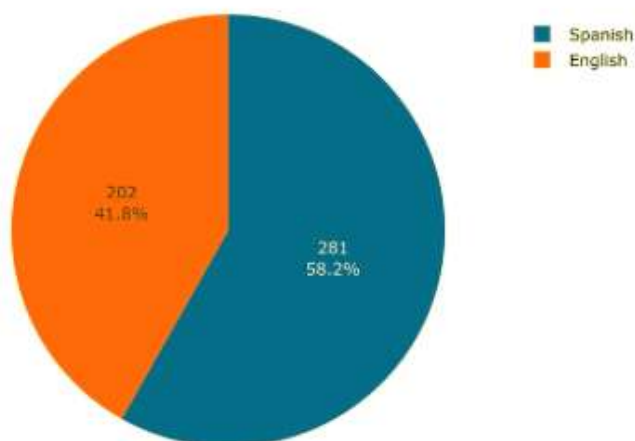
Subsequent analysis are language usage statistics for two members. The first figures indicate the use of language in the tweets, while the second figures show the language use of the links shared by the individuals. In statistics, those who have more than 5 entries in any language have been considered. Additionally, the links with longer than 100 words have taken into account. The use of language in the links makes the language distribution of the person more clear.

Tweet Language Distribution for Community Member 1



- a) Language distribution of a user according to the language use in Tweets. The first lines on the pies are the number of shared links, the second lines are the percentage.

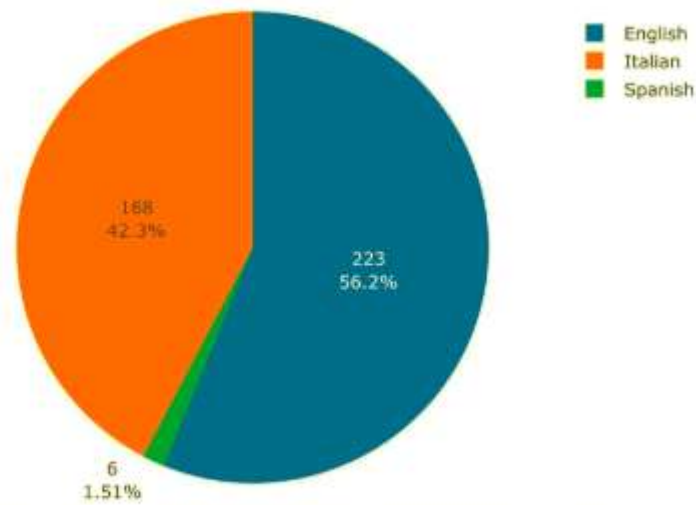
Shared Links' Language Distribution for Community Member 1



- b) Language distribution of a user according to the language use in shared links.

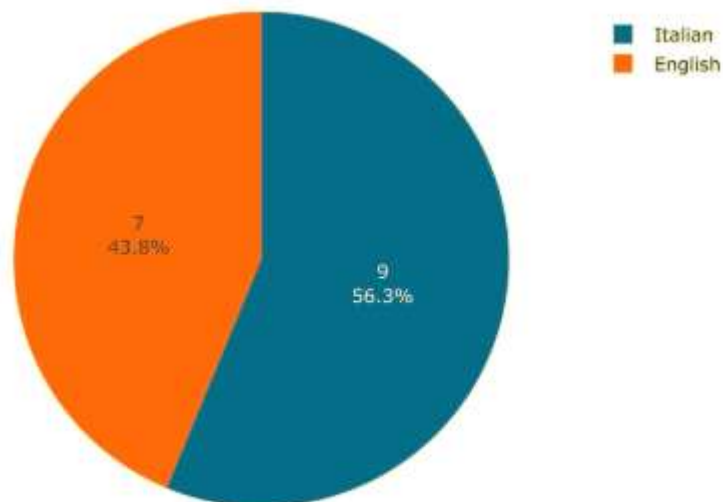
Figure: Language Distribution of Community Member 1

Tweet Language Distribution for LES Member 1



- a) Language distribution of a user according to the language use in Tweets. The first lines on the pies are the number of tweets, the second lines are the percentage.

Shared Links' Language Distribution for LES Member 1

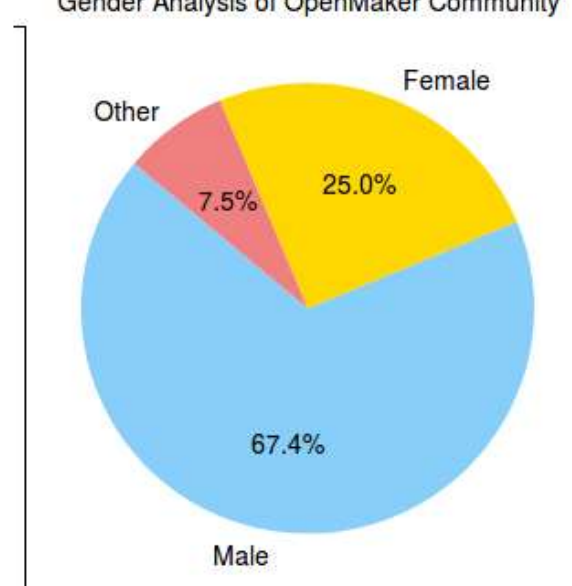


- b) Language distribution of a user according to the language use in shared links.

Figure: Language Distribution of LES Member 1

## SOCIAL IMPACT INDICATORS

We have developed a Digital Social Platform (OM Explorer/InSight/Watchtower) which, through Social Media Analysis and User Surveys, can be used to measure and assess OpenMaker's impact based on a range of data.

IMPACT INDICATORS	CURRENT STATE								
Community Size	The number of people who filled in the onboarding survey and signed a membership agreement. (509 as of January 3,2019)								
Number of Makers/Manufacturers	The onboarding process does not elicit this information since the discussions of LES with participants revealed that many of them did not want to associate themselves with a particular label 'Maker' or 'Manufacturer' - as they may take both roles at times. Onboarding process poses the questions in the form of "As a Maker/Manufacturer/Stakeholder ...". This a such differentiation among these groups are not harvested.								
Community Demography Participation Social Media Interactions	<p>Gender Analysis of OpenMaker Community</p>  <table border="1"> <caption>Gender Analysis of OpenMaker Community</caption> <thead> <tr> <th>Gender</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td>67.4%</td> </tr> <tr> <td>Female</td> <td>25.0%</td> </tr> <tr> <td>Other</td> <td>7.5%</td> </tr> </tbody> </table>	Gender	Percentage	Male	67.4%	Female	25.0%	Other	7.5%
Gender	Percentage								
Male	67.4%								
Female	25.0%								
Other	7.5%								

	<p>The above graph shows the gender distribution effective January 2019.</p> <p>Detailed information about the events organized totalling and tracked by LES' are reported in D1.8 Enabling Programme Report.</p> <p>An inspection of social media can reveal how the community members and their memes have been received. In Member Analysis section, you can see several graphs highlighting an elevation of feedback (such as frequencies of follower and mentions.)</p>
Social Network	<p>The elementary social network is the follower graph of OM members. Valuable metrics extracted from the social graph structure, such as diameter, degree, and betweenness.</p> <p>Beyond the conventional social networks on social media, there are interesting networks based on other relations that reveal interesting information. For example, mention graphs highlight the key persons being referenced. Both the internal (OM members) and external references (non OM members) are significant in understanding the influential actors that are relevant to the community. Furthermore, networks that relate users in terms of common characteristics, such as liking the same artifacts, reveal information about common ground.</p>
Social Network Connectivity Metrics	<p>The dynamic changes in the characteristics of relations – both inter and intra community - based on OM engagement factors are indicative of the impact on collaboration, creativity, co-working, and openness.</p> <p>Data is extracted from the network on 'Influencers' as key nodes in the OpenMaker network (densely</p>

	connected) for generating outputs and outcomes for impact (e.g. knowledge sharing, collaboration, etc.).
<ul style="list-style-type: none"> <li>Content analysis</li> </ul>	<p>Examine the content to discover frequently used terms and phrases and track how they change over time since communities evolve to adopt similar ways of expressing themselves.</p> <p>Depending on the content of the data, we can carry out content analysis for multiple outcomes and impact, such as new products, processes, technology, business models, social networks, etc. However, this depends on the context and will be adapted on a case by case basis (e.g. depending on LES, user data, etc.)</p>
<p>Continuous question and response data collection from online users through an ongoing Lime Survey, which focuses on gathering data on User's trust, values, and memes.</p> <p>Taken together, the aim is to collect static data (point in time, snapshot, overview) with dynamic data (evolution, change over time). This data can be used to assess OpenMaker's impact in relation to:</p> <ul style="list-style-type: none"> <li>-Innovation and Creativity</li> <li>-Products (e.g. new product launch, services)</li> <li>-Processes (e.g. entrepreneurship, intrapreneurship, open supply chain)</li> <li>-Technology (e.g. use of new technology, refining technology, upgrading, testing)</li> <li>-Business models (e.g. start-up, social enterprise, strategic partnership)</li> <li>-Social (e.g. trust, self-confidence, new connections, partnerships, collaborations)</li> <li>-Up-skilling (new skills)</li> <li>-Collaboration (new partnerships, collaborations, co-working)</li> </ul>	<p>Significant effort was expended into surveying survey tools for continuous data collections from users. There were several criteria, most importantly that it supports multi languages and is easy to manage the type of questions relevant to LES' and OM research community. The LimeSurvey was chosen, deployed, and utilized. However, the user response was very unsatisfactory and was difficult to manage dynamic questioning. Furthermore, the survey itself was deemed unsatisfactory. Therefore this issue was revisited from scratch, redesigned, implemented and deployed.</p> <p>As a result the initial survey was crafted to suit the community to take into account the experience gained from the first attempt. Much of this experience was related to a deeper understanding of the maker and manufacturer communities (such as not wanting to be labelled as either and some not relating to specific terms, which turned out to be cultural differences).</p> <p>In addition to the redesign of the survey, a new feature to capture continuous feedback, a chatbot</p>

<ul style="list-style-type: none"> <li>-Knowledge (new knowledge, increased knowledge sharing)</li> <li>-Employment (new jobs)</li> <li>-Entrepreneurship (new companies formed, new income streams)</li> </ul>	<p>was designed. This mechanism is used to obtain information about members' opinions and values about soft skills.</p>
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Impact Indicators and Targets	Status at the end of the Project
<p>A/B testing approach to measure real use of each single platform functionality (i.e. significant engagement of active users with visualization and analysis tools, measured through quantification of views, commentary, shares, tags and annotations) in order to assess relevance and real adoption.</p> <p>Functionalities must be used at least by <b>80%</b> of the registered community members.</p>	<p>The OpenMaker Explorer is designed through an iterative approach by conducting extensive interviews and discussions with several maker communities and members. Both the technical development teams as well as the LES were actively engaged in the conversations and requirement elicitation.</p> <p>For development, a highly effective agile approach has been adopted. By running biweekly sprints, it was possible to synchronize demographically displaced groups and incorporate change requests as soon as they were raised.</p> <p>Publicly accessible data is obtained from social network media platforms (such as twitter, eventbrite, facebook) about the OM community (after the required onboarding procedure has been completed). The behaviour and relations are analysed and novel platform functionalities are discovered, postulated and consequently discussed with all stakeholders.</p> <p>Data visualization and analysis tools are specifically tailored for the OM community and maker movement , based on information from Explorer, were used to reveal community structure and provides valuable information about the dynamics of the poorly understood social innovation processes.</p> <p>The Explorer platform has been extensively monitored and user behaviour logs has been collected. Exploratory analysis has revealed that about 60% of all the users (about 305/509) are using the functionalities provided by the platform (as described in detail in the DSP roadmap document). While these numbers are below the initial targets set by the proposal, as the full functionality offered by the InSight module</p>



	becomes available on the explorer, we expect this fraction to increase.
<p>Demonstration of the effectiveness of the TrustRank algorithm in the network of users of OM-DSP.</p> <p>Interactions within each LES, across LES's, communities and associated organizations, with other related parties to the Maker Movement in EU and beyond are documented through networks analysis and networked flow of information.</p> <p>Demonstrate that the integration of information from various social networks has a significant synergistic effect exceeding the effect of individual and standalone social networks.</p>	<p>It is built on the ground of physical communities and upon a clear methodology of engagement based upon values sharing and a clear system of incentives and motivations for collaboration.</p>
<p>Solid identification of the value systems and the trust factor in play for achieved outcomes, as well as their correlations with informational exchanges, emergent initiatives, groups formation, active participation in events and projects and community engagement.. Three categories of “unexpected results” will be also used as indicators for positive impact:</p> <p>1) After the call launch, number, frequency and reach of the interactions on the DSP <b>don't change their trend</b> (= the DSP is really useful, even after the “financial incentive”);</p> <p>2) In every local community, a number of members ask if the DSP may be used not only to share info/discussions but also as a tool to work on projects (= the DSP is not just a new chat/forum);</p> <p>3) <b>70%</b> of the LES events are seen by streaming from minimum 2 other countries during the second year of the project (= the community accord to the international connection is a real value)</p>	<p>The DSP as a platform addresses these indicators via the Explorer in:</p> <ul style="list-style-type: none"> <li>-Events Recommendation <a href="https://explorer.openmaker.eu/entity/events/">https://explorer.openmaker.eu/entity/events/</a></li> <li>-Article/News/Blog Recommendation <a href="https://explorer.openmaker.eu/entity/news/">https://explorer.openmaker.eu/entity/news/</a></li> <li>-Planned new features for the Projects/ Challenges IF has potential to boost transactions and international appeal <a href="https://explorer.openmaker.eu/entity/projects/">https://explorer.openmaker.eu/entity/projects/</a></li> </ul> <p>And in WatchTower and InSight with:</p> <ul style="list-style-type: none"> <li>-Event Impact Analysis</li> <li>-Dynamic Meme Tag Topic analysis</li> <li>-Mention Graphs</li> <li>-Group formation and community detection</li> </ul> <p>As explained in this document, Deliverable D2.5 Social Impact Memes.</p> <p>The OM DSP as its version at the end of the project is coined as a viable “Pilot” and demonstrates potential to achieve the desirable outcomes.</p>

<p>OM-DSP shows, by the end of the project, a size of at least <b>300,000</b> between individuals and organisations reached, then representing the 'critical mass' achieved.</p> <p>OM-DSP shows evidence of <b>increasing relation and exchange</b> between members of different communities of different EU countries on a continuous basis.</p> <p>At the end of the project, the user engagement of OM-DSP shows exponential growth, allowing for the analysis of the scalability factors and capacity of the community in play throughout the project life span.</p>	<p>OM DSP has not demonstrated exponential growth as of yet, but learned what is working and what is not working in user engagement through various tools and algorithms.</p> <p>Mapping : watchtower detected topic and location based twitter accounts and influencers. We have a better estimate for the addressable audience.</p> <p>Community analysis: demographics, tags, psychosocial profiling.</p> <p>The DSP has a modular design with UI-UX/ Analytics/Harvesting capabilities loosely decoupled via API's. The whole integrated system with the modules <b>Explorer/ InSight/ Watchtower</b> entails changes in the use of ICT platforms and networks, works as an integration hub that harvests and integrates platforms and social networks already used by the target-groups.</p> <p>The design fosters engagement of <b>influencers with users</b> by content and event recommendation as well as community monitoring by social network interactions. The design is aimed at augmenting the capacity to reach a wide critical mass, and supporting scalability and growth. The mechanisms for the attraction of new members and users are in place and special attention and resources has been allocated to the development of an effective user journey.</p> <p>a) tracing, measuring and assessing relations and trends within the community;</p> <p>b) analysing which factors enable or limit highly connected interactions and augment the size of the community;</p> <p>c) analysing how and to what extent offline</p>
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	<p>community engagement activities are able to augment the scale and the scope of the online community;</p> <p>The <b>OpenMaker</b> projects provides an <b>evidence-based methodology</b> to harness the collaborative power of ICT networks to create collective and individual awareness, which can be scalable to other communities and transferable to other sectors and industries.</p>
<p>A total number of <b>3000 persons between traditional manufacturers, makers, citizens and stakeholders</b> are directly involved in LES activities and events.</p> <p>A total number of <b>700-800</b> persons between traditional manufacturers and makers are LES and connected LES members. At least the 80% of members express the will to continue benefitting from LES offer</p> <p>At least <b>20 different prototyping projects fully deliver proof of concepts</b> (TLR3) and involve at least 40 persons between makers and traditional manufacturers</p> <p>At least the <b>70%</b> of the awarded partnerships continue to proceed towards 'ready to market' processes/products</p> <p><b>100%</b> of the funded prototyping projects have been assessed for the social impact achieved using the common impact framework</p>	<p><b>(Addressed by activities under WP1)</b></p>
<p>The determination of the most trustful player in the system and the quantitative assessment of its importance is a key passage in order to determine the desired onset of a network of collaboration in the market. By regularly planned meeting we expect to show these indicators to the various players and we target a progressive growth of the TrustRank into the system.</p>	<p>From a scientific point of view, the impact achieved by <b>OpenMaker</b> project will be related to the definition of new topological quantities as the TrustRank based on the centrality in the system as measured by the value of successful interactions. The possibility to collect and analyse such social data as collected on the platform, makes <b>OpenMaker</b> one of the most interesting cases of</p>

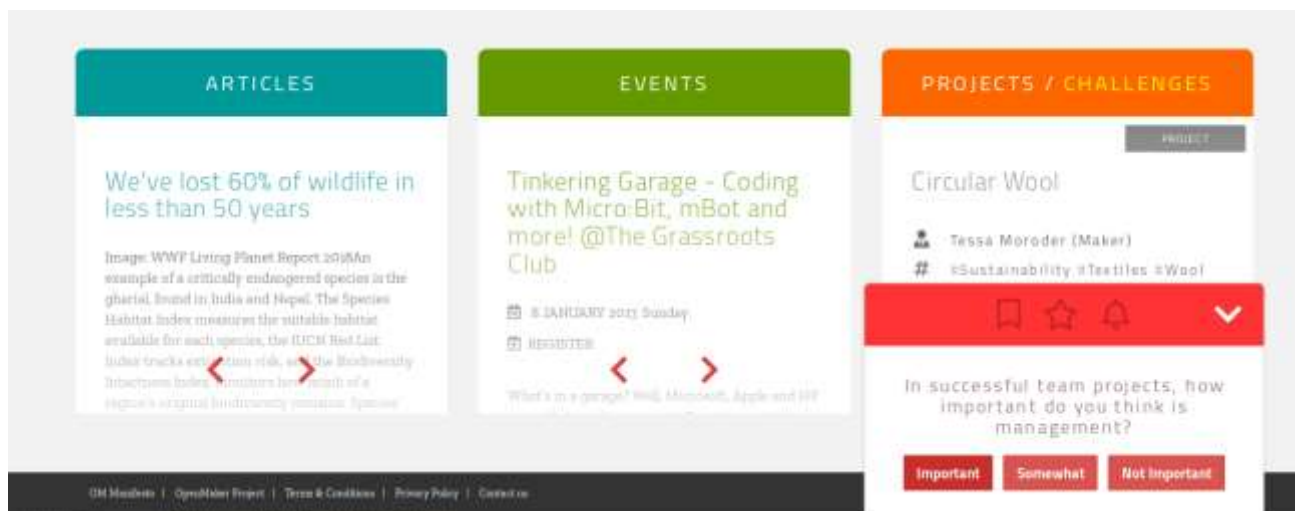
<p>Starting from the mapping phase baseline (WP1, task 1.1), the data analysis shows that during the project the hub-nodes (see 1.3.1) increase their connections and new nodes becomes hubs at transnational level in the DSP community. This demonstrates how OM approach, which mixed methodology of network science (ICT) and community building (offline), is effective and then useful in general.</p>	<p>study in the area of social network analysis. The conceptual framework underlying WP2 and the digital social platform are heavily reliant on the understanding of the complexities of networked interactions.</p> <p>As use data increases <b>OpenMaker</b> will further collect the dynamic aspects of the system evolution. Therefore, the network metrics will be used for the first time to in full to measure the nature and levels of trust amongst participants, the uptake and use of knowledge, the behavioral aspects of personal and group actions</p>
<p>In the first year <b>40%</b> of the quantitative targets in terms of participation are achieved (= thanks to the real communities the growth curve doesn't start from zero).</p> <p>Actors from other sectors formally manifest their interest to OM DSP data system.</p> <p>Assessment of use of platform by various user types and their characteristics in line with the exponential increase of use, compare the data from existing localities to across border communities for extrapolation purposes. Address big data and distributed architecture concerns and within the project time-span deploy, evaluate and document what works and produce recommendations for scalability purposes.</p>	<p>The quantitative targets in terms of participation are not optimally achieved but the sustainability vision for the DSP together with the developed tools has the groundwork ready. Existing consortium partners show interest in the follow-up and look forward to engagement with a mature product. Start-up Europe, the Social Innovation Community, local development agencies and citizens initiatives, political campaigns, smart cities initiatives as well as outreach programs for well-being and securities related sectors such as healthcare and insurance companies have demonstrated interest.</p> <p>The DSP modular and lean approach to development will guarantee its capacity to evolve and adapt to different societal challenges, as it will be possible to change and update in a very short time its core functionalities on the basis of feedbacks coming from the digital interaction and the physical spaces of the communities. The chance to actually interact with real people, committed to the project, will tremendously foster the opportunity of DSP to pass barriers and borders, as it will give access to a mass of</p>

	<p>information on user habits and attitudes not available through regular digital channels. Also the various real communities will constitute a good soil upon which building a larger and stronger users base for the digital platform. The users base mitigate the risk of failure in a very delicate phase, where many digital tools die. From a technical perspective the DSP will be designed taking in consideration possible future use in other fields: that may encompass relevant sustainability issues such as public good management, social innovation challenges or healthcare related problems.</p>
<p>The 10 thematic local innovation workshops focussed on social impact are attended by at least <b>1500 people</b>, of which at least 500 are not traditional manufacturers or makers.</p> <p>The 4 round-tables organized per LES by month 20, involving policy-makers, traditional manufacturers, makers and the general public at the scope of elaborating policy measures to foster Open Manufacturing, are attended by at least <b>100</b> policy makers.</p> <p>The impact evaluation framework detailing social impact objectives and related evaluation process and metrics has been enriched by the contribution of at least <b>50 members</b> of the OM community by M12.</p> <p>At least 5 of the 20 prototyping projects awarded under the PSS are multi-stakeholder partnerships or imply collaboration with people based outside the LES community.</p> <p>The OM-DSP shows evidence of relation and exchange between members of different communities of different EU countries on a continuous basis.</p>	<p>The core tools and algorithms to monitor and evaluate the success of the project based on KPIs of online follow-up of off-line activities are developed and remain to be tested at scale as a critical take-up level of the DSP is achieved with the necessary resourcing. The outputs of these tools are demonstrable in the InSight module and the ad-hoc analysis included in this deliverable to be included in the next version of the InSight before the end of project.</p>

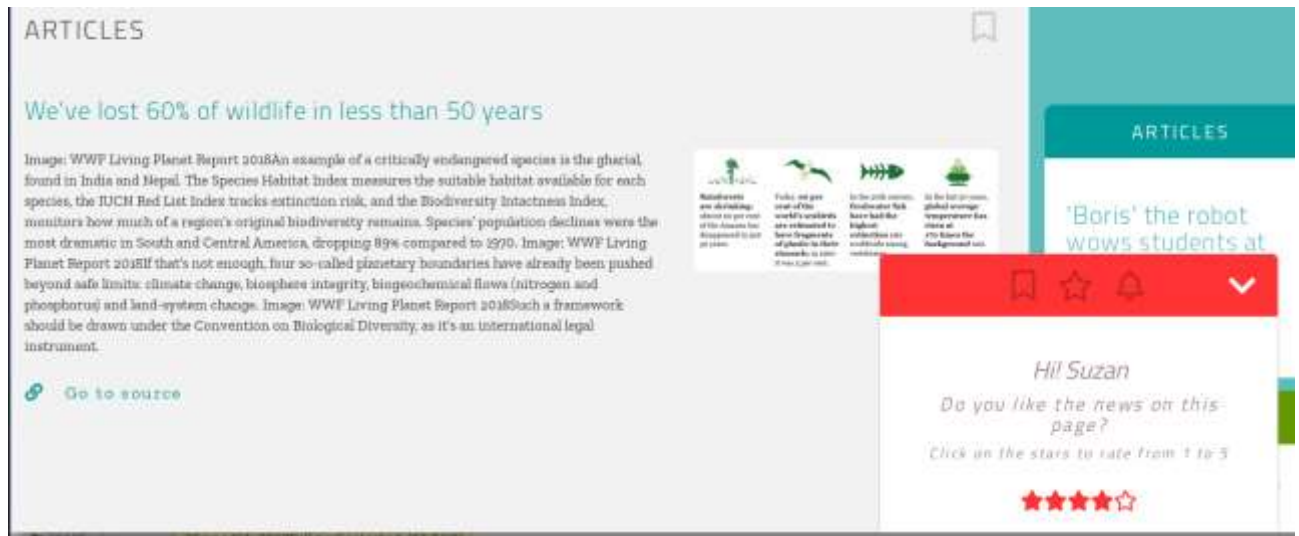
<p><b>OM-DSP</b> shows, by the end of the project, a size of at least <b>300.000</b> between individuals and organisations reached, of which at least 5.000 are neither manufacturers or makers.</p>	
<p>At least 100 users of the OM DSP provide feedback to the <b>20 prototyping projects awarded under the PSS</b>.</p> <p>At least <b>10 interactions</b> on the OM DSP outside the PSS translate into active partnership/joint projects.</p>	<p>The DSP MVP Roadmap the consortium of the project decided upon did not prioritize these indicators of evaluation of PSS projects by the users. Instead offline enabling activities were regarded as practical substitutes.</p> <p>The Projects and Challenges IF of the Explorer are in place to follow-up on the interactions beyond the PSS.</p>
<p>At least 20 different prototyping projects fully deliver proof of concepts (TLR3) and involve at least 40 persons between makers and traditional manufacturers</p> <p>At least the 70% of the awarded partnerships continue to proceed towards 'ready to market' processes/products</p> <p>The 4 round-tables organized per LES by month 20, involving policy-makers, traditional manufacturers, makers and the general public at the scope of elaborating policy measures to foster Open Manufacturing, are attended by at least 100 policy makers.</p> <p>The policy report delivered by OM is used as a basis to implement initiatives to foster Open manufacturing in the four cities where the LES are based.</p>	<p><b><i>The progress on these indicators are addressed under the Deliverables of WP1.</i></b></p>

## CONTINUOUS FEEDBACK

As a key goal is to discover the interests and nature of maker communities, relying solely on the users explicit profiling efforts during onboarding is not sufficient. One reason is that self-declared profiles often do not reflect users very well for a number of reasons, among which are the mindset during onboarding (not yet invested in the platform) and the structure and nature of the questions falling short to capture information. As the community being examined is better understood so are the criteria to define them, furthermore, the community is evolving, necessitating the understanding about the members to also evolve. Based on these observations, an effort for an incremental and evolutionary profiling has been developed. This is done by generating questions to elicit the interests and values of members by periodically presenting them with inquiries via a chatbot (referred to as OMbot - for Open Maker bot). Questions that are generated based on core work values and soft skills are presented to users as multiple choice questions as shown below:



Additionally, members are presented with news recommended specifically for them, for which their feedback is requested. This information is further used to profile the members in terms of the subject and values represented in the news item (see Schwartz BHV of documents):



The DSP continuous feedback system is constantly reviewed and improved upon. As actions level activities will be tracked en masse the features of the interactions that influence desired outcomes will be identified and system wide recommendations improved.

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