fenix

# WP 5 – SOCIAL MEDIA INTEGRATION AND CONSUMERS' INVOLVEMENT STRATEGIES

## Task 5.1 – Consumer involvement strategies

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# ABSTRACT

The main aim of the FENIX project is the development of new business models and industrial strategies for three novel supply chains in order to enable value-added product-services. Through a set of success stories coming from the application of circular economy principles in different industrial sectors, FENIX wants to demonstrate in practice the real benefits coming from its adoption. In addition, Key Enabling Technologies (KETs) will be integrated within the selected processes to improve the efficient recovery of secondary resources.

Deliverable 5.1 focuses on the identification of the most suitable and efficient Consumer Involvement Strategies for the Circular Business Model implemented within the FENIX project. This identification implements a state of the art analysis of existing Consumer Involvement Strategies and the exploitation of their expected benefits within the scope of this project. In this report the layout and structure of the User Forum is also presented, which has been developed as a mechanism for the customer involvement and in which the identified strategies are implemented based on their applicability. Last, Crowdsourcing is explored as a tool for distributed problem-solving as well as data gathering and its implementation to the development of the FENIX Marketplace platform in Task 5.2 is discussed. Some pre-identified crowdsourcing techniques and citizen feedback integration mechanisms related to the Task 5.3 are also presented in this deliverable, even though their integration within the 2 tools (User Forum and FENIX Marketplace) will start after the basic functions have been developed and an evaluation of their operation has been conducted. Thus, the final crowdsourcing technologies implemented will be reported in the respective deliverable (D5.2), due for Month 34.

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## Tables

| Abbreviations and Acronyms: | |
|---|---|
| CE | Customer Engagement |
| S-D | Service-Dominant |
| B2B | Business-to-Business |
| B2C | Business-to-Consumer |
| KET | Key Enabling Technology |
| CBM | Circular Business Model |
| ICT | Information and Communication Technology |
| WP | Work Package |
| C2C | Consumer-to-Consumer |
| BC | Brand Community |
| CEB | Community Engagement Behaviours |
| TEB | Transactional Engagement Behaviours |
| CS | Crowdsourcing Systems |
| WOM | Word-of-Mouth |
| P2P | Peer-to-Peer |
| MFP | Most Frequent Pattern |
| SCT | Social Cognitive Theory |
| DSS | Decision Support System |
| OIP | Open Innovation Platform |

# 1. INTRODUCTION

Deliverable 5.1 utilizes a state-of-the-art analysis to gather the different methods and practices used to engage consumers, for crowdsourcing systems and examine the way these practices can be classified. The findings are then evaluated according to their potential to be used within the Circular Business Model (CBM) identified in deliverable D1.1. The best and most applicable practices are then transformed into tools for the implementation within the **User Forum** and the online **Marketplace**. A presentation of the User Forum is included herein and an assessment has been made as a continuation to the identified consumer involvement strategies, as to the way which users can get involved to a crowdsourcing mechanism. The outcome of this process was a list of identified crowdsourcing tools and mechanisms which will be integrated to both of FENIX online tools.

## 1.1. FENIX PROJECT AIM AND OBJECTIVES

Fenix intends to explore the development of new business models and industrial strategies for three novel supply chains in order to enable value-added product-services. The supply chains include **a)** a modular, multi-material and reconfigurable pilot plant producing 3D printing metal powders, **b)** a modular, multi-material and reconfigurable pilot plant producing customized jewels and **c)** a modular, multi-material and reconfigurable pilot plant producing 3D printing advanced filaments. Additionally, FENIX aims to demonstrate how the adoption of circular economy principles can enable more sustainable supply chains in different industrial sectors. FENIX objective is to support the integration of different Key Enabling Technologies (KETs) for the efficient recovery of the secondary resources. The integration of the different KETs will be supported by industry 4.0 and circular economy principles to enhance the development of innovative business models and supply chains. FENIX, through a wide usage of sensors and social media will collect information from the plant and will share them with different end users, supporting them in several daily operational aspects. Products that reach their end-of-life, becoming waste, will be collected and the manufacturing/ demanufacturing module will disassemble them, by extracting the most relevant components. This module will be reconfigured for managing and automate the final assembly process in case of complex products.

## 1.2. PURPOSE OF THE DOCUMENT

This document aims to identify possible means that promote **customer's involvement** or **engagement** through his/her interaction with the project applications and other day-to-day operations. These strategies will be improved and enhanced using benefits provided by the social media, cloud computing and big data for the participation of both the B2C and the B2B end-users in the process. Customer involvement is expected to motivate users into a more active participation in project-related issues with value co-creation aspects across various **Crowdsourcing Systems** (**CSs**). For that purpose a **User Forum** platform has been developed and set online, where different stakeholders can participate to formulate a permanent mechanism for the consumer involvement and where some of the CSs tools will be integrated. Some other functions of CS will be integrated to the **Marketplace**, a very powerful application which can support the business component of the project as well as extensive users' interactions in a highly engaged environment.

The structure and layout of this Forum is described in this document as well as the tools which will be included for distributed problem solving and data gathering.

## 2. CUSTOMER INVOLVEMENT STRATEGIES

In today's highly active business environment, many companies have started to switch from linear models of economy to circular, to capture the customer's total set of behavioural activities. In this section a classification of the existing involvement strategies based on the stimuli tools that they use to engage consumers is presented, while additionally a selected list of applicable tools for the CBM of the FENIX project is to be recognised as part of the tools to be developed in Work Package 5 (WP5). As a final result, it is expected to extend existing engagement strategies in two ways: a) to enhance the interrelationships with other network actors in FENIX's CBM setting and b) to guarantee the economic sustainability of the process. As social media enhance interactions among customers and/or with the brand, these can provide new possibilities for engagement empowerment and associated activities. Also, the sophisticated information and communication technologies (ICTs) will be used, which facilitate interaction with and among consumers and have helped to the formation of **brand communities** (Muniz & Schau, 2005).

### 2.1. NATURE OF CUSTOMER INVOLVEMENT/ ENGAGEMENT

Customer's relationship to the company has changed/ advanced over the last years drastically based on modern marketing logic. Initial perceptions view the customer and the firm as separate and discrete, a relationship in which the customer is exogenous and the value is created in the production plant of the company (Deshpande, 1983). However, research on management literature shows the emerging view that customers can co-create value, increase competitiveness and to be involved in the development of the company, such a way as to become an intrinsic factor. In literature it seems that academics and practitioners agree to the positive effects of Customer Engagement (CE), as it can lead to enhanced corporate performance (Jaakkola & Alexander, 2014), stronger competitive positions (Kumar & Pansari, 2015) and increased potential to shape new markets (Storbacka, Brodie, Böhmann, Maglio, & Nenonen, 2016). Customer Engagement is a growing relationship in which, in order to achieve high levels of affiliation, incentives and ties between all network actors is essential.

Table 1 presents a set of useful definitions and perspectives on CE.

**Table 1: Various Customer Engagement definitions across diverse disciplines (Vivek D. S., Beatty, Vivek, & Morgan, 2014)**

| Authors | Definitions | Object/Term Used |
|---|---|---|
| Vivek, Beatty, and Morgan (2012, p. 133) | The intensity of an individual's participation in and connection with an organization's offerings and/or organizational activities, which either the customer or the organization initiate. | Consumer engagement |
| Mollen and Wilson (2010, p. 922) | The customer's cognitive and affective commitment to an active relationship with the brand as personified by the Web site or other computer-mediated entities designed to communicate brand value. It is characterized by the dimensions of dynamic and sustained cognitive processing and the satisfying of instrument value and experiential value. | (Online or computer-mediated entities) Customer engagement |
| Sashi (2012, p. 267) | It embodies interactive consumer experiences where ICTs such as social media act as tools that can enable and facilitate these experiences. The level of consumer engagement is calculative and affective commitment to an active relationship with a firm or the firm's online community. | Consumer engagement process |
| Brodie et al. (2011b, p. 260) | "[A] *psychological state* that occurs by virtue of *interactive, cocreative customer experiences* with a *focal agent/object* (e.g., a brand) in focal service relationships." | Customer engagement |
| Hollebeek (2011, p. 790) | The level of a customer's motivational, brand-related and context-dependent state of mind characterized by specific levels of cognitive, emotional, and behavioral activity in brand interactions. It includes the themes of immersion, passion, and activation. | Customer–brand engagement |
| Gambetti, Graffigna, and Biraghi (2012, p. 668) | Customer-brand engagement appears as a *multi-dimensional concept* combining such elements as attention, dialogue, interaction, emotions, sensorial pleasure, and immediate activation aimed at creating a total brand experience with consumers. | Advertising/media engagement but referred to as customer–brand engagement |
| Van Doorn et al. (2010, p. 254) | Customer engagement behaviors go beyond transactions and are defined as a customer's behavioral manifestations that have a brand or firm focus, beyond purchase, resulting from motivation drivers. | Consumer engagement behaviors |
| Higgins and Scholer (2009, p. 112) | A state of being involved, occupied, fully absorbed, or engrossed in something (i.e., sustained attention), generating the consequences of a particular attraction or repulsion force. | Strength of engagement |

The definition of CE is quite multilateral and described on one side as "*the level of a customer's physical, cognitive and emotional presence in their relationship with a service organization*" (Patterson, Yu, & Ruyter, 2006), while on the other side as "*the intensity of an individual's participation and connection with the organization's offering and activities initiated by either the customer or the organisation*" (Vivek, Beatty, & Morgan, 2012) and as "*the level of a customer's motivational, brand-related and context-dependent state of mind, characterised by specific levels of cognitive, emotional and behavioural activity in brand interactions*" (Hollebeek, 2011).

Apart from the different view of conceptualization presented by the above definitions, there are also some similarities in a sense that all accept the fact that CE appears to involve interactions between the customer and the brand, is strongly depended on **incentives** and it is characterised by its **behavioural manifestations** (Vivek D. S., Beatty, Vivek, & Morgan, 2014). The Consumer Advocacy Centre (CUAC) of Australia notes that "Community engagement and consumer engagement may include **informing**, **communicating**, **educating**, **consulting**, **participating**, **partnering** and **empowering**" (Consumer Utilities Advocacy Centre, 2013).

Alternatively, according to Keller (Keller, 2012), customer engagement is the extent to which consumers are willing to invest their own personal resources – time, energy, money – on the brand, beyond those resources expended during purchase or consumption of the brand.

## 2.2. ENGAGEMENT/ INVOLVEMNT STRATEGIES

Many of the definitions suggest that customer involvement goes beyond awareness, beyond purchase, beyond satisfaction. The arrival of the internet and especially the social media has heightened the interest of managers and companies to the concept of CE. **Social media** with its ability to facilitate relationships may help realize the promise of the marketing concept, orientation and relationship by providing tools to better satisfy customers and build this customer-brand engagement (Sashi, 2012).

Social media is the basis for the creation and maintenance of the **Brand Community** (BC) that can perform many important actions on behalf of the brand, such as providing assistance or socializing the customer with brand related elements. With the development of internet-based applications, more than half of the top 100 global brands have created online communities so as to strong relationships with their customers (Manchanda, Packard, & Pattabhiramaiah, 2012).

The emergence of social media has changed how customers and brands interact. Nowadays, customers take an active role in forming the image of brands online with interactions that go beyond purchase user experiences, include C2C interactions in brand related chat rooms, blogs, Word-of-Mouth (WOM) activity and/or through online feedback forms which comprise the motivational drivers of engagement behaviours (Van Doorn, et al., 2010).

> ''*Social media is a group of internet-based applications which build on the ideological and technological foundations of Web 2.0 and which allow the creation and exchange of user-generated content*'' (Kaplan & Haenlein, 2010).

Thus, Cabiddu et al. (Cabiddu, De Carlo, & Piccoli, 2014) suggest that social media are browser or mobile-based applications that allow users to easily **create**, **edit**, **access** and **link** to content and/or to other individuals, with examples include *blogs*, *wikis*, *RSS feeds*, and *electronic social networks* as well as *user-generated content aggregators*. Despite the development and the potential of social media as a tool, there is still a critical need of studies to reveal the factors motivating consumers to interact with brands on social media to achieve effective communication strategies, framed by marketers (Tsai & Men, 2014) but, nonetheless, it has been proven that companies which exploit the capabilities of social media to connect with customers, employees and other stakeholders outperform other companies (Corstjens & Umblijs, 2013). Most used social media channels include microblogs (e.g. Twitter), social networks (e.g. Facebook) and socializes microsites, followed by video sharing platforms (e.g. YouTube) and discussion forums (Ashley & Tuten, 2015). Top brands very often utilise creative strategies to engage users that include functional or emotional appeals. Recent study revealed that users tend to share content within social media platforms twice as many times if a *contest* is used rather than *discounts* (Ashley & Tuten, 2015).

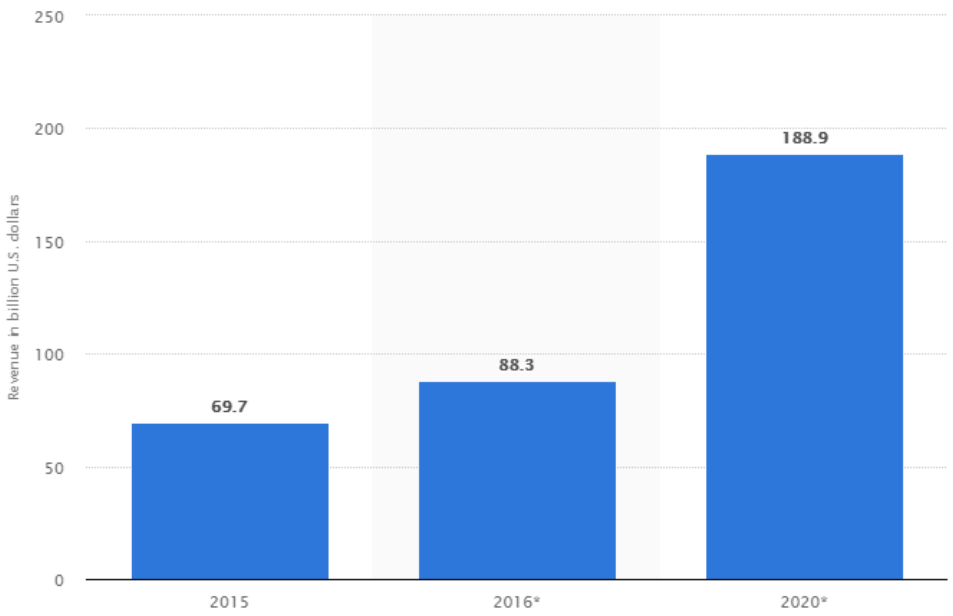


**Figure 1: World projected mobile app revenues from 2015 to 2020 (Statista, 2018)**

## 2.3. ENABLING MECHANISMS

Enabling mechanisms encompass the message content and the execution of specific actions, which both include the notion of designing communications in a way that increases the likelihood to produce the desired effects in the target audience (Laskey, Day, & Crask, 1989). CE is directly linked to the commitment that shows a customer in his/her relationship with a brand or a product and has two major dimensions: **affective commitment** and **calculative commitment** (Gustafsson, Johnson, & Roos, 2005). Affective commitment is more emotional and results from the trust and reciprocity in a relationship and leads to higher levels of trust and emotional bonds, while calculative commitment is more rational and results from a lack of choice or switching costs and leads to higher levels of customer loyalty and enduring relationships with brand or product representatives (Sashi, 2012). Same author suggest that the process of building CE constitutes a cycle in which the different stages will very in terms of the degree of **relational exchange** and **emotional bonds** that characterise the relationship between the customers and the "seller".

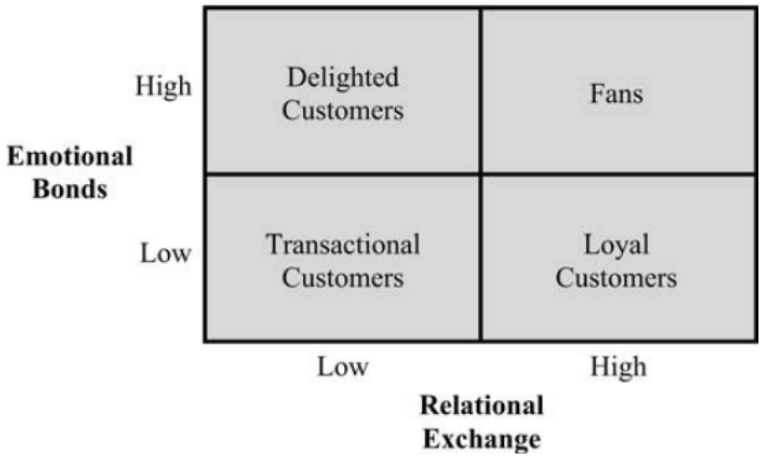


**Figure 2: The customer engagement matrix (Sashi, 2012)**

Following the classification of engagement's dimensions proposed by (Brodie, Hollebeek, Juric, & Ilic, 2011), has shown that the different dimensions: **cognitive**, **affective** or **behavioural** has increasingly applied.

According to a study (Vargo & Lush, 2008) the conceptual foundation of CE is:

- ***Customer is always a co-creator of value***
- ***All social and economic actors are resource integrators***
- ***Service-Dominant (S-D) logic translates into: we serve our network of resources for other to benefit in order to obtain service from others***
- ***Value is always uniquely and phenomenologically determined by the beneficiary***
- ***Service is viewed to generate specific customer benefits through the co-creation value with other actors in specific service relationships by virtue of focal interactions and/or interactive experiences***

The above statements highlight the interactive, co-creative nature of value creation and the context of the value creation to occur within networks and emphasize the experiential, inherently subjective and contextual nature of the value co-creation concept. Research under (Lush & Vargo, 2010) suggest that particular **interactive**, **co-creative customer experiences** may be interpreted as the act of "engaging".

Another recent study (Vivel, Beatty, & Hazod, 2018) on critical elements of engagement strategy names the following characteristics as essential in engaging the customer effectively:

- **Dialogue**: is the provision for facilitating interaction among all participants which can increase the ability of engaging customers.
- **Value co-creation**: by allowing the customers to participate in this procedure.

Both initiatives are proposed to facilitate actions, rather than direct customer participation for a more successful outcome.

## 2.4. CUSTOMER ENGAGEMENT BEHAVIOURS

A research was carried out (Gummerus, Liljander, Weman, & Pihlström, 2012) which divided CE into "**Community Engagement Behaviours**" (**CEB**) and "**Transactional Engagement Behaviours**" (**TEB**). Both types include a set of behaviours that are born and motivated by individual or a combination of different provided benefits. The first set of behaviours could be treated as a measure on intensity of participation with organisation and other customer in mutual knowledge exchange process, while the later to be understood as a set of activities facilitating repurchase behaviour and strengthening customer commitment to a brand (Dovaliene, Masiulyte, & Piligrimiene, 2015). In addition, the three relationship benefits were identified:

a) ***Social***
b) ***Entertainment &***
c) ***Economic***

This research showed that CEB have a positive influence on all three types of relationship benefits, whilst TEB (gaming and spending money) have a positive effect on social and entertainment benefits, but not on economic benefits. This may be explained by the fact that those who are actively involved into gaming, sometimes frequently, tent to spend more money and will not find other soft economic benefits that relevant. Hence, for the purposes of FENIX project, gamification tools should not aim or give the impression that comprise an economic mean for betting or enrichment, but instead to be recognised as a mean of entertainment and social actions actuator.

Some recognised types of customer engagement behaviours/ manifestations include **cooperation**, **feedback** and **compliance** concerning the B2C interactions but also **helping other customers** and spreading **positive Word-of-Mouth** for the C2C interactions.

It is understandable that this kind of involvement requires from the brand to keep up with one-on-one relationships with customers, which would greatly increase its running costs and time spent on developing these relationships. For this reason **brand communities** can play an important role by effecting the values of relationship marketing and play the role of the brands agents within the community (Muniz & O' Guinn, 2001).

Companies are creating online brand communities, motivating users to share their experiences and provide feedback with the purpose of reimbursing in value to the firms. The value is added in the form of ***trust***, ***word-of-mouth*** (WOM), ***loyalty*** and so on [ (Vivek, Beatty, & Morgan, 2012) (Hollebeek, 2011); (Islam & Rahman, Examining the effects of brand love and brand image on customer engagement: An empirical study of fashion apparel brands, 2016)].

### 2.4.1. TRUST

Trust is "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Davis, & Schoorman, 1995). This factor is crucial for online businesses and considered as when one party has confidence in an exchange partner's *reliability* and *integrity* (Morgan & Hunt, 1994). Engaged customers are involved to increased interactions, which are more likely to enhance trust, since customers rely more on the information coming from other customers rather than from the company (Dabholkar & Sheng, 2011).

### 2.4.2. WORD-of-MOUTH

Word-of-Mouth activities involve the outcomes of consumer-to-consumer (C2C) interactions which historically were referred as the oral communication between two customers, but nowadays this view has changed due to the advancement of the technology and incorporate networking sites, online communities, websites, etc. (Hennig-Thurau, et al., 2010), where WOM may be even more significant (De Valck, Van Bruggen, & Wierenga, 2009) since recommendations spread fast, the audience is larger and the transmitting of information is costless. Some of the key motivators for WOM activity within an electronic community in social media platforms have been identified to be the following (Wolny & Mueller, 2013):

#### *Fashion*

Fashion has been classified as a high involvement mean, which relates to products which are either expensive, rare or linked to personal identity. High-involvement products attract a significant amount of online conversations (Gu, Park, & Konana, 2012), even though there is a complexity in evaluating its value and particularly its social value, but it is believed that the individual relates the product to his self-image and attributes some hedonic qualities to the product (Higie & Feick, 1989).

#### *Brand*

Brand involvement or commitment is the positively adjacent of customers to a brand or company. Research under (Hur, Ahn, & Kim, 2011) identified brand commitment as predictor of members' behaviours in an online community, such as participating in community activities. Usually brand or company commitment is succeeded when consumers' values align with those of the brand.

#### *Product*

Product involvement has been identified as a motive for WOM communication behaviour ( (Blackwell, Miniard, & Engel, 2005) and has been defined as the level of personal relevance that a consumer sees in a product (Schiffman & Kanuk, 2006).

#### *Need for social interaction/ emotions*

This factor is linked also to the need of seeking advice from time to time for issues unknown to the user as well as the need to self-involve and share, transmit or projects his/her values within a community.

Word-of-Mouth is directly linked to the customers involvement and hence with trust (Teichert & Rost, 2003). If the customers' experience is satisfactory then trust will increase among customers which will lead to positive *affective* reaction among the community. It is evident that customer engagement is greatly influenced by trust and WOM activities in online brand communities (Islam & Rahman, Linking Customer Engagement to Trust and Word-of-Mouth on Facebook Brand Communities: An Empirical Study, 2016).

## 2.5. Customer Engagement Manifestations

### 2.5.1. SATISFACTION

Studies confirm the context nature of CE and its relation to satisfaction. Satisfaction plays a very important role in deciding whether to keep or drop relationship with a brand. Especially in the case of mobile apps, results have shown that mobile app users perceive a better value when they are engaged with apps behaviourally (spend lot of time in app store, considers comments, number of downloads in total and programs downloaded by influents, etc.) (Dovaliene, Masiulyte, & Piligrimiene, 2015).

### 2.5.2. LOYALTY

This relational variable is based mainly on past experiences with the brand. From a consumer's perspective, brand loyalty depends largely on the consumer's assessment of the consumption experience with a particular brand (Fung So, King, Sparks, & Wang, 2016). It is clear that loyalty and consumer commitment is induced also by the level of trust between the customer and the brand.

### 2.5.3. COMMINTMENT

According to Moorman et al. (Moorman, Zaltman, & Deshpande, 1992), commitment is defined as ''an enduring desire to maintain a valued relationship'' and it has been identified to have two types resulting from different motivations (Geyskens, Steenkamp, Scheer, & Kumar, 1996):

- Affective commitment – in which consumers like to maintain relationship with the brand
- Calculative commitment – in which consumers need to maintain this relationship for rational or economic reasons.

## 2.6. RESEARCH MODEL

Based on the above we conclude to the following research behavioural model which also agrees to the proposed model by Gummerous et al. (Gummerus, Liljander, Weman, & Pihlström, 2012).

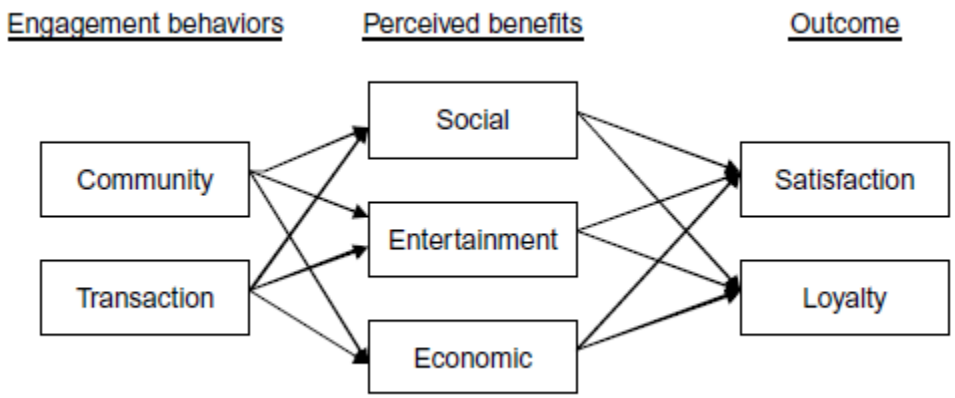


**Figure 3: CE testing model. Source: (Gummerus, Liljander, Weman, & Pihlström, 2012)**

This model shows that customers are presenting some particular engagement behaviours based on the type of the perceived benefits and if these are positive, with respect in time, then they can lead to specific outcomes of CE: a) *Satisfaction,* b) *Loyalty* and c) *Commitment*. It is important to note that no specific benefits lead to particular engagement behaviours. Some entertainment benefits may lead the user to present either **Transactional** or **Community** behaviours.

Figure 4 shows the CE ecosystem adjusted for the project's structure which subsumes the above review.

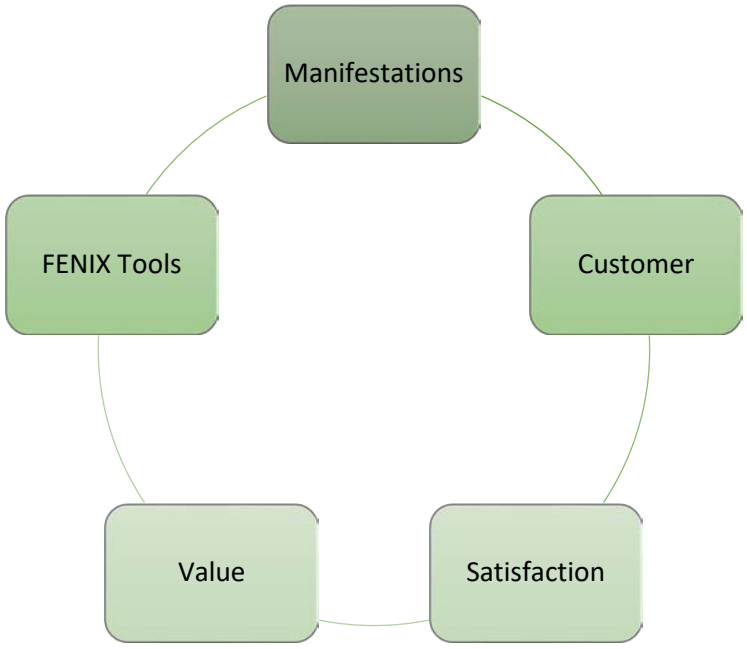


**Figure 4: FENIX Customer Engagement Ecosystem**

Customer's manifestations (transactional or community behaviours) require a mean (a channel) for transmitting the above messages or motives and a network to disseminate them. The network is passively created on social media and the project's tools based on the engagement level of the involved customers. What is interesting to examine, is the channel which can be used to feed the different engagement behaviours with the perceived benefits. Table 2 ranks a number of different

channels, from most frequently used to least which shows the number and percentage of 28 brands that utilise each channel (Ashley & Tuten, 2015). It is evident that social networks, microblogs and microsites are the most commonly used channels.

**Table 2: Social Media channel usage (Ashley & Tuten, 2015)**

| Channel | Number of Brands (out of 28) | Percentage of 28 Brands (%) |
|---|---|---|
| Microblog | 27 | 96.43 |
| Social networking | 27 | 96.43 |
| Microsite | 27 | 96.43 |
| Video sharing | 26 | 92.86 |
| Discussion forums | 24 | 85.71 |
| Social bookmarking | 20 | 71.43 |
| Photo sharing | 18 | 64.29 |
| Mobile apps | 11 | 39.29 |
| Audio sharing | 10 | 35.71 |
| Wikis | 8 | 28.57 |
| Social games | 5 | 17.86 |
| Virtual world | 4 | 14.29 |

### 2.6.1. SOCIAL BENEFITS AND INCENTIVES

Unlike traditional market exchanges, social media helps shift control of some traditional decisions (price, promotion, etc.) to the customers. Social media enables customers to participate in strategic choices and co-create value jointly with the "seller". Social networking practices are those focusing on **creating**, **enhancing** and **sustaining** ties among community members, such as *welcoming*, *empathizing* and *governing* (Schau, Muniz, & Arnould, 2009). This connectivity should take into account that consumer's interactions make them stronger minded so that they demand more and expect more from the brand. To overcome this over-performance of social media, brands should encourage and facilitate conversations and not disrupt them (Fournier & Avery, 2011).

Consumers often participate in the community to **seek assistance** and **help** from other members, in such cases support discussions are interlinked with social conversations (Dholakia, Blazevic, Wiertz, & Algesheimer, 2009). Also people seek to establish social ties with like-minded others and exchange information of mutual interest socially (Boyd & Ellison, 2007) and this fact, to be able to connect with other like-minded people is the biggest social benefit that can be offered. Thus, the promoted content (ideas, principals, ethics, life styles, etc.) should be such to reflect the majority's modern intellectual concerns.

A social platform should be able to provide the ability for **Peer-to-Peer** (P2P) interactions which can accommodate sharing of *personal experiences*, *exchange influence* among the users and acquiring *cognitive competencies* that may influence value-in-exchange and value-in-use (Lusch & Vargo, 2006). This model may greatly influence the *loyalty behaviour* within the online community, combined with the special ideological characteristics that FENIX attracts but also endorse (recycling values, prospect for new sustainable business models, awareness on manufacturing concernment, general information sharing, etc.).

The aforementioned social norms, social support and most particularly the exchange of ideology are the primary influence motivating community loyalty behaviour based on Social Cognitive Theory (SCT) (Lin, 2010).

### 2.6.2. ENTERTAINMENT BENEFITS/ GAMIFICATION MOTIVES

Entertainment benefits are mainly achieved through gamification. It refers to adapting something (usually a process) and not typically considered game-like to have qualities of a game. Gamification has been the experimental nature of act of adding systemic game elements into services (Huotari & Hamari, 2012) such as **points**, **badges**, **quests** and **leader boards** guided by simple behaviourist notions of motivation (Lieberoth, 2015). The definition lies in the use of game mechanics, dynamics and frameworks to promote desired behaviours (Lee & Hammer, 2011). The value of gamification artifacts has been already identified for its effectiveness (Hamari & Koivisto, 2015).

According to Malone (Malone, 1980) there are 3 core elements that evoke intrinsic motivation: a) **Challenges**, b) **Curiosity** and c) **Fantasy** and more recently the intrinsically motivating nature has been attributed to the potential to satisfy the psychological need for **autonomy**, **competence** and **relatedness** (Przybylski & Rigby, 2010). Different types of games promote different player competitiveness, which describes the extent which the individual engages in competitive behaviour. Robson et al. (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016) proposes the 4 player competitiveness levels presented in Figure 5 and also identifies some key gamification characteristics/ mechanics (Table 3) which correspond to desired features per type of player (Table 3).

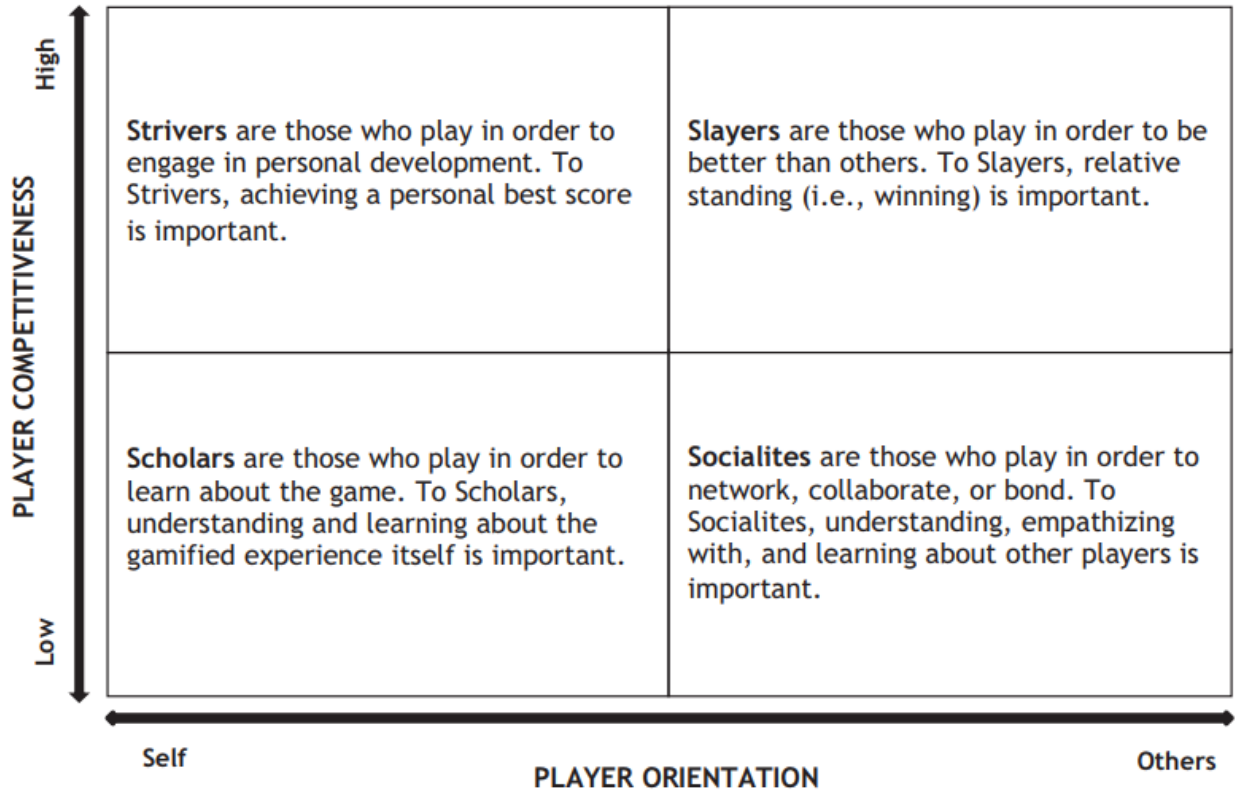


**Figure 5: Typology of players in gamification experiences (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016)**

**Table 3: Key gamification mechanics (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016)**

| | Slayers | Strivers | Socialites | Scholars |
|---|---|---|---|---|
| Leader boards, Badges, and Points | ✓ | ✓ | | |
| Increasing Task Difficulty | ✓ | ✓ | | |

| | | | | |
|---|---|---|---|---|
| Finite End | ✓ | ✓ | | |
| Multiplayer Orientation | ✓ | | ✓ | |
| Infinite Play | | | ✓ | ✓ |
| New Levels | | ✓ | | ✓ |
| Team Playing | ✓ | ✓ | ✓ | ✓ |
| Online Playing | ✓ | ✓ | ✓ | ✓ |
| Real World Playing | ✓ | ✓ | ✓ | ✓ |

Although game elements lead to overall performance gains, only intrinsic motivation is found to be associated with increases in the extent and quality of effort that people put into a given task (Mekler, Tuch, Brühlmann, & Opwis, 2017). The term element is used to distinguish gamification from serious games (Deterding, Dixon, Khaled, & Nacke, 2011) as gamification in FENIX will only be used as a motivational and engagement tool to promote other services and there is no intention by any means to sustain a gaming platform. Hence, no tool or mechanism is intended to contain pure game mechanisms as gaming needs are deemed to not meet and are out of the scope of the project.

### 2.6.3. ECONOMIC BENEFITS & FINANCIAL MOTIVES

The virtual world has provided many tools to connect not only companies but also consumers as it is already accepted that online communities allow strengthening consumer relationships and engagement (Algesheimer, Dholakia, & Herrmann, 2005). Dissatisfied customers are confronted with the dilemma of taking their transaction elsewhere which will result either in giving up the economic benefits or continuing repurchasing but accepting lower levels of satisfaction, so without the economic incentives, consumers are less likely to maintain loyalty or engage in the repurchasing behaviour (Zheng, Xiang, Liu, & Zhang, 2012).

The biggest economic benefit for both the brand and the consumer is the **value co-creation**, which is defined as ''an interactive process involving at least two willing resource integrating actors which are engaged in specific forms of mutually beneficial collaboration, resulting in value creation for those actors'' (Payne, Storbacka, & Frow, 2008) and based on the above literature review is considered as an important customer engagement behaviour manifestation. This definition is different than the involvement of customer in **co-producing** or **co-designing**, which is associated with personalisation of specific design features, with the essential difference, however, that this process can be originated from the brand or the company and is not a mean of behavioural manifestation.

Concerning the financial motives, research has shown that CE is mainly based on altruistic motives and particularly the two extrinsic financial motives of i) **Special offers/ prices** and ii) **Monetary compensation for customer's participation** had the smallest influence on customer's willingness to engage (Fernandes & Remelhe, 2016).

# 3. FENIX CROWDSOURCING SYSTEM

In a Crowdsourcing System (CS), tasks are distributed to a group of users, sometimes anonymous, for carrying them out. Hence, understanding the demographics and special characteristics of the available crowdsourcing population and attracting the most useful components to the crowdsourcing system greatly influences the performance of the system. First of all, it is vital to have a network of people which can interact and share information in direct and fast way so that all together will form a **virtual online community** in which each individual person is driven by intrinsic and extrinsic (getting paid) motivations to value co-creation. In these communities, users consume and produce in a voluntary and democratic manner (Ståhlbröst & Bergvall-Kåreborn, 2011), such as disseminating information through WOM activities, participating in brand related events but also influence other customers' perception (Brodie, Ilic, Juric, & Hollebeek, 2013). CS can be considered to be the ultimate and most important engagement manifestation, which especially on the crowdcreation end, there are studies presenting the benefits of crowdsourcing in generating new ideas (Huang, Singh, & Srinivasan, 2014).

In this section the main parts of CS model will be reported which are developed for the needs of the project (to be developed in the scope of task 5.3). Highly engaged customers can promote a key process in value co-creation such as provide feedback, participate in product design or assembly (Kristensson, Gustafsson, & Archer, 2004) and improve offerings through collaborative innovation (Zwass, 2010). Some of these mechanisms will be incorporated within the User Forum and some later on during the development of FENIX Marketplace in Task 5.2. These two applications (Marketplace and User Forum) will be the main platforms for CS implementation, besides of course performing the necessary business purposes. The following sections describe the partitioning of CS functions to be integrated in the above FENIX tools. It is necessary to distinguish the crowdsourcing mechanisms adopted in FENIX or elsewhere from other forms of crowdsourcing such as open innovation and open source application development.

## 3.1. ROLE OF HUMAN USERS

In the case of crowdsourcing, the process builds upon the view and the ideas presented by individual users to address organisational tasks or to crowdsource new ideas for products or managerial modes. Users in the marketplace are classified into 2 main categories in each of them there may be more subcategories based on the special characteristics (skills and willingness to get involved) of each user: i) the ***Task Providers*** and ii) the ***Task Contributors***. At this point is should be mentioned the critical distinction between crowdsourcing and social commerce (Saxton, Oh, & Kishore, 2013). In the first case, online users contribute to the value production process, while, in contrast, in social commerce users buy solely finished products and services.

## 3.2. INCENTIVES FOR CROWDSOURCING

The motivational factors that influence the user's behaviour towards crowdsourcing have already been identified, according to the appropriate customer involvement strategies in section 2, to be either **intrinsic** or **extrinsic**. Literature is replete with studies that illustrate the close relationship between motivation and engagement. A recent research shows that participation in crowdsourcing is highest when incentives satisfy the motives of the users (Leimeister, Huber, Bretschneider, &

Krcmar, 2009) but also factors that increase the intrinsic motivation, has better success in improving output quality than extrinsic motivators (Rogstadius, et al., 2011). The creation and preservation of the User Forum aims to induct an additional impetus mechanism: The creation of **personal interest** of the users in topics. Topic based internet is developed over a longer period of time and through personal experiences and emotions that give cognitive/ affective quality (Alexander & Jetton, 2000); (Schiefele, 1999).

### 3.2.1. EXTRINSIC FACTORS

These will include payments or prizes for winning a contest or participating to the value co-creation. An example of that is the contributor (user), who uploads his/her own designs for other users to use them as maquette. In that case, part of the item's price[1] will be given to the provider as an award for his effort. But some providers instead of choosing a design from those available in the Marketplace, might wish to set up a contest, where the winner earns the prize set by the provider. Gamification as described in section 2.6.2 is a game-design element that will be widely used across all possible fields. In that context gamification and entertainment elements will be a major impetus of the crowdsourcing mechanism, through gamified competitions which will increase users' participation and efficiency. Consumer's participation and collaborative interaction will be stimulated by game-like elements that reward progressive actions with suchlike award elements. Although, gamification mostly increases intrinsic motivations, it is considered here an extrinsic factor as the user is engaged to perform activities to earn rewards, even virtual.

### 3.2.2. INTRINSIC FACTORS

CS harnessing is expected to be amplified by the expected degree of community loyalty behaviour (see section 2.6.1.) supported by the knowledge and information circulated within the community. Additionally, the user is expected to get motivated by the potential of self-presentation, which refers to his/her gratification in receiving admiration and recognition, contributing to ones self-affirmation about his positive participation. This will be provided through a progressive ranking status achievement and evident signs of the user's bond with the online community. One such module is the leaderboards included in both tools which highlight the highest ranked users. There are three different leaderboards based on the following contexts:

- Reputation
- Most content
- Most post

The first three users in every category are given points but also the below trophies.

[1] The price of each item will comprise of the manufacturing cost, the core material cost plus the design cost. When the design has been created by other users, the design value will be set by the creators.


**Figure 6: Awarded trophies for the first 3 ranked users on the Leaderboards**

## 3.3. (CROWD)VOTING SYSTEM

### 3.3.1. REGULAR VOTING SYSTEM

Voting systems typically require from the *requester* to select one or more answers from a number of choices (provided by other *crowdsourcing workers*). Users can upvote*, downvote* or *not vote* so that answers and questions can be ranked among the community. Such mechanisms assist to evaluate the quality of data since the contributors are not experts and usually their incentives are not aligned with those of the requesters.

Regarding products and services offered through the Marketplace, consumers that have already made a transaction will have the option to leave an evaluation score and review text on the entry's notebook.

Voting is also required to upvote or downvote other user behaviours and actions, such as upvoting or downvoting posts, which can provide useful information about the quality of the provided feedback, but also to extract conclusion on the users preferences. The utilised voting scheme in FENIX tools uses both and an upvote or downvote point system as well as a multi-emoticon one, which result either in a point addition if the reaction emoticon is positive, or in no point changes if neutral and in a point subtraction if negative.

Hence FENIX uses 2 regular types of (crowd)voting systems, for the evaluation of: a) Content, b) User profile.


**Figure 7: FENIX emoticon crowdvoting system**

Downvote Upvote

**Figure 8: Two-way voting system (positive-negative)**

### 3.3.2. RULE ENFORCEMENT VOTING

The crowd is used to identify activities that deviate from the regulations. This type of voting system is more direct and possible negative voting may result in sanctions. For the operation of this system, the user is expected to issue a ''flag'' (warning point) when offending actions come to their notice, such as topic bumping, abusive behaviour, signature violation or inappropriate language is used. When a user issues a flag then a warning log is sent to the moderators/ administrators who are expected to take actions, from messaging up to temporary or permanent banning of the user. Warning points are only visible to the moderators/ administrators together with information on the profile of the issuing user in order to avoid potential abusive use of that function.

Also very low to zero ratings are also subject to control by the administrators/ moderators against possible fraud.

## 3.4. REPUTATION SYSTEM

This is extracted by the qualitative (based on the crowdvoting system results) and quantitative assessment of the user activity (number of posts, votes, etc.). Reputation points awarded are linked with gamification elements including points, badges and rankings in order to present the most active and important contributors in an incentive and motivational way. With respect to the aforementioned voting system, the ranking is classified into two respective ways: a) **Community reputation** and b) **Community ranking**. The reputation shows the qualitative dimension of the user's content (related to the reaction scoring of the posted messages) while ranking deputises the extend of the user's activity. These two have the following classes, represented by customised gamification elements.

Bad Poor Neutral Good Excellent

**Figure 9: User's community reputation**


**Figure 10: User's community ranking**

## 3.5. DATA PROCESSING AND MINING

An online community connected with the most popular social media platforms will be required to manage the ever-increasing in volume, number and generated speed of data produced by the users and captured by organisations, called **Big Data**. These data can be classified into categories based on their characteristics and are directly linked with cloud computing which serves as an effective platform for distributed data-processing. Figure 11 shows the processing framework of big data as presented by Wu et al. (Wu, Zhu, Wu, & Ding, 2014) and is centred around the mining platform which in turn focuses on low-lever data accessing and computing. Big Data is a huge treasure which contains innumerable information to explore human society, their behavioural manifestations, their preferences but also the impact on them of specific actions or topics.

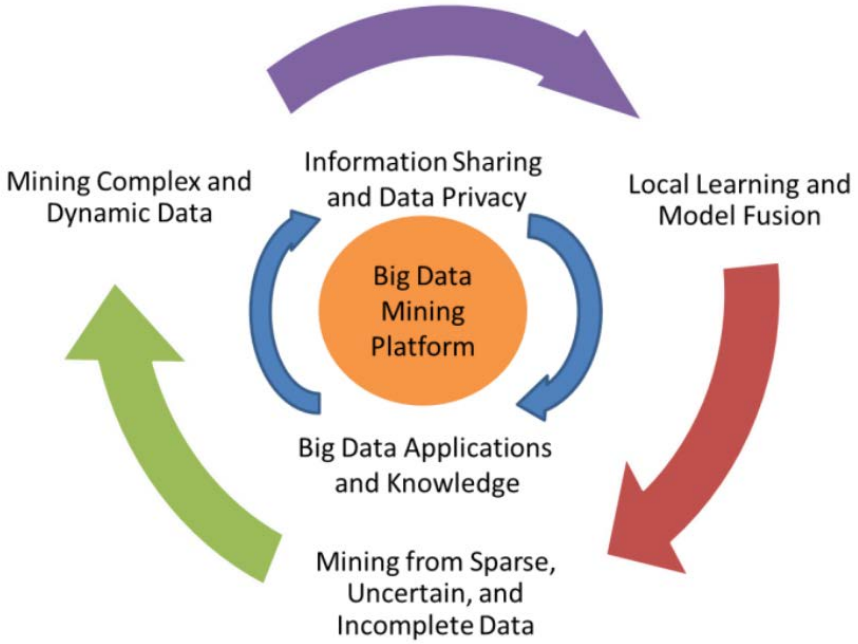


**Figure 11: Big Data processing framework**

Hence, FENIX will utilise data-processing mechanisms with respect to the GDPR, which will detect, collect and analyse information about the following:

- Manufacturing demand
- Recycling availability
- DSS/ Automation (how to make processes faster and more efficient)
- Market trends (what are the preferences of the customers)

## 3.6. PRE-IDENTIFIED GOALS WITH PROPOSED CS MECHANISMS & TOOLS

In this section a number of crowdsourcing mechanisms will be identified by analysing the three key elements of Web-based crowdsourcing (Saxton, Oh, & Kishore, 2013): the *crowd*, the *outsourcing model* and *advanced internet technologies* to be used. The demographics and the purpose of CS to serve is studied extensively and below the most important goals of CS are captured, matched with the most suitable solution approaches, the triggering factors and the platform on which it is intended to function, while subsequently each mechanism to be developed in WP5 is thoroughly explained.

**Table 4: Main objectives of WP5 coupled with an appropriate CS mechanism**

| No | Aim | CS mechanism | Operating Platform |
|---|---|---|---|
| 1 | Populating item availability | Customers generated content Platform (upload own designs, items, etc...) | Marketplace |
| 2 | Optimizing demand-production | Allow and promote mass orders | Marketplace |
| 3 | Main and secondary market | Trading Platform | Marketplace |
| 4 | Product-service evaluation | Enable a Crowdvoting system | User Forum & Marketplace |
| 5 | Minimizing fraud/ scam risk | Use of Crowdvoting system for reporting inappropriate activities | User Forum & Marketplace |
| 6 | General problem solving | Open content communication tool | User Forum |
| 7 | Identifying future market trends | Data mining to monitor customers activity and trends, but also allow information fishing through custom polls | User Forum – Data mining and Polls, Marketplace – Data mining |
| 8 | Attract new customers | Allow interactivity with popular social media for dissemination | User Forum & Marketplace |
| 9 | Open Innovation Platform | Provide a platform where individuals can set custom challenges and call for contributors | Marketplace |

### 3.6.1. POPULATING THE AVAILABILITY OF NEW ITEM DESIGNS

*Aim*

It is clear that FENIX needs to have a sufficient number of prototyping designs of items that can be produced using materials and processes either offered or found in the context of FENIX and its network and in order to acquaint the potential of this circular market to the users. But the consumers' interest is expected to decline continuously shifting to more personalised products with different degrees of personalisation based on the user's culture and ethics as dictated by the recent trends (Choi, Lee, Sajjad, & Lee, 2014) (Torrico & Frank, 2017). Hence the following CS mechanism aims to create a self-developing database of designs, on one hand, and on the other to contribute to the formation of involved customers. Principal implementation place is the FENIX Marketplace.

*The mechanism*

CS can be used to enhance the availability of items by letting the users who are capable, to produce a plurality of designs and drawings in exchange for social, entertainment and economic incentives[1]. This can be done through competitions organised by the users, administrators of the Marketplace of networking actors of the business model (e.g. manufacturers). This way the database of the available for manufacturing and selling products will continuously populate. The tendering mechanism and the database with the uploaded user's designs will be incorporated in FENIX Marketplace application and will provide the following incentives, with fluctuating intensity according to the level of complexity of the design and the current market demand.

*Incentives*

***Social***

Each uploaded design will be available for public evaluation. The uploader will receive the evaluation points collected as experience points to his account for the reputation ranking. Additionally the Marketplace will bear a "best exhibits" or ''showroom'' section, where the best designs will be presented based on user's preferences (top of all time, top items by manufacturing materials, top items by category, etc.) with clear reference to the creator.

***Entertainment***

When the administrators wish to promote a market demand in design, this will be carried out in the form of a competition, the benefits of which have been recognised in 2.2. That means for one single demand, various designs will be produced and additional points can be awarded based on the position that each exhibit has occupied. The additional awarded points will be made known with the announcement of the competition and the exact amount will be based on the number of the corresponding relevant searches performed either in Marketplace or the User Forum.

***Financial***

[1] Manufacturers, sellers/ resellers, other entity of FENIX network or the FENIX consortium itself does not bear any responsibility for the functionality of the designs. The responsibility lies with the users who upload and download these documents, which can then be up or down voted based on their assessment.

As any product available on the market, the price should include, in addition to the profit, all the costs contributing for the construction. The design phase is very important and therefore a small *percentage* in the final price of each product will be dedicated to the design. If the design belongs to individuals then this amount will be credited to them for each sale. Also, it will be possible for a design to be sold to other registered users or companies, including FENIX. This process will be carried out in the form of *gamification*. Since the application is called a Marketplace, the price will be a result of a bargain between the involved parties, where each can send an offer and the other party can either accept, decline or send back a counteroffer. The tool for this process in the Marketplace is the "**Trading Room**" and the outcome of the process is a tangible example of value co-creation.

### 3.6.2. OPTIMISING DEMAND - PRODUCTION

#### *Aim*

One of the major aims of FENIX project is the digitalisation of manufacturing/ demanufacturing processes for the purpose of: a) real time monitoring and b) optimisation of the main performances. Even though the Marketplace is meant to trade personalised items or services, it would be a significant mistake to overlook the benefits of the new technological advancements and especially the new digital industrial technology Industry 4.0. Since the production will be connected along the value chain with all stakeholders acting as a system, the production will be able to analyse the financial benefits of mass production and because of this connection the customer order is directly transmitted to the relevant plants. Of course this procedure can be activated by users. This tool will be used to optimise the demand by promoting mass ordering among the users, which will initiate a single manufacturing process at the largest possible scale. The mass ordering tool is a great CS tool as it is expected to reduce both the machinery and logistic costs, which will in turn lead to value co-creation, initiated by the customer and implemented with the utilisation of the crowd.

#### *The tool*

The platform will be integrated into the Marketplace in the form of a sub-process, in which the user will enter as soon as he/she chooses to, before submitting an order. Just before the finalisation of the order which will initiate (automatically) the manufacturing process, an option will prompt the user, if so desires, to set a timeframe before activating it. Within this timeframe other users can express interest in the same order by adding the desired quantities. When this time expires then the order will be automatically send to the respective manufacturing plants.

#### *Incentives*

***Social***

By using this function, the user is given the opportunity to actively participate in the FENIX community and be presented as a participant who creates interactive environments within the community. This action will always award the profile of the user with points added to the user ranking, while the biggest participation that he/she manages to mobilise with his order will also reward points added to the reputation level.

***Entertainment***

There is no particular entertainment incentives for this function as it is included to the more generic gamification environment build for the Marketplace.

***Financial***

The function has a direct link to the financial profit for all the participating users. The largest amount of the ordering quantity, the biggest the discount will be. The available discount margins will be pre-set by the manufacturers.

### 3.6.3. MAIN AND SECONDARY MARKET

*Aim*

The main market will form the major mechanism for trading (B2B, B2C, C2C) products and services associated with the project and represent the cross layer approach for managing the intelligent recovery of several kinds of waste. The platform will be connected to the DSS mechanism, to be developed in Task 4.4 and presented in the respective deliverable D4.4.

In a secondary market the investors, the users and other network actors exchange value between each other but not with the issuing entity. Exchangeable items can be the products/ items, money or services. Throughout this market the product/ services increase in value by keeping them in longer use while it's a direct contribution for value creation by the involved stakeholders.

*The tool*

The Marketplace will include many important functions which will be developed during Task 5.2. The users will be able to navigate with customisable filters through the available resources (items and services), check their characteristics and proceed to the purchase. Trading among users will also facilitate a bargaining session if chosen by any of the involved users.

*Incentives*

***Social***

Using FENIX Marketplace is interwoven with terms as ecology, recycling, technological advance and social media. All of which have gone way beyond their meaning, introducing a whole new lifestyle in which more and more people are being identified into and thus feeling as they belong to a vast community which envisions and acts towards the socially beneficial development of a modern society. In practice all of the user's actions here are rewarded with ranking points.

***Entertainment***

The whole environment will include gamification graphic designs coupled with other elements such as a trading/ bargaining window where users can approach other users or entities and bid for the item they are most interested in.

***Financial***

Any transaction will result in money transfer, so the seller has a direct financial motive. On the other hand, the buyer has the opportunity to get the desirable item, if that is available in the secondary market, for a lower price.

### 3.6.4. PRODUCT-SERVICE EVALUATION

*Aim*

This is one very useful function for all stakeholders. Voting of tradable resources will result in their ranking which is useful for:

- Easier searches for the users
- Identifying market trends and needs
- Reward the most active members of FENIX community

*The tool*

Every tradable product or service in the Marketplace will have the option to be evaluated. This option, though, will become available for items after their purchase to avoid false results by insidious users. The evaluation of the uploaded user-customised designs will be always available, but still the number of real ''usage'' (number of times the particular design has been purchased or used) will be recorded, in order to provide a relevant filtering option for search results.

*Incentives*

***Social***

Motives are completely extrusive, since the user's opinion will be taken into account to shape the global rankings in the Marketplace. From the User Forum, the users can develop free content comments on products or services, which will be taken into account for their account activity.

***Entertainment***

Evaluation process will result in the formation of showrooms which has the same entertainment benefits as the leaderscores, since users are one way or another connected to the products.

***Financial***

No financial incentives will be available for this function.

### 3.6.5. MINIMISING FRAUD/ SCAM RISK

*Aim*

Learning to identifying schemes that seek to take advantage of unsuspecting people to gain a benefit or use FENIX tools to discourage users is very important, since –gradually- the community users will lose interest to get involved, be sceptical about the promoting offers and hesitant to proceed to online purchases. The main topics for related activities to be spotted are:

- Spamming
- Inappropriate language
- Signature violation
- Abusive behaviour
- Topic bumping

*The tool*

For the spamming and the use of inappropriate language a special algorithm will be used which automatically scans the tools and identifies these activities with a very high success rate. The rest abusive topics will require actions taken by the moderators, which can be users with a higher reputation in the online community. To bring these warnings to their attention, FENIX tools count on the collective contribution of all users by incorporating crowdsourcing warning mechanisms based on the crowdvoting system as described in §3.3.2.

*Incentives*

***Social***

Engaged users are expected to be motivated by the feeling of contributing to the online community which they belong. It gives the opportunity to be very active users, shows that their opinion does matter and if correct can result into serious consequences. Their contribution is rewarded with a strong feeling of earning an authority role.

***Entertainment***

This procedure is done by using an evaluation scheme which makes use of gamification elements, such as adapted graphics for the voting system (use of flags, warning points, etc.).

***Financial***

No financial incentives will be available for this function.

### 3.6.6. GENERAL PROBLEM SOLVING

*Aim*

In the past there have been many attempts for the development of universal general problem solvers, that find what inputs are acceptable and what outputs should be generated by breaking a problem into subcomponents. Because of the large application field and the robust technology used in FENIX, defining the problem and choosing potential solutions can be particular difficult. For this reason, this task will be assigned to the crowd, using mainly the FORUM tool.

*The tool*

General problem solving incorporates some basic steps,

a) Become aware of the problem
b) Define the problem
c) Propose potential solutions
d) Evaluate the valid potential solutions to select the best

In FENIX all of the above are assigned to the crowd by allocating special Forum and Poll (Review) sections. By using the poll section, users can set a problem which they can define in advance together with the potential solutions and in return get a fast evaluation of these solutions by means of quantitative feedback. The Forum section allows the task definition by means of free content

which allows qualitative feedback to be collected. Answers can also be evaluated using the gamified elements presented in §3.3 by the users to generate the best potential solutions.

*Incentives*

***Social***

Users take an active role in the community. More recorded activity means more awarded point for reputation and community ranking.

***Entertainment***

Sub processes include gamified elements, such as a gamified voting system and user ranking which contributes to the formation of leaderboards.

***Financial***

Financial incentives in this case are served through the Service-Dominant (S-D) logic: we serve our network of resources for other to benefit in order to obtain service from others (§2.2). Profit in this case is indirect, which means that the user can attract more potential interested parties in a product and gain profit either by triggering an optimising demand, either through the significant quality improvement of the product (or service of course).

### 3.6.7. IDENTIFYING FUTURE MARKET TRENDS/ DATA MINING

*Aim*

Apart from the introduction of the new technological solution in the manufacturing and recycling processes, FENIX market penetration is heavily depending on keeping the customers satisfied and constantly recognizing needs for sustaining value co-creation and hence business circularity. The purpose of this tool is to undertake the identification of these needs and trends that will follow after the start of FENIX Marketplace through data mining and statistical analysis for useful data interrelations.

*The tools*

This mechanism utilises more than one tool. One tool is the use of the poll (review) section from which we can extract user preferences in two ways: a) by processing and fishing answers provided in completed polls to perceive useful conclusions on the desired issues or b) by stating directly the appropriate question which will initiate a debate between the users which will reveal their will and opinion. Another tool will incorporate fishing of the user's free generated text by means of keyword finding and statistically reprocessing them to present the most discussed topics/ issues. Last, the Marketplace will have the provision to automatically save data on purchases and other generic user activities (always with respect to the GDPR regulation) for their future processing and exploitation.

*Incentives*

***Social***

The above tools receive input from processes which award each user for their input, such as posting on threads, evaluating answers and purchasing items.

***Entertainment***

Some tools incorporate gamification elements (e.g. Poll section and crowdvoting), but the real mechanism is not user-interactive and hence cannot have any such elements.

***Financial***

The financial value for this mechanism is on the side of the FENIX consortium partners (manufacturers, recyclers, merchants...), as they are given the opportunity to use these date for the improvement of the manufacturing/ recycling processes and the quality of the final product pointing all acting members to a more profitable course. This is very important as this mechanism promotes sustainability of the project and confirms for another time how much it is based on business circularity.

### 3.6.8. ATTRACT NEW CUSTOMERS

*Aim*

FENIX with its developing applications aims to promote the green circular economy that can only be achieved through long lasting design and adaptation to future economic and environmental needs. To succeed this sanguineous goal FENIX will need to follow the future market trends evolve along with a secure forecasting of the customers' preferences.

Social media marketing will be utilised to promote FENIX products, services and ideology. Social media can be a useful source of information as they are extensively being used among users to share reviews and recommendations, but can also been used as communication channel to address a range of stakeholders or even the very specific audiences. This mechanism aims to allow all consumers to express and share opinion about FENIX subject matter, become an active participating user of the FENIX marketing campaign. This manifestation can be expressed either by sharing content simply or by having reactive conversation with other social media users by responding to those interested in related subjects.

*The tool*

Both FENIX tools (User Forum & Marketplace) will integrate the ability to link FENIX accounts to the most used Social Media. That way users can share content related to FENIX directly through their social media at the push of a button.

*Incentives*

***Social***

Social incentives are both extrinsic and intrinsic. Sharing content to their social media account will award users with reputation and ranking points, but also contributes to growing the social circle of the user and associating discussions on issues that affect him/her with social groups involved.

***Entertainment***

Sub processes include gamified elements, such as a gamified voting system and user ranking which contributes to the formation of leaderboards.

***Financial***

No financial incentives are applicable for this mechanism.

### 3.6.9. OPEN INNOVATION PLATFORM

*Aim*

FENIX **Open Innovation Platform** (OIP) is the virtual place where the needs of the various stakeholders can meet and match challenges defined by **Task Providers** to a pool of **Task Contributors**. Within this platform enterprises can address their innovation needs and access the ideas and capabilities of the crowd. These collaborations will generate opportunities for co-creation and commercialisation.

*The tool*

This platform will present all the active tasks, on which the user can sign up for participation and finished tasks together with their winner ranking leaderboard. The innovation calls will comprise of 3 stages: 1) **The application phase**, 2) **The evaluation and selection phase** and 3) **The proof of concept output**.

**1. The application phase**

The task provider can set a new active task by filling in the **general description**, a **title**, the **main objectives** of this task**,** the available **timeframe** for the submitting of proposals and the **rewarding price**. Within this timeframe the candidate contributors apply to participate and provide their contribution.

**2. The evaluation and selection phase**

The task provider will have a predefined timeframe (approx. 2 weeks) for the in-depth evaluation and the shortlisting of contributors. The outcome of this process will be the scores awarder to the contributors out of which will be formed the task ranking.

**3. The proof of concept output**

The contributors will be awarded their price and their ideas will turn into prototypes for the proof of concept of the task.

*Incentives*

***Social***

Social incentives are both extrinsic and intrinsic. Every participant will gain standard ranking points for contributing, while reputation points will be staggered to the first 3 winners based on final rankings. Ranking and reputation points will be nominated based on the total participant number.

***Entertainment***

Based on §2.6.2 the above tool manages to satisfy all 3 entertainment intrinsic motivators: a) **Challenges**, b) **Curiosity** and c) **Fantasy**. In addition, the outcome of each task will be presented in a gamified leaderboard element.

***Financial***

Each Task Provider has to set an appropriate price for the contributing winner. It will be an open decision on the side of the provider whether to set a price and the exact amount of it, but tasks which fail to return value for the applicant's contribution may be barren.

# 4. USER FORUM

The User Forum is one of the two FENIX platforms which formulate a permanent mechanism for the customer involvement and the place where some core activities of the project are implemented. This platform has been developed throughout the activities of Task 5.1 (M6 – M12), is hosted in CERTH's servers and can be accessed through the following link:

**https://forum.fenix-apps.eu/**

With this tool users are given the opportunity to use a single account for the logging in to both tools (User Forum and Marketplace; the latter is under development), which will enable the coupling of their activities. So points, money and ranking earned from any of the above will be added up to a common account and hence users will have additional incentives to be active to both FENIX tools.

## 4.1. STRUCTURE OF THE USER FORUM

The User Forum has the following structure. Each main section consists/ includes subgroups of related classification:

1. Header
    a. FENIX logo
    b. Sign in/ sign up function
    c. Notification area/ Messages/ Reported Content
    d. Access to personal account page
2. Navigation bar (includes sections of the Forum activities and the User activities)
    a. Forum
    b. Review
    c. Articles
    d. Classifieds
    e. Clubs
    f. Online Users
    g. Unread content
    h. Content I started
    i. Leaderboard
3. Sub-navigation Bar: shows the navigation path
4. Content
    a. main content of each section e.g. Forum: contains the main threads and posts
    b. Possible advertisements
    c. Push notifications
    d. Recent polls to participate
5. Footer
    a. Info about the project
    b. Guides and rules about the forum
    c. Contact form

d. About the consortium

## 4.2. FORUM FEATURES AND CHARACTERISTICS

In this section the main features of the forum are presented and an overview explanation on the interrelating functions with the intention to make the reader more familiar with the digital environment of FENIX.

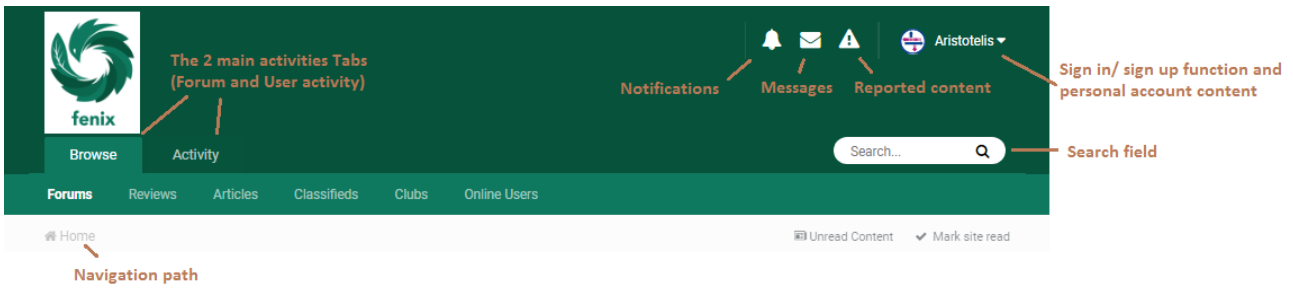


**Figure 12: Header section functions explained**

### 4.2.1. GENERAL

The User forum is intended to form the social community of FENIX. Visitors to this site can access view only content, but have to sign up to enjoy greater privileges. Users are separated into the following groups that represent a membership which is accompanied by consistent privileges and responsibilities within the online society.

a) **Administrators**: They manage technical details, appoint moderators, unrestricted access to perform any database operations.
b) **Moderators**: Users that are granted access to posts and threads. Based on user's privileges they can delete/ban/suspend/unsuspend other users, delete/merge/move/lock/rename/stick posts and threads.
c) **Registered users**: The can reply to any post and based on their privileges to create new threads. They can participate to polls and also add their own advertisement.
d) **Visitors**: Unregistered users. Can only view/read threads and posts. Have also same read-only access in the advertisements section.

Apart from the above ''institutional status'', users are required to be registered into one of the following cluster category which provides useful information for the consortium, improves the quality of services provided to the users and most importantly, allows them to registered to sub-communities called ''Clubs'' where users with very close interests communicate freely:

1. **Consumers**
2. **Manufacturers**
3. **Merchants/ suppliers**
4. **Recyclers**
5. **Financial/ Banking institutions**
6. **Authorities**
7. **Other network actors**

The free text communication among the users is achieved through HTML text format that includes emoticons, attachments and other interaction systems which also account for user ranking and reputation, as described in section 3.3. All registered users can follow other users or their content to get informed about their recent news and activity.

### 4.2.2. FORUM

This is the part of the forum which allows users to enter free text content to present their news to the community, make comments and provide review, develop discussion with other members and arrange common social events. Users can add new discussion threads and integrate them into the matching modules while this section requires greater supervising by the moderators. The free text content enabled in here is one of the main tools contributing for the formation of the FENIX online community where major engagement behaviours can take place (WOM activity, customer education, manifestations, etc.). This is probably one of the most important parts of the application since it can accommodate the general problem solving mechanism described in section 3.6.6.

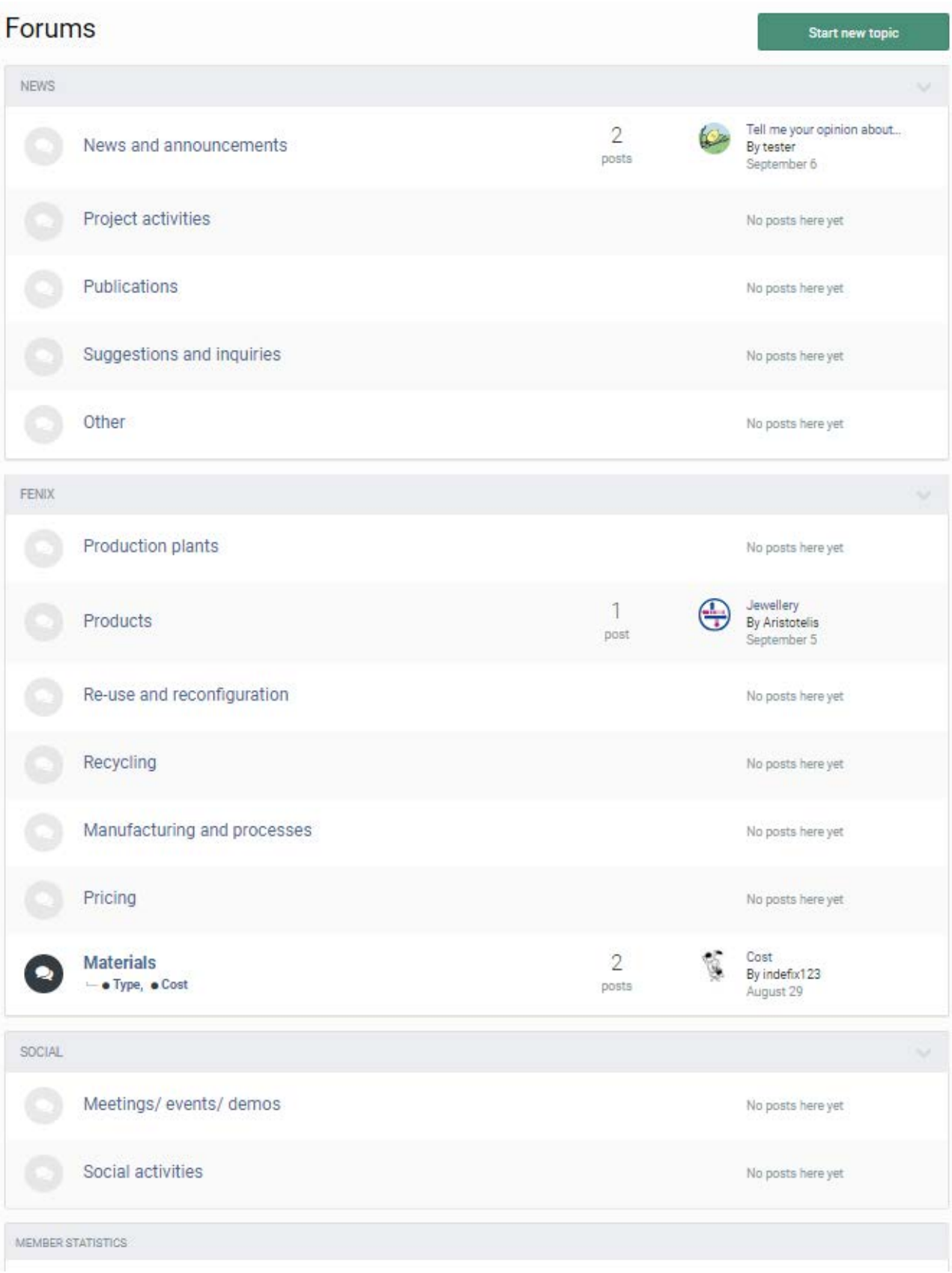


**Figure 13: Layer of the forum Tab**

### 4.2.3. REVIEW (POLL) SECTION

In this section the users can see the active polls in which they can also participate, view the results of the finished polls or go to the ''other review'' section to engage in in-depth review.

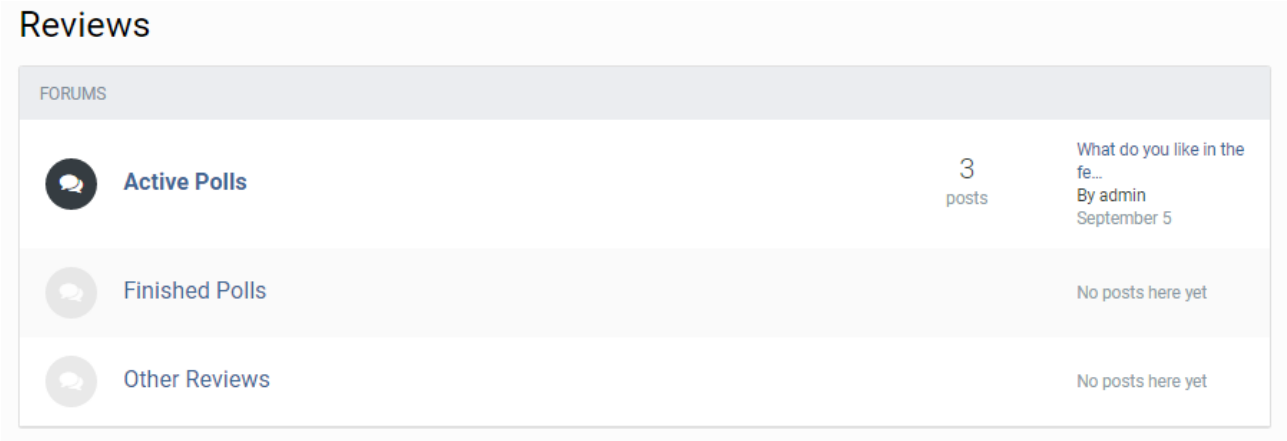


**Figure 14: Review (Poll) section**

This section hosts the biggest part of the crowdvoting mechanism and data provided here can be used through processing (§3.5) for various exploitation methods (see also §3.6.7 and §5.7).

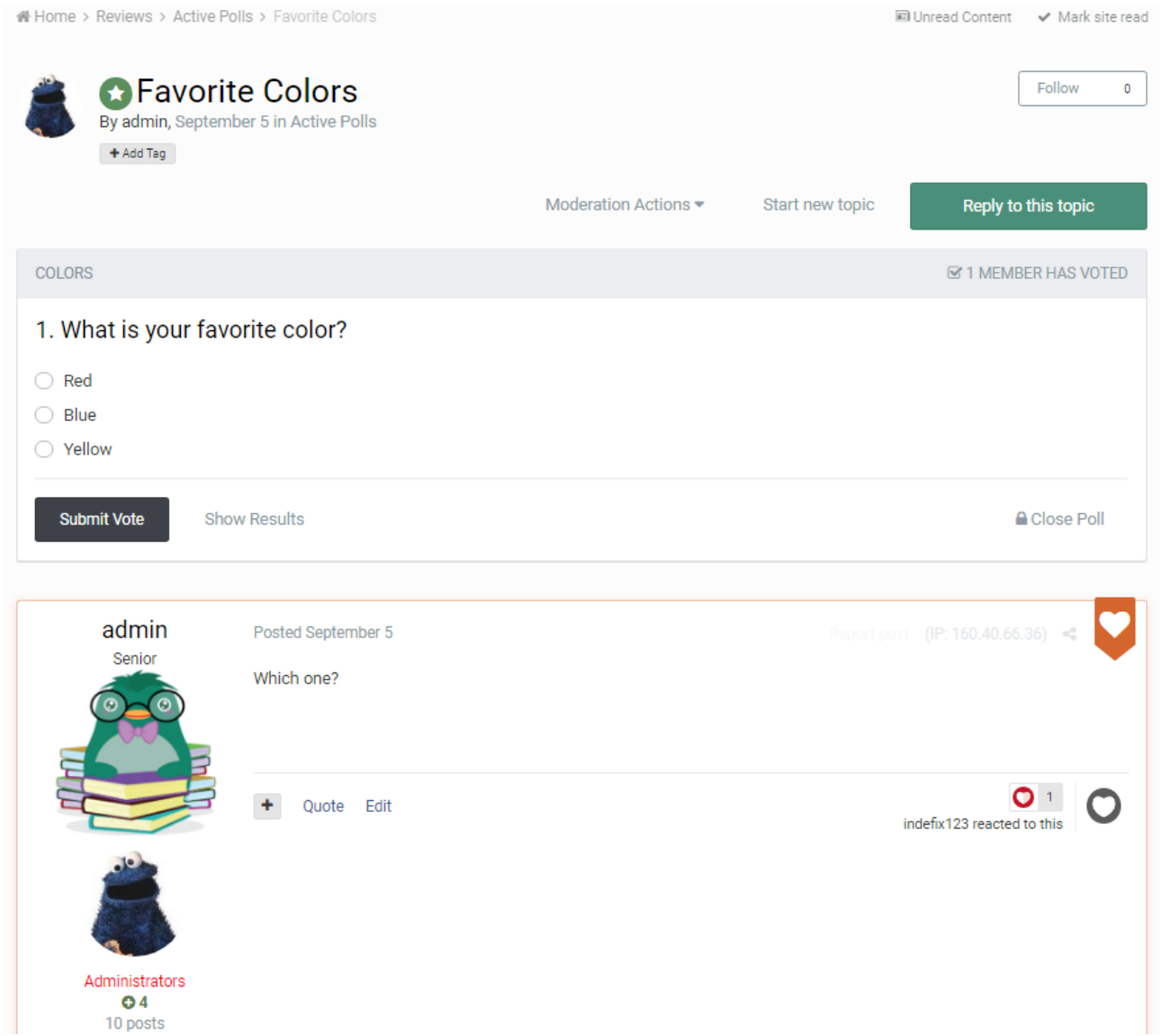


**Figure 15: Layout of an active poll**

### 4.2.4. ARTICLES/ CLASSIFIELDS/ CLUBS AND ONLINE USERS

On these tabs the users can again engage in discussions using free text content. **Articles** section contains articles on tutorials or product instructions; **classifieds** contains advertisements which can be freely added by the users and enlisted per item category or services. Within **clubs** a special sub-community of users is formed based on the same cluster registration, in which members can interact with other users of close interests on common issues. The **online users** tab, shows the available online users from where their personal page can be accessed.

### 4.2.5. ACTIVITY TAB

All user activity can be monitored on this tab. Unread content can be easily located and accessed together with content started or last formatted by the user. Also the user **leaderboards** can be viewed in this section which show the ranking of the users based on the reputation points and their activity. Leaderboard is associated with both with social incentives as well as entertainment, since it includes the notion of competence and is presented in an incentive way (see section 2.6.2).

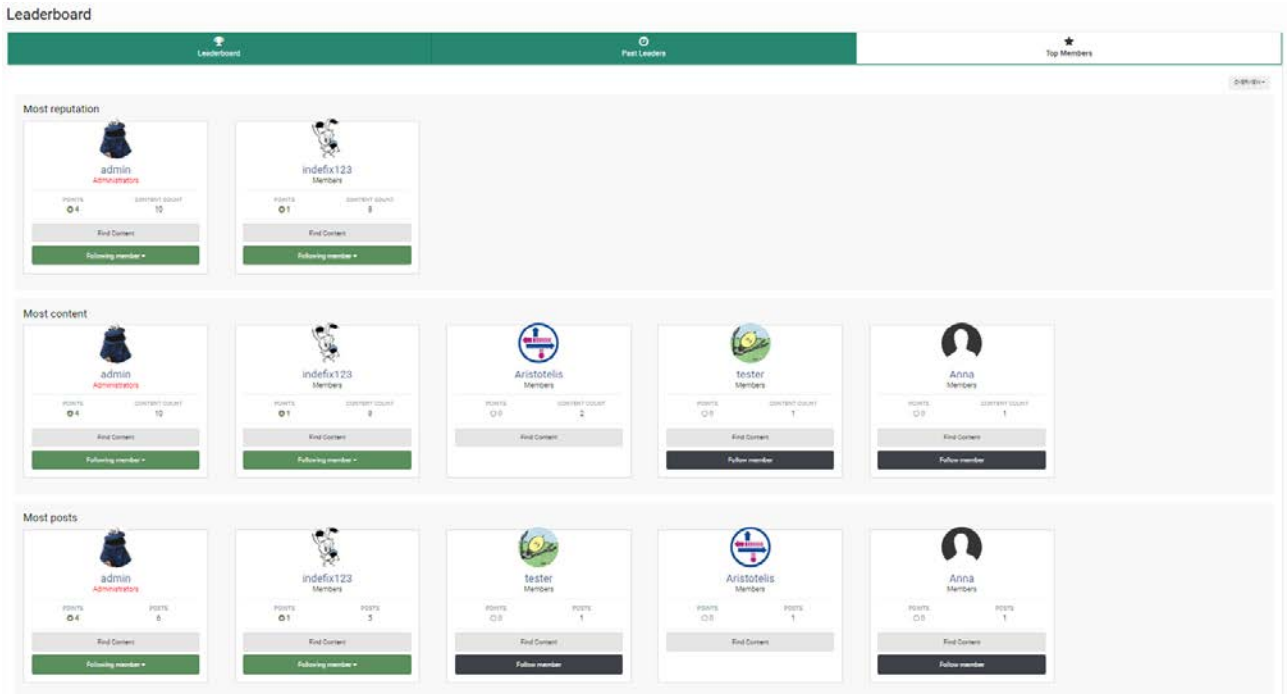


**Figure 16: User Forum Leaderboards**

The leaderboards are actually more than one ranking table that includes scores in a variety of areas (based on posts, reputation, reviews, etc.) or combined (that take into consideration all factors together). Also leaderboards exist to present a short history of leaders and that's why there are different tabs showing current leaders, past or all-time top members.

### 4.2.6. USER PERSONAL CONTENT PAGE

This page can be accessed by the top right corner and takes the position of the sign in/ sign up function as soon as the user logs in. The user can see any information regarding his/ her personal activity on the forum, the awarded points and badges, can gain quick access to recent activity (posts, polls, other discussion, etc.), upload attachments and manage all account settings.

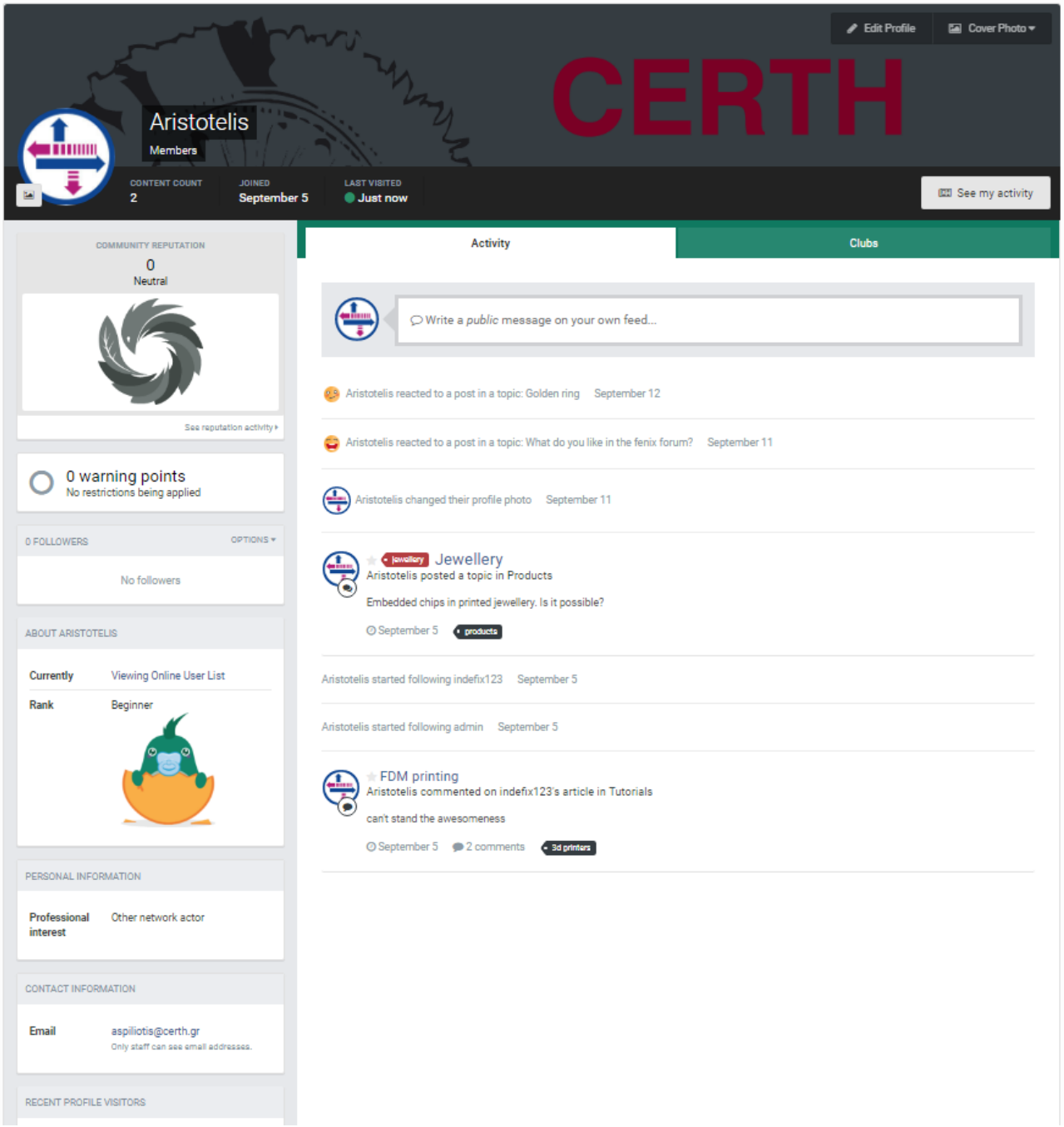


**Figure 17: User personal profile page**

In this page the user can also manage the followed content and users.

Through the account settings option, the user can adjust all kinds of notification settings, edit his/her profile and manage ignored users. FENIX account can be easily linked to other popular social media accounts of the user, in order to share content from one platform to the other.

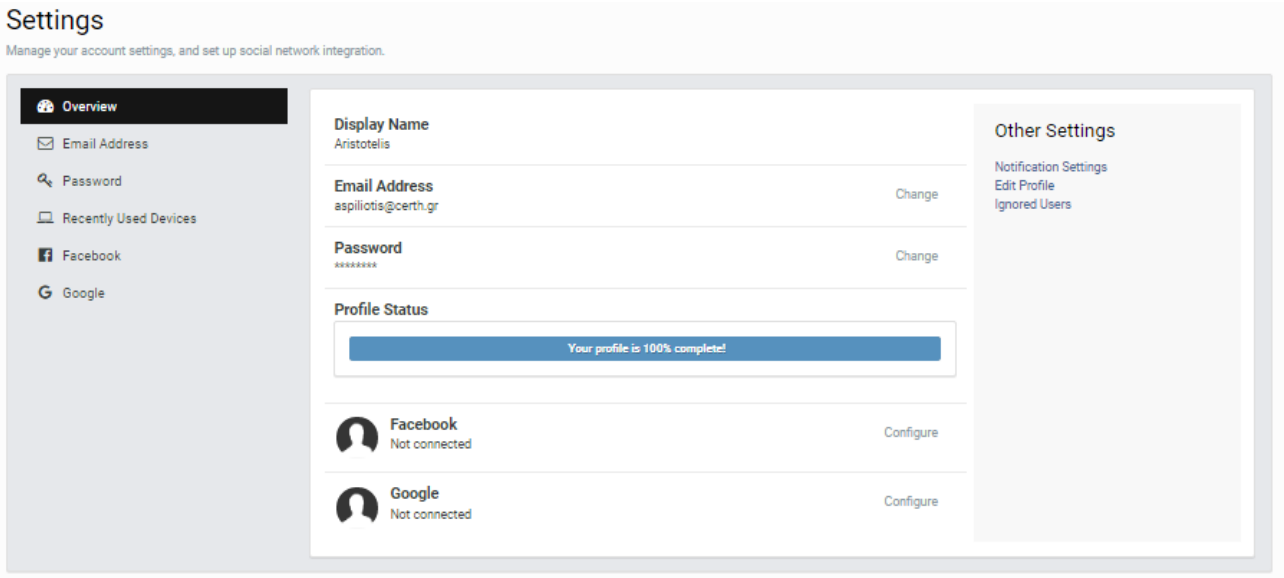


**Figure 18: User Forum account settings**

Another feature of the Forum which can be edited from this panel is the managing of the followed content. Members are given the ability to follow other users, articles, categories or forums in order to build up and gain easy access to a personalised content based on their preferences.

### 4.2.7. NOTIFICATION AREA, MESSAGES AND REPORTED CONTENT

All inbound notifications are presented on the header section under the respective icon. By pressing the icon, all recent notifications unroll and an option exists to redirect the user to the notification area page. A similar process is followed for the personal messages by using the respective icon (mail). From the inbox page the user can view all messages (inbound/ outbound), add folders, send new mails and manage the existing. Messages can even include more than 2 participant members in the form of a discussion.

The reported content is a function available only for the moderators and provides relevant notifications in real time and has been developed to operate in accordance with the principles described in §3.3.2. The moderation site allows these users to take actions related to the content:

- See reported content and recent warnings
- Manage members
- Make use of IP tools
- Delete/ hide content
- Check status or profiles
- View and manage topics, posts, comments and article reviews
- Review products located within the classifieds section

# 5. FENIX MARKETPLACE APPLICATION

FENIX Marketplace is planned to be developed within task 5.2 and is intended to be a very powerful tool which will host many of the proposed CS mechanisms described in §3.6 and will serve as core functions of the project. It is the 2nd online tool after the User Forum, which again will be hosted on CERTH's servers where all the main operations will be performed. The platform will in reality consist from a number of combined applications functioning under the same interface. The name of the application may vary until the application is done, as this multidimensional tool supports multiple functions and should not be confused with the shopping platform where all purchases are performed and which is also called ''Marketplace'' (see 5.2).

Main platforms are:

- **The Marketplace**
- **Showroom**
- **User Management page**
- **Customer's Generated Content (value)**
- **Open Innovation Platform (OIP)**

which are accessed through a **Central Page** and assisted by a number of applications and sub-functions that operate horizontally, such as the data mining application which identifies and processes data on all databases.

The developed User Forum and the Marketplace (to be developed), will use responsive web design principles to automatically resize, hide, and shrink the website to make it fit its contents on screen on all devices (desktops, tablets, phones).

Note: as the marketplace design is still under process, its layout and graphical design (presented in the following images) might need to be slightly changed during the course of the project, in order to achieve an optimal result.


**Figure 19: Interrelationship of the platforms forming the Marketplace application**

Hence, the user is going to navigate within this application in the following structure:

**Central Page**

→ **Marketplace**
- Main page where all services and items for trading are presented
  - By selecting an item, a separate window shows all information about the item and has links to subfunctions:
    - Complete payment
    - Initiate Bargain process
    - Initiate optimised order
    - Share or like content on social media
    - View other user personal page
      - Contact user/ manufacturer/ seller
      - Info about the user/ manufacturer/ seller (reputation, rating..)

→ **User Management Page**
- Main profile page with information and links to the following sub-functions:
  - Profile information (reputation, ranking, etc...)
  - Followed content or users
  - Notifications
  - Mailbox
  - Account and payment settings
  - Upload content
  - Selling bench (quick view of tradable items and services)

→ **Customer's generated content**
- See all content produced by other customer's. When choosing an item a window similar to the Marketplace shows information about it and has the following links:
  - Complete payment
  - Initiate Bargain process
  - Share or like content on social media
  - View other user personal page
    - Contact user/ manufacturer/ seller
    - Info about the user/ manufacturer/ seller (reputation, rating..)

→ **Showroom**
- One main page that presents the ''best of'' all items, services or user activity in the Marketplace. Leaderboards and rankings are produced instantly based on user preferences and filter applicability.
  - Can see item/ service information page
  - View other user personal page
    - Contact user/ manufacturer/ seller
    - Info about the user/ manufacturer/ seller (reputation, rating..)

→ **OIP**
- Task page
  - Active Tasks
  - Finished Tasks
  - Add/ create Task

## 5.1. CENTRAL PAGE

The central page introduces the user to this web ecosystem and provides a short info about the functionalities and operation of the available main platforms. The presentation of the main platforms is in circular order to represent the adapted business model and the interrelationship of all these functions.

**Figure 20: Central page of the Marketplace**

As the user scrolls the mouse over the circulated platforms the icon will change and a small text box will appear that will present basic information about the selection.

## 5.2. MARKETPLACE

This platform will host the financial interaction among all FENIX stakeholders and support the ''*Main and secondary market*'' tool as described in §3.6.3. A draft graphical presentation is shown in Figure 21. The interface comprises of a list of products either new or second hand and services offered within the FENIX business model. Several filters will be available as an option for the user to apply his/her particular search preferences (product or service, new item or second hand, sorting order by newest, price, popular, etc...).

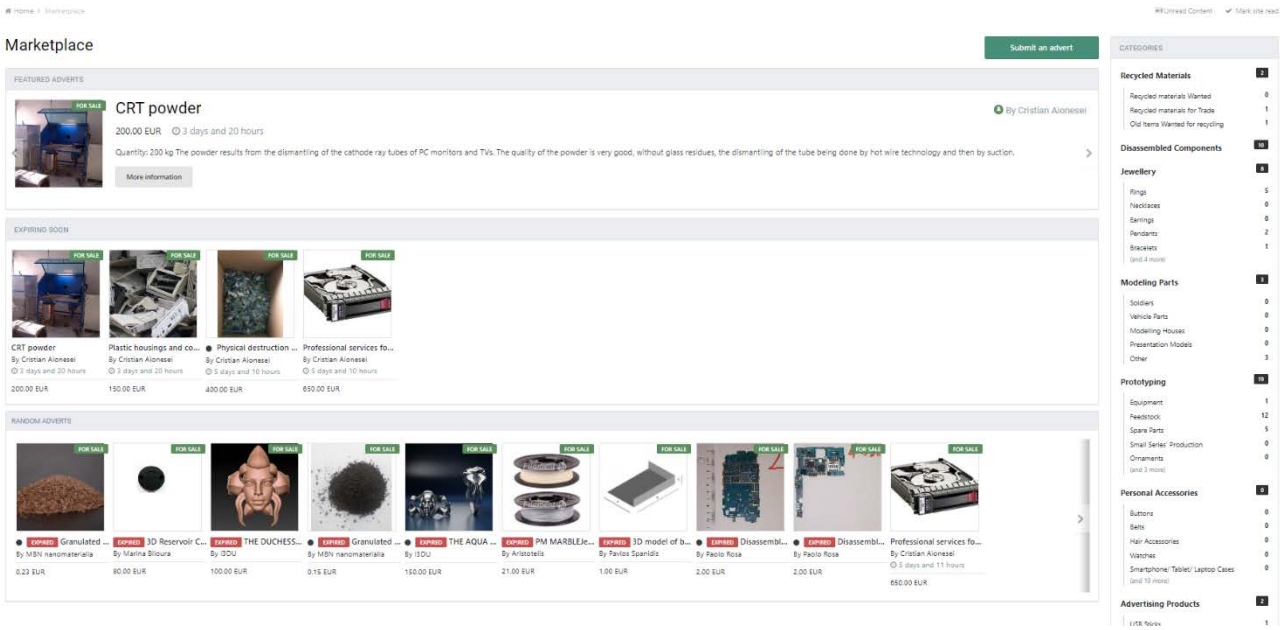


**Figure 21: Main trading market window**

After choosing a specific item then a minor window will pop up to include next steps and/ or initialise horizontal functionalities. For example, after choosing the desired item or service, the user can either proceed to the purchase or initiate the ''*Optimising Demand-Production*'' sub-function, with which can set a timeframe in which other users can express interest to participate, in which case when the deadline expires the order will automatically be activated and send to the manufacturers.

A special feature option after the selection of a product will be the ''*bargaining process''* which applies to transactions among users (seller - buyer). When this option is selected, the prospective buyer sends a price as a counter-offer to the assigned one on the product/ service. The seller can then accepts the offer, decline it and send another counter offer or decline and stop negotiations. This process can be iterated until any of the 2 parties' choses to terminate it.

## 5.3. SHOWROOM

This will be the place where all the evaluated services and products can be displaced in ranking order, the best of which will occupy prominent and distinguished positions on the screen. There will be many ranking tables available for presentation using a filter. Rankings will also be formed for users, similarly to the *Leaderboards* in the User Forum, that will show the most active, productive and quality contributors. This platform is intended to serve the ''Product-Services evaluation'' tool (§3.6.4) together will the User Management Page (§5.4).

## 5.4. USER MANAGEMENT PAGE

On this platform the user can view/ edit profile information, link the account to other social media to share and exchange content (in accordance to the aim set in §3.6.8), enter the mailbox services, configure payment methods and upload items or services that he/she wish to trade in the platform. Also on this page all initiated sub-functions by the user will be accessible for review or editing, such as *''bargaining processes''*, *''optimising demand-production''* or check the evaluation points given. Mailbox will support all communication between members and allow attachments of a certain limited size.

On this section, the user can also upload his/ her own generated content such as designs, which can be offered through the **Customer's Generated Content** platform (§5.5) or add tradable items (second hand) which will be shown in the **Marketplace** (§5.2).

Another available feature will be the reviewing of previous purchases made by the user, which can then be evaluated[1].

In this section it is also possible to register one or more bank account details for the payments received from any effort contribution (upload content to the **User Generated Content** database or participate in the **OIP**).

## 5.5. CUSTOMER'S GENERATED CONTENT

In this platform all the uploaded content by the users will be available and presented in a handy way so that member's content can be easily retrieved from the respective database. Any means of value co-creation by the users will be concentrated here, but it has strong links with other platforms too. Part of the **Showroom** will be dedicated to present best practices uploaded in this section, to provide the entertainment and social incentives identified in §3.6.1.

Users have a direct financial incentive to participate and upload their own effort. Designs, for example, can be chosen by other members to be used by nearby manufacturers to produce the desired item. In that case the owner of the design will receive the amount that he had pre-assigned for this specific design.

It differs from the **Marketplace** platform since here there are no go-around products on the market. Materials or immaterial work or services are solely user generated.

## 5.6. OPEN INNOVATION PLATFORM

This platform will host the tool of the OIP described in §3.6.9. The screen will list all task competitions, active and finished, which can be sorted based on user's preferences.

[1] Products and services can be evaluated only after purchase to ensure the validity of the rankings. Evaluation differs from identifying fraud/ fake advertisements which can be indicated by issuing a flag (see §5.7).

**How it works:**

Any user or company can create a new task by pressing a single button which opens a new window. In here the task provider will chose a title for the task, provide a small description of the required/ expected work, set the timeframe for contributions deadline, set an attractive price to attract contributors and if deemed necessary, a limited size of documents. After activating the task, it can be cancelled without a penalty within 2 days, otherwise the user will be subject to deduction of reputation points. Repeatable actions that lead to deduction of reputation points will be flagged and monitored against scam/ fraud activity. The rewarding price can be shared among users, but in any case the number of winners to share the price should be predetermined by the provider of the task from the beginning.

In the active tasks section, the user can view and participate in any of the running tasks, by simply declaring his/her participation and making sure to submit the contribution within the time frame indicated by the task provider.

In the finished tasks section, the evaluation phase and the proof of concept output will be visible to all users for the sake of greater transparency. The evaluation phase will be presented in rankings with reference to the score.

## 5.7. OTHER HORIZONTAL SUB-FUNCTIONS/ PROCESSES

A number of functions will operate horizontally, in the sense that they serve general application needs applied at all levels. Below follows a small description of these processes and the expected general specifications to be developed in Task 5.2.

### 1. Decision Support System (DSS) interoperability function

This function will be developed in accordance to the digitalization of operational processes to be defined in Work Package 4 (M12-M24). The DSS will be connected through sensor networking and data fusion mechanisms and output data will be essential for the whole project, some of which for the Marketplace application in particular. The DSS will have the ability to ''communicate'' with Marketplace and exchange information such as item or production availability, but also customers order through Marketplace will have the ability to initiate the respective plant production automatically. This mechanism, the communication with the DSS, can also exchange useful information for the analytic services in synergy or not with the Data mining process of the Marketplace.

### 2. Fraud/scam detection and product/services evalutation

Main crowdsourcing tool for scam detection will be a mechanism based on voting described in §3.3. Members can evaluate several aspect of their application activity such as:

- Quality of products and services received
- Other members generated content
- OIP evaluation process and ranking configuration

- Issuing of a flag for several occassions (inappropriate product of service, offensive user, etc.)

Issuing of a flag leads to the direct examination by the admins of the warning, who then take actions to ensure the smooth operation of the application. Very low evaluation points also result in the examination by the admins for possible inappropriate activity, e.g. task provider does not rank contributors ethically in order to avoid the fee payment.

### 3. Data mining and processing

This function will be used for the mechanism described in §3.6.7 that will be applied both to the Marketplace and the User Forum. To identify potential future business needs and keep all stakeholders satisfied, FENIX will need to receive feedback based on their actual preferences and actions. Firstly a suitable mechanism will be formed to collect these data, with respect to the GDPR legislation and this will be done by saving anonymous information for all purchases that take place within the Marketplace (which items sell in what numbers, etc.) but also to identify users searches and most debated products/ services. Identifying searches can be done by several methods, but for the purposes of FENIX, an anonymous mean will be chosen that will extract specific keywords from the search boxes (user forum and marketplace) but also from the free text content (mainly the User Forum) and the conversations that take place between members[1].

Information about purchases that take place in the Marketplace can include *time*, *kind*, *number* of *pieces* and *price* paid. Using analytics this database can then be translated into useful information about market trends and customers' preferences and feedback.

### 4. Social media

The User Forum already has the provision to link social media accounts to the application to share content, activities, liked content, etc. Marketplace does not have such fields to exploit throughout social media but a similar function will be added to advertise offered services and products throughout this mean. This mechanism will either be functioning stand alone in the Marketplace, or work in conjunction with the user forum through the classifields section.

### 5. Optimising demand – production

Every time the user is about to finalise a payment, there will be an option to initiate this sub-function. When initiated, the user will choose the desired time frame after which the order will automatically activate. Active orders with time offset will be visible to other users and allow them to participate within the deadline (see §3.6.2)

[1] It should be noted that the mechanism will not monitor and record discussions and personal information of the users. Only keywords and an estimation of the reported area will be saved.

## CONCLUSIONS

This deliverable was intended to identify, based on the current literature, all these mechanisms and the ''addictive'' stimuli that can lead to customer engagement/ involvement together with the **corresponding behavioural manifestations**, coupled with specific means of **CS** which are favourable within the project. These stimuli can be enabled by either **extrinsic** or **intrinsic** personal motives which are in turn enabled by **social**, **entertainment** or **economic** perceived relationship benefits. The aim of the above is to enhance the participation of customers and end-users in the processes of FENIX, prove their important role in the operation, promotion and development of the project and demonstrate -in practice- the broad benefits that can be derived for similar economic models.

Having defined the appropriate CS mechanisms and the respective influential incentives, two powerful tools are presented which will accommodate all the necessary functions, the **User Forum** and the **Marketplace**. The User Forum has already been developed and its purpose is mainly connected to the formation of an **online community**, supporting free text content for general troubleshooting and to generate a greater social activity and hence strengthen bonds between members. On the other hand, the specifications of the Marketplace application have been established, which is intended to support the economic interactions between stakeholders (B2B, B2C, C2C) and form a mean where CS is used to contribute positively to the business outlook of the project.

With the completion of the User Forum and the identification of all the main tools and specifications to be implemented in the Marketplace, task 5.1 has come to an end. Task 5.2, subsequently, has started with the graphical development of its core platforms as described in §5 and will continue with the software implementation that will make up the front-end interaction of the user with the FENIX ecosystem. In the process of this development all the aforementioned mechanisms will be included and necessary configuration will take place to support the operation of the DSS.

## ATTACHMENTS

Are not included.

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