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Food Chain Innovation: Reviewing 35 Use Cases to Identify Business Model Success Patterns

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ABSTRACT

A team of 8 organisations from Belgium, Germany, Hungary, Italy, The Netherlands and Turkey supported over 40 teams and preferably startups to realise food chain innovations. Over a period of 2 years, a programme was developed and realised to select and support teams from the ideation to the commercialisation phase. The teams were usually working in close collaboration with a business partner, were supported in the usage of reusable software components for Internet based solutions and got direct assistance to address potential customers especially in the area of fruit and vegetables.

Embedded in a larger initiative with use cases from different business domains, a set of metrics was developed to assess the teams and solutions that were characterised by different maturity levels, size and market potentials. The objective was to rank the teams for being able to focus support on the best performing solutions. Subsequently, it was discussed, if there are potential success patterns that could help to assess team performance at an earlier stage and possibly facilitate the forecasting of potential investment risks at an earlier stage. Finally, the objective is to use those results for being able to analyse and technologically assist future use cases that are currently set-up in the scope of a Large Scale Pilot initiative. The objective is to use the results for facilitating future selection of food chain innovations that could complement the set of 19 use cases currently being developed.

Keywords: *Food Chain Innovation, Startups, Use Cases, Business Models, FIWARE, Future Internet*

1 Introduction

The ongoing trend in Europe, the US and Great Britain to decrease the key interest rates even below the inflation rate challenged private and corporate investors to find appropriate investment opportunities. A promising investment alternative are young and innovative companies – so called startups – that are developing new products with reasonable profit margins and high growth rates. They are usually pitching their ideas in front of investors and are supported by a growing industry of e.g. business angels, accelerators, incubators, mentors, co-working spaces as well as public programmes for founders.

Depending on the maturity of a startup, investors as well as potential business partners are offering risk finance, while taking equity in return. Investors are following different strategies like offering basic financial investment, building partnerships, searching for fresh ideas, finding new teams or offering an exit to the founders to overtake the business accordingly. However, investors are analysing potential risk and success factors that could facilitate investment decisions as early as possible also facilitating mentoring of teams. This was also true for a consortium of 8 organisations located in Belgium, Germany, Hungary, Italy, The Netherlands and Turkey that aimed at the support of teams that will realise food chain innovations. During an initiative that lasted around 2 years from mid-2014 until last quarter of 2016, over 40 teams were supported, while analysing their performance and results as presented at FInish (2017).

This was realised as part of an initiative called 'FIWARE' that was co-funded by the European Community's Seventh Framework Research and Technological Development Programme, while it was specifically aimed at food chain innovation as well as realising solutions that are making use of new Internet based information and

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communication technologies (ICT). Those teams were mentored from a business and technological perspective, providing access to potential customers as well as helping to make use of new Internet based technologies provided by the FIWARE Foundation, using the so-called generic enabler, offered via the FIWARE (2017) catalogue.

Finally, the teams were assessed with different types of key performance indicators (KPI). This helped to rank the teams with respect to their developed business models as previously outlined in Sundmaeker (2016a), technology usage and team performance. Within this paper an overview of the approach and analysis is presented, aiming at correlating realised (positive) results and related business models for being able to analyse and technologically assist future use cases that are currently set-up in the scope of a Large Scale Pilot initiative, called Internet of Food and Farm 2020 (IoF 2020). This initiative is specifically looking for use cases with solutions that are making use of Internet of Things (IoT) based solutions in different agri-food sectors.

As outlined in Sundmaeker (2016b), it is expected that farming and food will be transformed into smart webs of connected objects that are context-sensitive and can be identified, sensed and controlled remotely. This is expected to change agri-food processes in unprecedented ways, resulting in new control mechanisms and new business models.

2 Background

In the scope of the EU funded FIWARE initiative, the international team was realising the FInish (spelled “finish”) project for accelerating the development by selected teams. It was supporting startups and small and medium sized enterprises (SMEs) that were proposing the development of new software applications that are utilising FIWARE technologies.

This resulted in the development and operation of FIWARE based solutions for dynamic supply chains of perishable products and especially food and flowers. Therefore, envisaged developments were addressing the domains of agri-food supply chain, transport, logistics, food manufacturing/processing and retail of food/flowers. Potential synergies with other fields such as smart cities, health awareness and/or multi-media were also welcome and supported.

The FInish accelerator was aiming at sub-granting ideas that had a clear business impact. Therefore, proposers had to identify and clearly outline the business needs of user communities and creative ideas & technological opportunities for the software developing startup or SME.

To facilitate the provision of software services to a critical mass of developers and end-users, FInish promoted the usage of FIWARE technology. At the same time, it was aimed at realising solutions for seamless B2B collaboration of end-users and related companies. This included startups, SMEs and new players to set up and participate in new regional, horizontal and vertical collaboration quickly and at minimal costs. By supporting this, the objective was to promote an impulse to the shift from cost-driven to value-based, information-rich supply chains, which will significantly increase the benefit, competiveness and sustainability for the domain as outlined in Sundmaeker (2016c). More specifically, it was aimed at the following:

- Empower small & innovative ICT players to develop high-quality and high-impact solutions for food and flower supply chain networks using FIWARE technologies.
- Develop a large set of innovative and technologically challenging services and applications for virtualisation, connectivity and intelligence of food and flower supply chain networks.
- Implement and validate FIWARE technologies and concepts.
- Support SMEs in creating high-impact applications and helping to market their apps cross border in specialised EU markets and beyond.
- Ensure business value of services/applications for collaborative business networks in food & flower business networks.

In total 58 software developing companies were supported with some 4.8 Mio Euro that were involving some additional 68 business partners for system development (i.e. involving 126 organisations in total). In its two major open calls, the teams were involving on average 1.4 organisations that were supported on average with some 98 kEuro. The business partners were providing some additional in-kind contribution in terms of budget or person efforts of nearly 1.4 Mio Euro in total. In a smaller third open call, four teams were supported on average with 32 kEuro. On top of that, FInish awarded prizes in the scope of competitions (e.g. Net Futures FIWARE Challenge, FInish Italy Challenge, FInish Food Safety Challenge) with some 150 kEuro as well as awarded the best teams in total with some 190 kEuro.

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3 Methodology

The project FInish designed an acceleration approach, which was based on several phases to identify, select and support teams that are aiming at the development of innovative solutions. The acceleration approach had to consider several aspects. On the one hand, the EU funded FIWARE initiative provided the technological and financial prerequisites to aim at the development of innovative and potentially high-impact solutions utilising FIWARE technology towards the realisation of a "Future Internet". An outcome would be the testing and validation of those enabling technologies, and facilitation of their wide and global uptake, also realising an open source community. On the other hand, it was necessary to take the rather limited amount of budget and time into account that teams supported by FInish (and the other 15 FIWARE accelerators) had to realise their solutions.

The acceleration approach was structured in 6 steps. Within the initial analysis & advertisement phase, FInish initiated contacts with both solutions providers and end-users. This helped subsequently to match teams with potential end-users as well as to coach the teams with respect to the characteristics of the agri-food sector. After preparing open calls for proposals, those were promoted internationally and specifically by the 8 project partners and their regions. In the scope of different open calls (i.e. three larger international open calls and several competitions for new and the existing teams) teams were asked to outline their ideas that were evaluated by independent evaluators. After selecting the best proposals, the main phase supported the teams with business and technological mentoring. Finally, the teams were supported with additional marketing related support and activities that also helped to initiate contacts in the business sector.

The evaluation of proposals was analysing the proposals with respect to their business potential, the technological excellence (i.e. including the team) and the envisaged usage of FIWARE related technologies. Those criteria were further detailed for the evaluation, while specifically the relevance of the solution for the business sector was considered most important as well as the usage of FIWARE enabling technology, as the idea was to test the usability of FIWARE and to improve the enablers along the FIWARE initiative.

As outlined above, the teams were supported by an international group of mentors. They were regularly assessing the latest status, while specifically looking at KPI with respect to the addressed market and business model, the envisaged impact (i.e. economic, environmental and social), financial parameters, the team performance, solution usability and the technology. Usually, the mentors were assessing the teams in a monthly cycle with key milestones for the kick-off, at mid-term and the end of the planned course of realisation.

For all the larger projects, there was a final assessment at the end of FInish. The mentors and a team of external evaluators assessed the teams based on their past performance and the realised final results. The objective was to answer the following questions:

- Solution: Now that the project has ended, has the team managed to develop a working solution?
- Value proposition: Is the developed solution something that actually helps the targeted users (reduces effort, fills a need, etc.), also taking into account the feedback of the team's business partner?
- Business model: Does the solution and associated business model have the potential for future business success and growth, and has there already been success/growth during the project runtime?
- Exploitation capabilities: Given that the solution has the chance for future business success and growth, is the team visible to potential customers and is it able to attract new customers?

For assessing those aspects, especially the following groups of KPIs were assessed for each team:

- Minimum Viable Product (MVP) with Product/Service-Market Fit:
  Is the solution (product/service) viable, i.e. is it possible to use it operatively for the intended purpose, even if it has shortcomings or functionality is partly missing? To what extent have the intended features of the final product/service been implemented? Given there is an MVP, does it fit the in-tended market?
- Usability/user experience:
  The best solution with respect to provided functionality will not sell if the intended users do not want to/cannot use it because of bad usability/user experience. Using the solution must be intuitive and must not cost more time and effort than using an established solution.
- Quality of business model:
  The project must maintain a business model (business model canvas) and adjust it according to current stage of the project. The business model must fit the intended product/service as well as the associated market. In addition, as the project matures and gets traction, it will (most likely) be necessary to adjust business aspects such as revenue streams, channels, cost structure, etc.
- Growth potential:
  What growth potential does the project have taking into account its business model, technological aspects and targeted market? Is the intended market large enough? Is it already saturated? Are there factors (e.g. increasing need for infrastructure, work force, business plan not scaling) that would limit growth? Regarding

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the number of users it needs to be carefully analysed which type of users we are talking about. Are they paying at all, once, or is there is a continuous revenue stream (e.g. via subscription)? The question is whether the company can make a living from it, now and in the future.

- Composition of the team:
  Does the team cover all competences/expertise (e.g. typical roles: designer, programmer, exhibitionist) required for successfully implementing and selling the intended solution? Can the team pre-sent themselves, the problem and their solution (i.e. product/service) in a clear, structured and credible way? All key positions need to be covered. The designer has to define a product the market/customer wants (including usability and user experience), the programmer has to implement it (while making good use of state-of-the-art technology), and the exhibitionist has to make noise and sell the product/service to investors and/or customers.
- Presence of a team:
  How does a team let the rest of the world know about its existence and what it can offer? E.g.: own website, via partner websites, flyers, YouTube, Facebook, fairs, conferences, etc. Does the material raise curiosity and attract (possible) customers? Is the material clear, that is, does it provide the big picture of what the team and their solution is about? A team that's "invisible" to the rest of the world has a hard time finding customers. This aspect has to be assessed taking into account the current stage of the project. Start-ups might be in "stealth mode" on purpose when developing their product so as not to reveal their ideas to the competition too early.
- Revenues:
  What is the turnover/month of the developed solution? Does it pay the team or generate profit?

On top of that, FInish carefully analysed the technological realisation, also highlighting the quality in using the FIWARE enablers. This also helped to identify potential showcases for this new set of technological enablers.

4 Realised Business Models

4.1 Type of realised activities and provided support

The project FInish realised different activity types that were all dedicated to a specific purpose. The type of activities are presented in the following:

- Several international events to present, assess as well as to award specific ideas and concepts for food chain innovation. Finally, some 16 teams were awarded with some 22 k€ of prizes, especially to cover costs for travelling and attendance.
- 2 competitions finally selecting and inviting some 14 software developing teams to personally present their ideas and concepts for food chain innovations, making use of FIWARE technology. The teams were awarded with some 96 k€ to encourage and enable the teams to realise their envisaged solutions.
- 35 use cases selected in the scope of 4 open calls. The use cases were realised by 44 software developing organisations, each teaming up with at least one business partner (i.e. 68 business partners in total). In average those use cases were supported with some 136 k€ each.

Therefore, those activities involved in total some 142 teams/organisations, while 8 of the 30 teams that were joining the events or competitions were also involved in the realisation of the use cases.

4.2 Classification of supported business models

As outlined above, different type of activities were accomplished to initiate the development of ideas, concepts and solutions. However, the main focus was upon the realisation of use cases (i.e. 97.6% of the provided financial support for third parties). Therefore the review of use cases is specifically focusing on the 35 larger solutions and neglecting the other 30 potential use cases presented, since the latter were in the ideation/ conception phase and it was assumed of being not possible to derive a valid KPI assessment that is required to identify potential business model success patterns. Finally, those 35 use cases were classified according to specific types of business models. As outlined in Sundmaeker (2016a), the main business model areas were grouped as follows:

- E-Business and Marketplaces
- Fish chain related applications and Aquaponics
- Data Access and Discovery
- Monitoring and Sensor based Solutions
- Transport & Logistics

There was an even distribution of business models over the different groups. Only the fish chain related applications were represented by just three projects. Those business models were further detailed with respect to the specific solution characteristics. As presented in Sundmaeker (2016a) the solutions were further detailed with

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respect to the purpose in relation to the provided features. At the same time, there are solutions that are combining different aspects like regional marketplaces that are offering features for optimising transport and logistics to facilitate the last mile delivery as well as to reduce related costs and efforts. Those combinations of features specifically provided business benefits that served an argumentation towards an environmental impact and a sustainable food production. The teams highlighted their impact on a potential reduction of food waste, minimisation of the CO2 footprint and the transparent provision of supplies.

5 Assessment of the supported Use Cases

5.1 Assessment by business model areas

Each team realised a specific use case that was categorised in accordance to the different business models. For each of those teams, the mentors assessed sets of KPIs in accordance to the needs of the related project phase as explained above. To facilitate an overall analysis of the supported use cases, the KPIs were compiled in three groups - business, technological and team performance with a subset of the overall amount of KPIs that were monitored by the mentors:

- Business included the KPIs availability of MVP, usability, business model quality, growth potential, number of customers and revenues.
- Technology included the KPIs number & complexity of used FIWARE generic/specific enablers, appropriateness of FIWARE usage and quality of implementation & configuration (correctness).
- Team included the KPIs team composition and presence of team.

The following Figure 1 presents the overall results of the supported teams, grouped by types of business models.

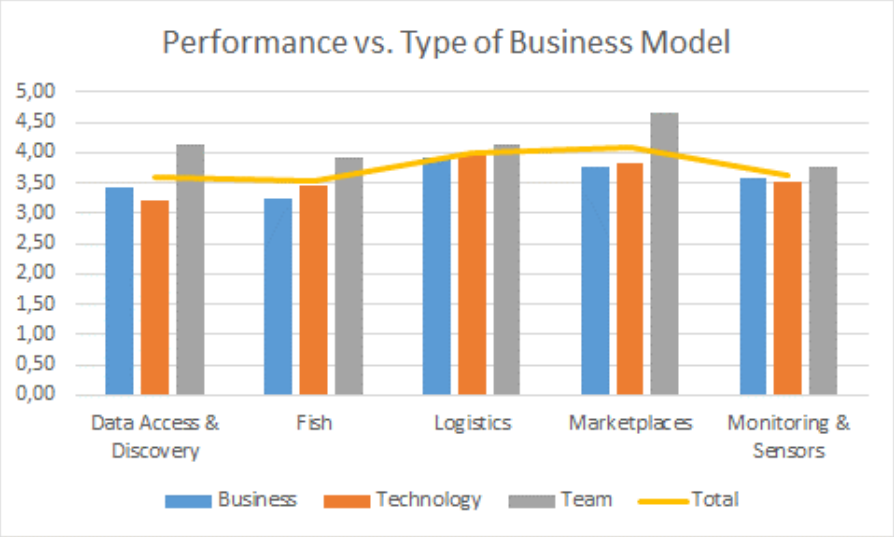

Figure 1: Average performance of the use cases in relation to the addressed business models.

For all business model types, it was observed that the team performance was usually assessed at a higher degree compared to the business and technological performance. Especially for marketplaces, the team performance seems to clearly over-perform the other use case performance indicators as well as being better than for the teams addressing other business model types. This might be obviously related to the need that the realisation of marketplaces are naturally connected to a sales perspective and the team members usually also capable in selling their ideas and results to the mentors.

Especially for data access & discovery, the business performance seems to be usually better than the performance with respect to the realised technology. This might be due to the fact that the business value of making data available is considered by a majority of teams more important than the selected technology deployed for the purpose. There is a slight similarity for monitoring & sensors what could confirm this assumption, while this business model has usually a stronger focus on technology like IoT based solutions that are still requiring further work and innovation. However, the best team for data access & discovery is rated better for the used technology than the business aspects what also confirms the need for a proper usage of the technologies. The average values for logistics are characterised by a quite similar performance and an overall better performance than the other business model types. When grouping the results and just looking at the use cases that were assessed with a 4 as minimum, the following type of solutions can be identified:

- E-Business and Marketplaces

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  - Enabling an easy access to a wide range of regional and organic food.
  - Connecting small local farmers and producers with local customers.
  - Platform for managing local and dynamic delivery structures that are matching offer and demand.
  - Enabling online trade and purchase for small businesses.
- Data Access and Discovery
  - Monitor trends of issues and its handling in the supply chain.
- Monitoring and Sensor based Solutions
  - Facilitate the tracking, monitoring and tracing of shipments and specifically the individual products.
  - Secure environmental conditions and reduce costs for last mile deliveries especially of cooled products.
- Transport & Logistics
  - Coordinating last mile delivery.
  - Real-time monitoring of shipments for different stakeholders along the food chain.
  - Sealing and monitoring objects like containers or cars that allows the identification of unauthorized access

5.2 KPI assessment for the best performing teams

The analysis as presented above, grouped the assessed KPIs in the categories business, technical and team performance to facilitate a comparison of the use case performance. However, those groupings combined KPIs that were assessed individually. Therefore, to identify potential and more specific business model success patterns, the idea was to analyse main KPIs for the best performing teams that were analysed by a group of individuals that were working either directly in the project FInish as well as external experts that are active in the area of FIWARE based solutions, are experienced in agri-food as well as are knowledgeable about startups. The following Figure 2 presents those KPIs for the best 6 teams (17,6% of the larger projects selected in the main open calls) ordered by the performance rating. Also the accumulated KPIs for the remaining teams are presented in Figure 2. This shall facilitate the discussion of results and to analyse if one can identify major differences.

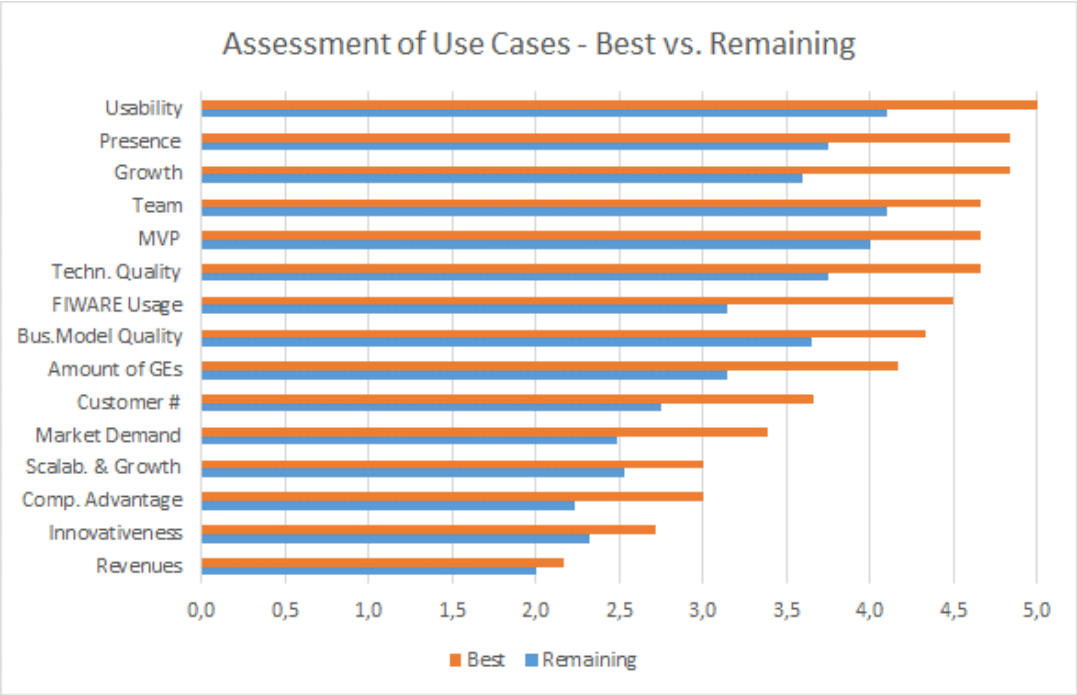

Figure 2: Average assessment of main KPIs for the best performing teams compared with the remaining teams.

The objective is to use the KPI ratings to identify business model success patterns, assuming that the KPI comparison with future teams can help to facilitate the assessment whether the success rates of a future project can be rated positively. The KPIs as listed in Figure 2 are discussed in the following, while the results are presenting the assessment of 26 use cases out of a sample of 35. Eight use cases were excluded at an early stage from this discussion, though realising solutions that are appreciated by the envisaged end-users with respect to the expected features, while the degree of food chain innovation was assessed as rather moderate by the related mentor. One use case as part of the final activities in FInish was still under development and it would not have been reasonable to assess it in the similar way as it was just presenting its first prototype lacking valid experience in daily usage with the business partner. The following discussion is also listing the average rating for the best versus the remaining teams.

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- ***Usability/user experience*** [5.0 vs 4.1]
  The usability can be considered as a key factor for potentially successful projects/solutions. All of the best teams scored at maximum. When comparing this with the other solutions supported in the scope of FInish, usability was also the best assessed KPI for all others (i.e. 4.3). Therefore, this can be considered as a key lessons learnt to look for the usability of the provided or envisaged functionality, facilitating an intuitive usage. Of course, in the ideation phase when starting the realisation of a use case, it is obviously difficult to assess the usability. Therefore, one shall consider this as a kind of regular quality gate in upcoming use case reviews and funnelling steps with the related pitch sessions.
- ***Presence of the team*** [4.8 vs. 3.8]
  The presence of the team was continuously experienced by the mentors as there were regular contacts, activities and interactions along the realisation of the use case. Especially the best performing teams were making use of any opportunity/event to attract interest for their solution, to get in contact with potential customers as well as to initiate synergetic collaborations with other teams. They were rather asking for help than waiting for support. The teams elaborated attractive and appropriate material that enabled a proactive style of communication and were initiating communication with potential partners. This KPI can be correlated with their intrinsic motivation and commitment to address challenges and make use of opportunities, what could not be observed in this degree for the remaining teams.
- ***Growth potential*** [4.8 vs. 3.6]
  Compared to presence of the team, it got a similar assessment for the best performing teams but even a lower one for the remaining teams. This KPI can be considered as one of the reference indicators when assessing new ideas and concepts as this can be estimated based on the market characteristics, technological aspects and the business model. For the remaining teams it shall also be highlighted that despite this low growth potential, following KPIs concerning team, MVP and technical quality are rated even better. Therefore, it can serve as an early indicator for an effective strategy to make a successful use case.
- ***Team Composition*** [4.7 vs. 4.1]
  Also the team competency can be considered as a main success factor. Taking into account possibilities to analyse a team based on social media as well as a relatively simple and factual assessment of references with respect to past experience and education, it can be used in a very early stage of a startup. Even in the ideation phase it can serve as a quality gate to either trust in the competencies of the team or to stop further collaboration as one can assume that the team might not be able to thoroughly improve their idea or concept. At the same time, it is usually much simpler to pivot an idea or concept than to fundamentally change the shareholder/founder shares in an organisation or startup.
- ***Availability of an MVP with Product/ Service-Market Fit*** [4.7 vs. 4.0]
  An MVP driven implementation approach is following the lean startup methodology. The first step is to enter the Build phase as quickly as possible with a minimum viable product (MV). The MVP is that version of the product that enables a full turn of the Build-Measure-Learn loop with a minimum of effort and the least amount of development time as highlighted in Ries (2011). It is to validate the solution with respect to the customer expectations as early as possible while continuing in an iterative approach. The best teams were succeeding with this approach as it helped them to avoid wrong assumptions as well as to enable early pivots. When supporting teams, this can be used as a kind of guiding principle for managing the development. Besides the early validation, it also allows a direct interaction of teams and mentors to avoid misunderstandings and find new possibilities on how to mentor the teams (e.g. identifying the need to involve other stakeholders, refine the features, redefining customer segment, and change the architecture /technological enablers).
- ***Quality of implementation & configuration (correctness)*** [4.7 vs. 3.8]
  This can be considered as a kind of hygiene factor when realising a technology based solution. Taking into account the predefined requirement to make use of FIWARE enablers, it was also possible to analyse to which degree the teams were able to reflect very specific customer requirements as well as how flexible the team can react to specific technological environments and architectures. For assessing teams for realising future use cases, this factor can possibly serve when analysing their willingness to make use of new technologies and adapt to specific requirements. This can be also combined with the analysis of the team composition and their technical expertise to analyse their openness and flexibility.
- ***Appropriateness of FIWARE usage*** [4.5 vs 3.2]
  On the one hand, this was a very specific aspect of the FIWARE related initiative that supported over 1,000 teams in making use of FIWARE enablers. On the other, it clearly reflects the team's competency of being able to learn using new technological approaches and applying them most effective. Therefore, this KPI might be useful as a general indicator for technological appropriateness in environments were defined technological frameworks and enablers are offering potentials to increase efficiency as well as to reduce costs and efforts for the developers.

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- ***Quality of business model*** [4.3 vs. 3.7]
  When analysing the individual assessments of the best teams, half of them scored at maximum, while one was in the situation to pivot the model when assessing the status. A clear and defined business model, preferably as a business model canvas is considered as a prerequisite when assessing as well as mentoring a team. This helps to explicitly discuss the dimensions of the use case and future product. This can be used as an early KPI from the ideation phase on, while a good quality of the business model will help to facilitate a pivot and increase the effectiveness of the team itself.
- ***Number & complexity of used FIWARE enablers*** [4.2 vs. 3.2]
  This KPI corresponds to the interpretation of the appropriateness of FIWARE usage. On top of that, we identified a negative correlation of proposing the usage of a high number of external (FIWARE) enablers and the technological competency of the team. Since especially individuals with limited technological background were rather "selling the technology usage" than designing a proper architecture.
- ***Number of customers/contracts*** [3.7 vs. 2.8]
  There is a large gap of 10% (0.5) on the rating scale between this KPI and the others for the best teams. For a maximum rating, we expected a high number of paying customers and follow-up orders that are even generating significant profit. At the same time, the analysed use cases were all in a very early phase not yet able to widely commercialise their solution. Therefore, this KPI shall be considered on a more qualitative scale, analysing rather the type of customers/contracts (e.g. customer loyalty, length & amount of commitment, free vs. premium subscriptions) than the sheer number.
- ***Anticipated market demand*** [3.4 vs. 2.5]
  The majority of the solutions were realised in an B2B environment. It is usually tedious and requires significant effort to address potential customers. This is a challenging environment for SME type solution providers and specifically for startups as business customers are usually aiming at long-term collaboration and are often assessing teams with respect to their past performance. Therefore, the resulting assessment is rather considered as a characteristic of the business field than a pure weakness of the teams. However, the KPI needs to be carefully analysed for each team in combination with the business model to identify as soon as possible strategic business partners/ customers for being able to assure at least a reasonable start of activities, the availability of showcases and reference customers as well as to cover the basic fixed costs of the team.
- ***Scalability and growth potential*** [3.0 vs. 2.5]
  Most of the best use cases despite one, were assessed at medium level for the envisaged scalability. This is of course due to solutions that require a larger amount of expertise that is difficult to hire. Moreover, one needs to analyse the pure innovativeness of a solution compared to the envisaged probability to have high commercial success rates. Both models are considered as valid, while even some models with a mediocre scalability and growth rate might include significant unique selling points avoiding copycats.
- ***Competitive advantage*** [3.0 vs. 2.2]
  This needs to be carefully analysed for each team very individual. Since as soon as a team enters the market, there are a large number of small and large teams that might be able to simply copy the offered solution. This is specifically true for all software centric solutions, while hardware centric solutions might be protected by a patent. However, this KPI is rather considered as a supporting indicator that will help to design the go-to-market strategy.
- ***Innovativeness of the solution*** [2.7 vs. 2.3]
  As already indicated by the previous KPI, only few teams were able to come up with a food chain innovation that easily sells and can be thoroughly protected by related mechanisms (e.g. patents, algorithms). Therefore, this was also considered as an input to design the go-to-market strategy and the related timing.
- ***Revenues*** [2.2 vs. 2.0]
  The teams were assessed in a quite early stage of realising their envisaged product. In this stage, the best teams realised between 5 and 10 k€ revenue/month, not considering the financial support by the project FInish. This seems to be a typical characteristic specifically for startups, while this phase is also called "valley of death" or "hockey stick effect" that is rather difficult to survive, taking into account costs and revenues. Therefore, the revenue needs to be carefully monitored and has to be planned on realistic assumptions to not to mix strategic objectives with down-to-earth planning. Nevertheless, realised revenues with representative reference customers/contracts, even if there are only a few, can serve for a realistic planning and validation of the business model.

Having discussed all the best performing use cases in comparison with the remaining ones helped to identify the usefulness of KPIs in relation to the use case phase. Some KPIs are specifically capable to facilitate decisions in the early ideation phase, while others are profound tools to analyse the situation when mentoring a team and specifically startups. Especially the KPIs regarding the team, growth potential and the usage of an MVP driven

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implementation approach seem to facilitate assessing teams in the early ideation and conception phase. Generally the overall set of KPI can help to facilitate planning and refining the business model, while the experience with the supported use cases showed that the preparation of a business model canvas helped to communicate about the use case progress and to carefully refine the strategy.

6 Next Steps and Future Activities

FInish was part of the FIWARE initiative that directly supported approximately 1,000 startups, SMEs and web-entrepreneurs. Agri-food was a key business domain that served for the realisation and validation of use cases. The experience gained and lessons learnt will be used for realising a large scale pilot to experiment and validate the usage of IoT technologies. In the scope of the Internet of food and farm 2020 (IoF 2020) project, the objective is to realise 19 use cases that are deploying IoT technology in the areas arable farming, dairy, meat, vegetables and fruits. An initial consortium of around 70 international partners will develop use case specific solutions as well as aim at the reuse of existing IoT related enabling technology. At the same time, IoF 2020 will aim at contributing to initiatives like FIWARE and M2M as well as to the interoperability of existing agri-food related solutions and platforms for helping end-users and solution providers (i.e. platform providers themselves as well as machinery and service providers) to increase efficiency, decrease costs and efforts as well as to facilitate the provision of new services that are required for serving the increasing expectations of consumers.

The realisation of IoF 2020 is planned for a duration of 4 years. It started in the beginning of 2017 with 19 use cases grouped in 5 trial areas. A significant amount of additional use cases shall be added around mid-term. An open call will be published, to search for additional cases that will complement the existing ones. As the work is oriented to experiment and validate IoT based solutions, the objective is to learn from the experience gained in the realised use cases of the FIWARE initiative, for being able to increase the success rates of future use cases. This is considered essential for being able to showcase the IoT related lessons learnt to the agri-food end-users and the related ICT solution providers to push the usage of IoT and hence the degree of innovation in the agri-food sector.

7 Conclusions

The 35 use cases were supported in the scope of the FIWARE initiative by the project FInish. On top of that, additional competitions were organised to push the elaboration of food chain innovations. In total, over 120 organisations were directly or indirectly financially supported with some 4.8 Mio € as well as involving additional teams in the ideation phase, open calls, events and competitions. Especially the 35 use cases were analysed in detail by an international team of mentors and additional experts. A set of KPIs was used that analysed the use case performance with respect to the business success, the technological quality and the team performance. Also the resulting assessment for individual KPIs was discussed, differentiating this discussion between the most successful use cases and the rest.

The KPI discussion identified specific KPIs that can serve as a kind of potential success indicators when analysing use cases as well as proposals for realising use cases. Specifically the latter can serve for the development of a selection approach when aiming at the realisation of future use cases. Therefore, the KPI discussion was specifically highlighting, if a KPI can be assessed already at an early stage of the use case life cycle and ideally in the ideation phase.

Finally, the experience gained was already used for designing an approach to realise an agri-food related large scale pilot initiative to experience the potentials of IoT technologies. On top of that, it will serve for the selection of future use cases aiming at the realisation of successful showcases that will be able to push the usage of IoT and hence the degree of innovation in the agri-food sector.

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