



Mid-term evaluation

Title of the programme: **Smart City Eco-System**
Acronym of the programme: **EkoSMART**
S4 priority area: **Smart Cities and Communities**

Evaluator:
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1. Marand d.o.o.- MAR (Co-ordinator)
2. Alpineon d.o.o. - ALP
3. Cosylab d.d. - CSL
4. Elgoline d.o.o. - ELGO
5. Inova IT d.o.o. - INO
6. Anton Trstenjak Institute of gerontology and intergenerational relations - IAT
7. Institut »Jožef Stefan« - IJS
8. Iskra d.d. ISK
9. University Clinic of Respiratory and Allergic Diseases Golnik - KG
10. Medis d.o.o. - MED
11. National Institute of Public Health - NIJZ
12. Nela Razvojni Center d.o.o. - NELA
13. RC IKTS d.o.o. - IKTS
14. Robotina d.o.o. - ROB
15. SRC Sistemske Integracije d.o.o. - SRC
16. Špica International d.o.o. - ŠPI
17. Telekom Slovenije d.d. - TS
18. UL - Faculty of Electrical Engineering - FE
19. UL - Faculty of Computer and Information Science - FRI
20. UL - Faculty of Sport - FS
21. UL - Faculty of Medicine - MF
22. UM - Faculty of Electrical Engineering and Computer Science - FERI
23. University Medical Centre Ljubljana - UKCL
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25. Dr. Adolf Drovc Healthcare Center – ZDM

1. Introduction

The review concerns an assessment of the progress made to date of the project under *S42 Priority Area: Smart Cities and Communities* entitled 'Smart City Eco-System (EkoSMART)'. The multi-faceted program utilises the spectrum of data streams generated by existing public and commercial systems embedded within City environments and through their coherent integration, enables the derivation of actionable information - in single data streams in isolation or through cross-correlations of a number of data – which brings impact and benefit to the citizens of densely populated environments such as Ljubljana. The target applications



are varied and each has the potential to improve the health and wellbeing of individual citizens as well as increase the efficiencies of key functions within Cities such as transportation.

2. Assessment of Progress

2.1 General

The project has progressed largely according to the development phases detailed in the original submission. The technology and applications/services under development are both highly complex and it also must be stressed that the Theme is being researched heavily throughout the world. In general terms, the principles adopted by the EkoSMART Consortium are not novel; nevertheless, their implementation is non-trivial and governed by not only technical but substantial commercial challenges.

A number of key challenges are targeted, all reliant on the establishment of the data hosting platform and the ready access to the range of data required to effect an optimisation on a process or define a service. The route to commercialisation is the most critical element of the project and there is evidence that each selected area has a potential impact route either as an enhancement to a core service provisioned by the City or, with more global relevance, a data-driven service that has market relevance in other heavily populated environments.

The scope of the target outputs from the outset has been extensive and consequently creates issues of resource allocation through pursuing multiple goals. There is a danger of diluting the impact of each individual work stream by continuing to concentrate on all of the applications stated in the original project. This in turn moderates the level of impact of the overall project outputs. This is a scenario which occurs in most projects of this complexity and in this case, the Consortium has managed the delivery of a wide spectrum of goals albeit at varying levels of progress.

2.2 Key Highlights

The major deliverable achieved to date is undoubtedly the establishment of a data platform, the spine of collecting, managing multiple data streams and their storing/hosting in a readily accessible (cloud-based) facilities. The platform manages the acquisition of a range of data integrated into an environment allowing their analysis to yield actionable information that optimises the practices for a mix of City stakeholders including, for example, health service providers, provisioned over various mediums such as smartphones. The platform then facilitates the evolution to new business models based on provisioning a range of services – ‘software-as-a-service’ methodology.

The most mature strand in terms of closeness to commercial exploitation is the notable achievements in the digital health services domain. The route to revenues is clear as the market presence of the Consortium Company Lead in the sector is undoubted. *The recommendation that this segment of the project should become the primary focus for the remainder of the project is evident. The recommendation is made on the acknowledgment that the progress made in the other work streams has been significant but the solutions are further away from extensive adoption.*



The product/service validation phase – and movement up the TRL evolution - decrees that any solutions in the sector need to demonstrate scale. The development of the minimally-invasive heart monitor and its role within a heart monitoring service to treat remotely and pro-actively prevalent health conditions such as ‘Chronic Obstructive Pulmonary Disease (COPD)’ is a prime candidate to accelerate to market given the groundwork thus far.

The sport/wellness app has the potential to support any pro-active strategy to enhance the wellbeing and in turn health of individual citizens. The challenge is how to monetise this development; should it be marketed as a standalone or integrated within a more holistic bundle of services targeting major health conditions inflicting the community?

The development of a highly functional system that optimises the transport infrastructure has progressed and the interplay between the simulation and experimental domains is the appropriate approach to utilise. However, there are significant elements that need to be implemented if the system is to be of value and the validation in operational environments is massively problematic. Again the customer for the solution may on the surface be obvious; however, proving the ‘return-on-investment’ still remains before the barrier to revenue is breached. The most appropriate business model requires to be defined. *The recommendation is that the Consortium therefore aligns the bulk of future activities on the selection of the most appropriate revenue bearing business strategies.*

One of the major outputs stressed by the Consortium was the definition of the ‘Eco-System’ and the relevant ‘Supply Chains’. Although there is value to these definitions for the Consortium, ambiguity across the world communities remains owing to local factors such as inculcated cultures/behaviours and commercial practices.

2.3 Changes to Workplan

In many multi-faceted, multi-institution project such as EkoSMART, the formulation of the original submission makes the most informed ‘Case for Support’ to secure the award. The major Work Packages are well articulated but the detail of the execution although following a validated methodology, lacks the highest granularity. Now that the project Consortium has had time to fully understand the scope of each organisation’s contributions, the alignment of resources/facilities/expertise to optimise the delivery of the training elements of the project has been managed appropriately.

2.4 Future Workplan

Given that the project is nearing the end of the funding period, the focus should turn the validation of the most mature products/services developed to date. The Consortium has demonstrated progress through the TRL levels for all of the strands under consideration but robust verification of attaining TRL 6 – Technology Demonstrated in Relevant Environment (industrially relevant there is a difference in interpretation on the extent that the goal of providing environment in the case of key enabling technologies) – is partial and thus remains largely outstanding. This may be viewed as a weakness but given the complexity of the dynamic between solutions providers and customers in this area, the period to validation and market traction is significant.



3. Role of the Partners

The composition of the Consortium is well balanced comprising both technical expertise in all of the disciplines required to establish the data hosting platform; in tandem with the tools to manage and understand that data; the applications specialists in the domains/sectors from the target services; through to commercial organisations with proven track records of provisioning commercial services.

A significant advantage in effective development within complex projects that should not be minimised or indeed taken for granted and thus under-utilised, is that Slovenia is a relatively small geography with a strong sense of unity. This is highly relevant in projects such as EkoSMART as the spectrum of disciplines and partner organisations originate from different cultures, practices, terminologies and methodologies. Overcoming these behavioural issues can typically take a significant period post-start and detracts valuable time from attaining notable achievements before the end of the project.

4. Internal

One of the strengths of the Consortium is the mix of industry and academic partners. The observation is that the major drive for the project has, to date, originated from the academic groupings. This should not be regarded as a negative since the first phase deliverable centred on the establishment of the data platform which aligned excellently with the skills and experience of the academic partners. A limited amount of information was provided on the role of the commercial and applications partners in the development as the technology must serve the applications it supports; the project outputs must not be 'pushed by technology'.

At this stage of project lifetime, a shift to being guided by the commercial/societal needs is mandatory, a natural evolution of the activities and the validation of the products/services require the extensive engagement of the target end users and the definition of the route-to-commercialisation, skills not routinely found within academic groups. The external communication of the project has been effective.

5. Dissemination and Exploitation

A trade-off exists between the wish to disseminate the outputs and the risk of compromising the advantages of the innovation in the goal of commercial exploitation. Publication, presentation and showcasing the outputs in advance of protecting the Intellectual Property (IP) that yields the competitive differentiator restrict the ability to gain rapid market traction and delays the time to initial sales.

Furthermore, given the mix of industry and academic partners are governed by different measures on occasions creates contention between the need to publish in international journals/conferences and the wish to secure revenues through competitive products by being first-to-market. One strategy is to protect the innovative elements through Patenting; I note that the Consortium has filed 3 Patents. That strategy has merit - especially if the company has access to massive resources for legal fees in the event of challenges to Patent validity -



but there is an alternate approach which focuses on 'stealthy' market entry with little product detail until significant sales.

The Consortium has successfully published a notable number of papers; I would recommend that the highest impact journals should now be targeted since the maturity of the developments has increased and in turn the advances on the state-of-the-art. The quality of the publications also serves to corroborate the benchmarking of the project globally.

Acceleration of the dissemination is now appropriate. The original plan harnesses the target groups for the developed products/services and the showcasing of the outputs in real-time garners more corroboration of the usability of the offering and most importantly reduces the barriers to market adoption. The showcasing environment must be well planned and should be broadcast more widely through webinars/podcasts.

6. Scientific Achievements

The scope and degree of scientific achievements is difficult to assess as the volume of research and meaningful deployments is large and continually changing, globally. There are many examples of services that address City-wide processes/problem areas and the project is obligated to benchmark its developments against these environments. The benchmarking should assess the level of innovation both in terms of the technical progress but also in determining the cost and impact of potential commercial offerings. The latter is core information that lowers the barriers to adoption.

I would recommend that the Consortium approach other City-wide projects e.g. Barcelona, Bristol and establish a line of communications and discuss potential visits, to gain a more detailed understanding of the world-wide progress in the sector.

6. Partner Co-operation

There is some evidence that all of the partners have participated and contributed to the project activities. On the limited exposure to each partner – due to restriction in review time – the conclusion that all are co-operating is nevertheless valid given the extent of progress thus far.

Of critical importance is the active engagement of the target applications sectors and in this project, the Consortium is blessed to comprise both seasoned expertise at operational, commercial and academic domains. What is very difficult to conclude is the extent of influence in the core decision making that each partner has had. There is evidence that the solutions have been tested and feedback obtained from representative targets groups e.g. sport and wellbeing app, heart monitoring and COPD. The end user engagement is non-negotiable to establish the specifics of the solutions which in turn ease the speed of adoption and market traction.

7. Conclusions and Recommendations

Given the limited time to the end of the project, a prioritisation exercise should be executed by the Consortium taken into consideration the progress made to date – in essence governed



by the most significant progress through the TRL levels – and the thrust of the effort should be aligned to the push towards the deployment of the solutions in real world scenarios.

A shift of focus to address the barriers to exploitation is a necessity. The Consortium should convene a sub-group comprising predominately commercial partners to address the definition/development/validation of new business models. At the commercial level the partnering of standalone system providers is mandatory for the creation of the spectrum of services that can be envisaged, governed in large part by data ownership agreements. The definition and validation of revenue models should have, at its foundation, requirements and usability capture through knowledge elicitation sessions with end users/potential customer groups.

The Consortium has proven that there is the scope of excellence within the partners to address and create solutions at the technology dimension. There are fundamental requirements for the data platform to have inter-operability, scalability and ease of management. All data streams must be synchronised to enable impactful derivation of information; all data streams must be structured to enable cleansing, mining and analysis of the combined data through advanced (artificial intelligence) software; all data streams must be secured. Many of these features have been proven by the project but migrating to 'plug-and-play' scenarios presents many more challenges to solve. The establishment of standards is a major goal in reducing the cost of both the 'platform-as-a-service' and 'software-as-a-service' business models. All these requirements are central to cost-effective solutions.

There is evidence that the progression of the project to date has been predominately guided by the academic groupings. The academic leads are highly competent and through achievement have proven their worth within the project. The leadership of the project must now be migrate to the commercial partners that have the experience and understanding on the strategies to bridge the gap between proving solution functionality in restricted, controlled scenarios to creating commercial offerings that meet customer expectations and quality of experience. The skills and expertise are fundamentally different.

The Lead Industry Company has the necessary track record of executing on product and service development and has secured international market traction. As such should assume the predominant role in managing and guiding the validation of the commercial viability of the project outputs.

Dissemination activities should now accelerate and more extensive showcasing events should be planned with channels to broadcast the demonstrations more extensively.

The benchmarking of the quality and excellence of the impacts must be integral to the final project report. The impacts to be addressed are multi-dimensional; scientific/research methodologies and practices, commercial/business model, social/wellbeing, economic and environmental.



8. Future

The Consortium has been productive in terms of establishing a functional data management technology platform and a nascent eco-system that is at the beginning of creating valuable products and services. The investment to date from Government therefore has been impactful and the strong recommendation – based on experience of similar initiatives/programmes across the world – is to continue the support of the group and the innovation environment it has succeeded in seeding *without interruption*. The recommendation is made in the full understanding that any follow-up funding will originate from a different budget and place more commercial targets on any activity. It may be optimum in this respect to segment the work streams/products/services developments within the EkoSMART and seek funding for single stranded, more focussed development projects.

Often the expectations of the funding body stops at injecting significant support to a group such as EkoSMART and believe that the intervention is sufficient. That may be the optimum outcome in some cases but in this particular sector, the innovation cycles are beyond 10 years and thus consistent funding over that period is the proper strategy to mining the initial investment and in turn future opportunities. The recommendation is made acknowledging that a 'grant-based mentality' i.e. growing by securing successive grants, is counter-productive to rapid commercial growth and is to be avoided. This is not the case for this Consortium as the route to commercialisation - not just 'locally' but globally - is still in its infancy.