Recommendations and Conclusions

11th ETIP SNET Regional Workshop

ETIP SNET

European Technology and Innovation Platform
Smart Networks for Energy Transition

Recommendations and Conclusions

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Authors:

CLERENS (Valentina Ferrara, Irene Garofalo, Martin Bracken, Daniela Gaddari, Shenja Ruthenberg)
ICCS (NTUA) (Prof. Dr. Nikos Hatziargyriou, Dr. Aris Dimeas)
BACHER ENERGIE AG (Dr. Rainer Bacher)
B.A.U.M. Consult GmbH (Ludwig Karg, Rita Dornmair)

Review: ZABALA (Maria Laura Trifiletti)

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INTRODUCTION

On 21 April 2021, ETIP SNET organised its 11th ETIP SNET Regional Workshop. Due to the sanitary crisis, the workshop was organised virtually. Whereas in the past workshops (in the framework of the EU project INTESYS4EU) have been organised physically with a focus on a specific region, in April 2021 projects from all over Europe were invited to attend the workshops according to 4 themes:

- Theme 1: Electromobility integration in the energy systems
- Theme 2: Cooperation between energy system operators
- Theme 3: Digitalisation: managing energy data and Cyber security
- Theme 4: Consumer involvement, citizen engagement and energy communities

The 4 themes have been selected based on the research areas of the ETIP SNET Working Groups and the BRIDGE initiative as well as with view to contributing to the ETIP SNET Implementation Plans and Road Map.

In the following Chapters of this report the identified key recommendations and the conclusions per each parallel session. Finally, also the recommendations from ETIP SNET WORKING GROUP 5 in terms of "Innovation, Implementation in the business environment" are reported.

1. KEY RECOMMENDATIONS FROM THE PARALLEL SESSIONS

The following key recommendations have been identified and discussed during the final wrap-up session of the workshop and are reported in the next paragraphs divided per parallel sessions.

1.1. PARALLEL SESSION 1: Electromobility integration in the energy systems

The focus of Parallel Session 1 was on electromobility and the impact in the grids. Four projects have presented their activities in this domain and many interesting aspects have been identified.

The first issue analysed was the needs of the end user, namely the driver. The project analysed different type of users (urban, commercial, etc) and identified that in several cases the battery capacity is no longer the main problem as there are sufficient number of charging stations and the average routes are not very long. Furthermore, the projects identified that the end user should manage lot of information (Charging station location, billing methods etc) and that the solutions cannot cover the needs of all users.

Next, the use of block chain technologies in the management of EVs has been discussed. Block chain technology could improve the challenge of coordinating many distributed, non-centrally coordinated EV. It can be used to manage charging stations as it can easily implement different types of rewards and furthermore, it is a cheap solution supporting different tariff schemes.

Moreover, wireless charging technologies are demonstrated in one the projects and the benefits both for the system and the end user are under analysis. This technology has some important advantages as it is less complicated for a significant part of the end users and requires less complicated management of the charging process.

Furthermore, the impact of autonomous driving in the distribution grid is under study in one of the projects. The focus of the study is how the optimisation of the driving route could create benefits for the system.

Finally, during the discussion some other topics have been mentioned:

- the collaboration between the charging process and the RES production is important.
- ENTSOe identified that the peak EV battery charging capacity (not on energy) on the grids must be considered.

- Currently, many (too many) stakeholders are involved in EV management and this requires new procedures and roles (business cases).

1.2. PARALLEL SESSION 2: Cooperation between energy system operators

The aim of parallel session 2 was to discuss the collaboration between TSOs and DSOs. This collaboration is very important in view of the wide penetration of distribution grids by Distributed Energy Resources and the need to exploit their flexibility for the operation of the power system with high share of Renewable Generation. In particular, the following points were discussed with panel participants:

- What are the grid services provided by each operator (DSO and TSO)?
- What are the market models (the theoretical and implemented in different countries)?
- What data and how is it exchanged between operators?
- How are planning tasks coordinated?
- What is the level of cooperation between different operators of multiple energy carriers (e.g., electricity and gas, electricity and heating/cooling, etc.)?

Interesting discussions have taken place regarding the activation and provision of services through various TSO-DSO coordination schemes, namely central, local and mixed. Standard products that provide services to the network operators were defined and tested. These services include balancing, controlled islanding, congestion management and voltage control. Other interesting outcomes of projects concern the development of a common architecture enabling the connection, data and information exchange for efficient coordination between the DSOs and TSOs optimizing operations and incorporating all energy value chain stakeholders. Different data are exchanged according to the requested services by the TSOs. An original, advanced demonstrated grid service was described by a DSO via a regional power market enabled day-ahead procurement of reactive power services from DER for dynamic voltage control with a Virtual Power Plant (VPP). Finally, in another demonstration, battery control setpoints are generated based on real-time knowledge of the grid state provided by Distribution System State Estimation (DSSE) using PMUs. The services provided are feeder dispatching, voltage control & line congestion management and primary frequency control. Moreover, the value of cross-sector energy coupling was presented based on the ETIP SNET White paper. Finally, the use of existing infrastructures like transmission lines and lignite coal power plant sites in future decarbonized system, where assets will have been withdrawn was suggested, e.g. for installation of hydrolysing units.

Overall, the feedback received from the discussions about the TSO/DSO collaboration underlines the high importance of the relevant topics for the efficient operation of the future power systems and the solid progress made in understanding the related needs and preparing the necessary market models and data infrastructures.

1.3 PARALLEL SESSION 3: Digitalisation as key enabler

The aim of this parallel session was to discuss the theme of "Digitalisation as a key enabler for integrated energy networks and systems", because of its high enabling relevance to almost all energy system integration aspects of all kinds of users with a view to analyse which solutions to R&I challenges and tasks / cooperation's / users have proven to be successful.

Questions were discussed with panel participants about what the attributes of "Use Cases" and what are the right "R&I-related TOPICs" to be further investigated in R&I projects.

The following outstanding remarks were made:

"Digitalisation is an enabler and is everywhere"

- How to select digitalisation UC from which we can truly learn in terms of digitalisation needs? What are the core digitalisation R&I issues? There are UC which talk about digitalisation but may not really contribute to the real issues which are strongly about data exchange, about scalability, about reuse, about gaps

between who pays and who profits. R&I is needed which contributes to making Digitalisation-for-energy-system-integration more systematic, more reusable, and scalable.

"Digitalisation is more than data and numbers"

- A new R&I idea: Digitalisation may be about mapping compliance, legislation and regulation

"Digitalisation is about considering Data spaces beyond Energy-Data spaces"

- When making progress to the Energy Data space, R&I needs to consider that progress in many other Data spaces is ongoing at EU Level in Energy, Mobility, Health, Agriculture
- The Energy data space initiatives should consider the other Digitalisation-related European Initiatives: Horizon Europe, GAIA-X, Interreg all deal with digitalisation beyond energy.

"What makes Energy data special"?

- Digitalisation-related R&I needs to consider that Digitalisation for the specialised area Energy systems "may lose out": Digitalisation progress in other, non-energy system data spaces may "simply" be applied and be used in the energy data space
- The discussion covered many facets where no consensus could be reached yet: From "Energy customer / energy data owner must be the focus", "Grid make the energy system special", "real-time balancing needs makes the energy system special" to "there are and will be no boundaries, no or little speciality for energy data space"
- Remove borders of digitalisation
    - Become much more cross-sectorial, more interoperable, like done for EU Data Exchange Architectures, Link to Mobility, to manufacturing, to water sector
    - Needs of interconnect different sectors and see how and if data exchange architectures can be replicated also in other fields
- Gaps: Need to define benefits of digitalisation for DSO and consumers; create trust for digitalisation of energy
    - Privacy is one of the issues to be tackled especially in DSOs
    - Creating mutual platforms for sharing data

- Is energy data space more complex than other data spaces?
    - Masses of real-time data as justification for speciality of energy data space?
    - Distributed, decentralised energy system as special challenge, possibly not cloud based
    - Creating a Market Space not only for energy data, but ensuring also access to other data designing a kind of Data Library.

This feedback leads to the conclusion that not enough is known about what makes the "energy data space" special and distinctly different from the other "data spaces" such as mobility.

- More research and analysis is needed in this area.
- Discussion to be continued in upcoming ETIP SNET [Regional] Workshops

1.3. PARALLEL SESSION 4: Consumer involvement, citizen engagement and energy communities

The session title "Consumer involvement, citizen engagement and energy communities" had been chosen on purpose. Selected projects pointed to the fact that it is not enough to involve consumers as customers for new energy products. An ever-growing group of people want to contribute as "good citizens" to the energy transition process in their cities, regions and countries.

Representatives of EU-funded and transnational projects (from ERA-Net Smart Energy Systems) pointed some common findings:

- "Citizen" can mean persons in residential, business and public domains

Methods and tools for private homes and businesses need to match the needs of the different eco-systems. It seems that too many projects concentrate on residential end-consumers while potentials for reducing consumption and contributing to system stability are high(er) in businesses. It is necessary to understand that responsible functions in businesses are kept by people as well – which have besides economic success needs, expectations towards "normal" people.

- People are different

There is not one driver that fits all. Different groups follow different triggers. There seems to be a common understanding (at least with experts from the social sciences) that there are drivers other but reducing costs or investing in measures with high return. Other drivers may be self-containment, independency and security of (self)supply or contributions to a carbon-neutral future.

- Communities can drive the customer and consumer participation

Peer pressure or joint engagement have been reported to be non-neglectable drivers – one reason why energy communities may make the difference when heading for a sustainable new energy system. Supplying, selling and sharing energy in groups of generators, prosumers and consumers, is a big driver for people to contribute to the change from a centralized and vulnerable to a stable and sustainable distributed energy system.

- Bottom-up and top-down approaches are needed

While it is important to create legal and regulatory frameworks on EU and national levels, there are good reasons to introduce new models and measures of energy supply into existing spatial and real estate planning, city and rural development. Involvement in local planning and decision making does not only unveil the needs of citizens but motivate them to participate in change processes.

- "Living labs" are key to get tangible and reliable solutions

Only when testing solutions in real live environment the soundness and sustainability of solutions can be guaranteed. But establishing such "living labs" is costly and takes time – often more than a single project can afford.

2. CONCLUSIONS FROM THE PANEL SESSIONS

The following key conclusions have been drafted by the Parallel sessions' moderators as key outcomes of the discussions.

They are reported in the next paragraphs divided per parallel sessions.

2.1. PARALLEL SESSION 1: Electromobility integration in the energy systems

The discussion with project representatives and panel participants identified some important issues. The main finding is that the solutions should be friendly for all type of users (urban, commercial, etc) reducing the amount of information that should be processed by them (location of charging station, payment method etc). Therefore, future design of the EV management systems should be more user centric.

The typical size of the battery capacity, currently and in the future, seems to be sufficient for the majority of the end users. This fact simplifies the management procedure as less optimisation is required.

Several technologies could provide advantages for the domain, such as wireless charging, block chain or autonomous driving. These technologies should be further developed and tested in demonstration sites.

As a final conclusion, the research in the domain is quite advanced and some of the solutions have sufficient maturity level. These technologies will be important in the near future as the number of EVs is expected to increase significantly.

2.2 PARALLEL SESSION 2: Cooperation between energy system operators

The feedback received from the projects during the panel discussion and via the project surveys confirms the primary importance of the topic of TSO/DSO collaboration for the efficient and secure operation of power systems with high levels of Renewable Generation.

The findings from the BRIDGE projects demonstrated clearly that several services have been tried between DSOs and TSOs and different market coordination models have been designed. The formulation of services as products with standardized characteristics is an excellent outcome. The development of a common architecture for the exchange of data and information between the DSOs and TSOs optimizing operations and incorporating all energy value chain stakeholders is another important development towards the implementation of the TSO/DSO collaboration.

The regional projects have provided advanced results and original applications regarding specific services at the DSO level, like dynamic voltage control, grid-aware control of battery storages, data exchange platforms and data models. These services were provided to the TSOs.

In conclusion, we believe that research in the topic of TSO/DSO collaboration has reached high TRL levels in several aspects, however there is a strong need for more innovation focused, applied projects in order to test further the efficiency of the various coordination schemes, data exchange and more advanced services.

2.3 PARALLEL SESSION 3: Digitalisation as key enabler

Based on the feedback received from the project pitches, the short questions and answers after these project pitches, the opinions of the panellist experts during the panel discussion as well as the interactive surveys, the

following R&I and Use Case-related aspects shall be refined for the theme "Digitalisation as key enabler" in the next versions of ETIP SNET R&I Implementation Plans and ETIP SNET R&I Roadmap.

From "Digitalisation is an enabler and is everywhere", "Digitalisation is more than data and numbers", "Digitalisation is about considering Data spaces beyond Energy-Data spaces", "What makes Energy data special", invite in the next ETIP SNET regional workshops ongoing R&I projects and discuss with their project experts and their experience gained in the projects, and with ETIP SNET WGs and BRIDGE experts

- on creating trust for digitalisation of energy, including related to privacy
- on defining digitalisation benefits for DSOs and consumers
- on creating mutual platforms for sharing data
- on approaches, methodologies, technologies and use(r)s to be able distinguish better between generic higher-level digitalisation enablers
    - such as needs for generic API, standardisation, interoperability, data exchange architectures generic Use Case description methodologies applied in multiple areas such as Energy, Mobility, Health, Agriculture

  and energy-integration related specific digitalisation enablers
    - such as SGAM, CIM, Energy-related cross-sectorial issues, masses of real-time data for real-time aggregation needs, decentralised subsidiarity-related energy reliability, security and market needs
- on understanding Digitalisation-related differences between European initiatives such as Horizon Europe, GAIA-X, Interreg (intend to) contribute in the area of Digitalisation
- on dependencies between "generic" digitalisation-enabling solution needs ((including the time when needed within between 2020 and 2050) as prerequisites for specific energy system integration digitalisation enablers and needs
- on core digitalisation R&I priorities, when they are needed, how R&I solution shall be used in what types of Use Cases - by going through the digitalisation-related TOPICs and Tasks defined in the recent ETIP SNET IP (Research Area 3, TOPICs 3.1-3.5 and related FUNCTIONALITIES / Use Cases)
- on (high-Level) Use Case needs to realize higher TRLs for R&I Tasks related to "digitalisation as enabler of integrated energy systems"
- on truly new R&I TOPICs and tasks, not yet specified.

2.4 PARALLEL SESSION 4: Consumer involvement, citizen engagement and energy communities

Based on the inputs from projects on the panel and polls with the audience the following should be considered when developing future roadmaps and implementation plans:

- Research, development and innovation (RDI) projects should more often and better involve consumers, contributors and potential customers into development process. To get to reliable results, diverse teams with technological, social and communication experts should be formed. RDI programmes should allow for and foster such multiform approaches.
- We should concentrate more on smart energy topics in existing development processes on municipal and rural level (spatial planning, SDG implementation programmes) and involve citizens into such processes.

Research is needed to better understand how existing development and planning tools could be enriched with smart energy approaches.

- We need to investigate potentials of more participation in (existing) business entities. To that end, we need more technologies, methods and tools and more research to unveil the needs of small and medium sized businesses in different eco-systems.

- Since developing "living labs" to assess and test innovation in real life is time-consuming and costly, existing test environment should be maintained and motivated to support further research and development. In any case: we need more real live projects.

- We should better understand the relation of governance and people's expectations towards the future energy system. More insights are necessary on acceptance and effects of more democratic models in energy systems. Energy communities point to the right direction, but we need a better understanding on how they could be connected to establish a real "system of systems".

3. RECOMMENDATIONS FROM ETIP SNET WORKING GROUP 5 IN TERMS OF "INNOVATION, IMPLEMENTATION IN THE BUSINESS ENVIRONMENT"

The objective of ETIP SNET Working Group 5 is to mobilise experts in support of R&I work in EU to reach the market. It works closely with all WGs of ETIP SNET to utilize projects' results in support of R&I needs for the years to come.
In order to reach this aim, it is essential to have a homogeneity of technology classification and a universal approach that allows to coherently structure and analyse all data coming from projects.

WG5 has identified a list of technologies and systems in order to capture the smart grids systems from end to end. As a result, 5 groups of systems and 33 technologies and sub-systems have been detected. This classification has been first evaluated by WG5 (top-down approach) and then by researchers of the R&I community (bottom up). All the projects can self-classify themselves within this categorisation.

Following this adapted approach, WG5 experts have selected six projects (time was not available to send the prepared questionnaire to all the selected projects for the regional workshop) to which a tailored questionnaire was sent for classifying the research areas of their projects under the universal list of 33 technologies and give their verdict on this universality. The responses received were very positive giving evidence that ETIP SNET is making positive steps forward. This was reported at the regional workshop with positive remarks for those that have contributed to complete this cycle of validation.

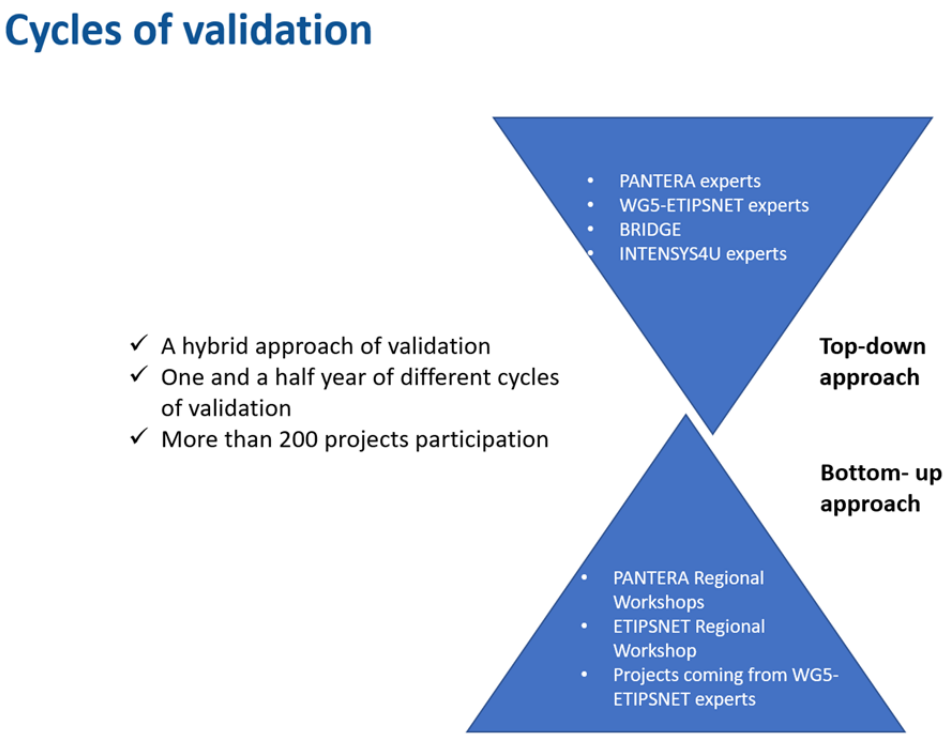

Figure 1: Cycles of validation

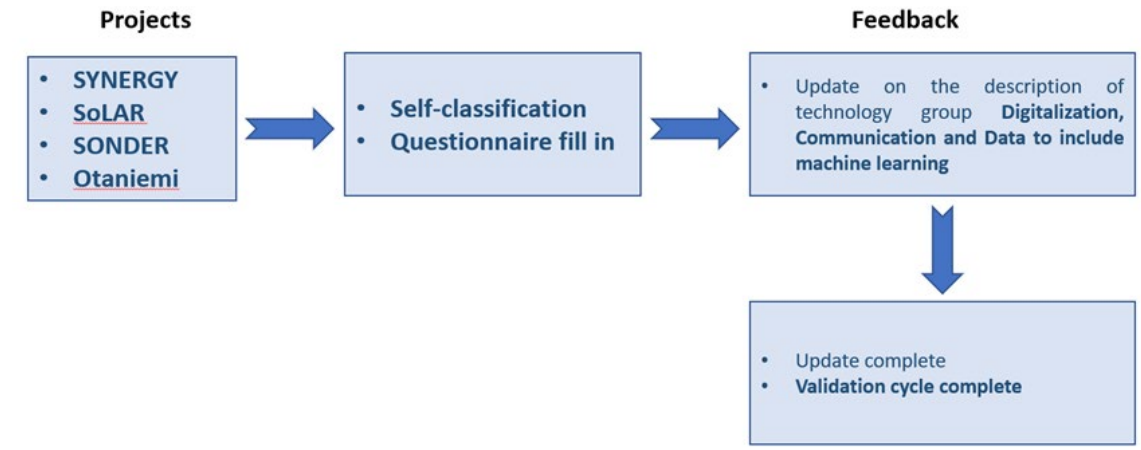

Figure 2: Feedback fro ETIP SNET Regional Workshop

A second questionnaire has been shared with all the projects presented during this 11th Regional Workshop. It is based on three pillars: innovation management, innovation readiness and market potential. The aim is to provide practical advice to projects with a focus on go to market strategy. It will also help the formulation of the Roadmap and Implementation Plan.

The questionnaire consists of 36 questions organised into six main areas covering the innovation facilitation:

1. Technical Description
2. Exploitation
3. Business Planning & Market Competition
4. Context & Ecosystems
5. Investors & Finance
6. Management

All the projects presented during this 11th Regional Workshop have been evaluated according to these six areas and each of them has received a specific score. Results are presented in the visualisations that follow.

3.1. FEEDBACK VISUALISATION: SESSION 1

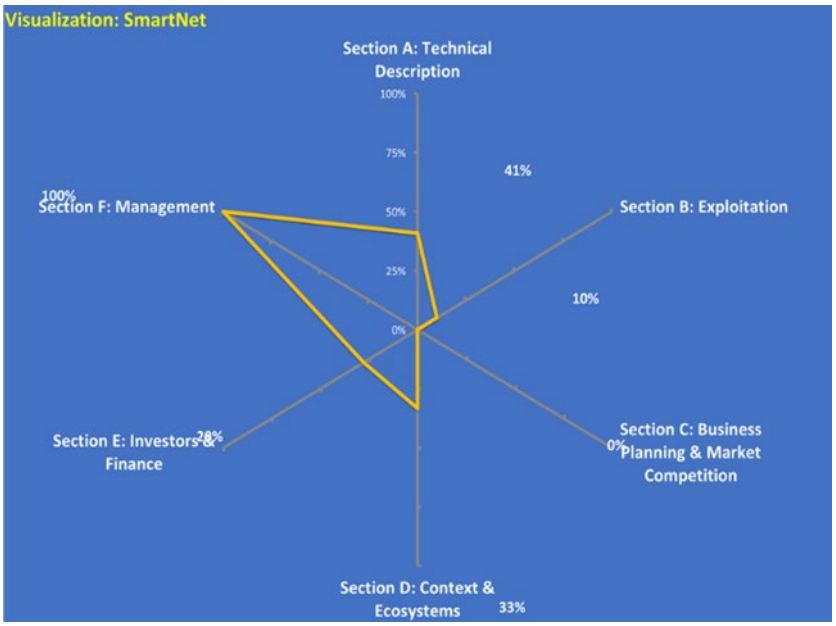

Figure 3: Visualisation SmartNET

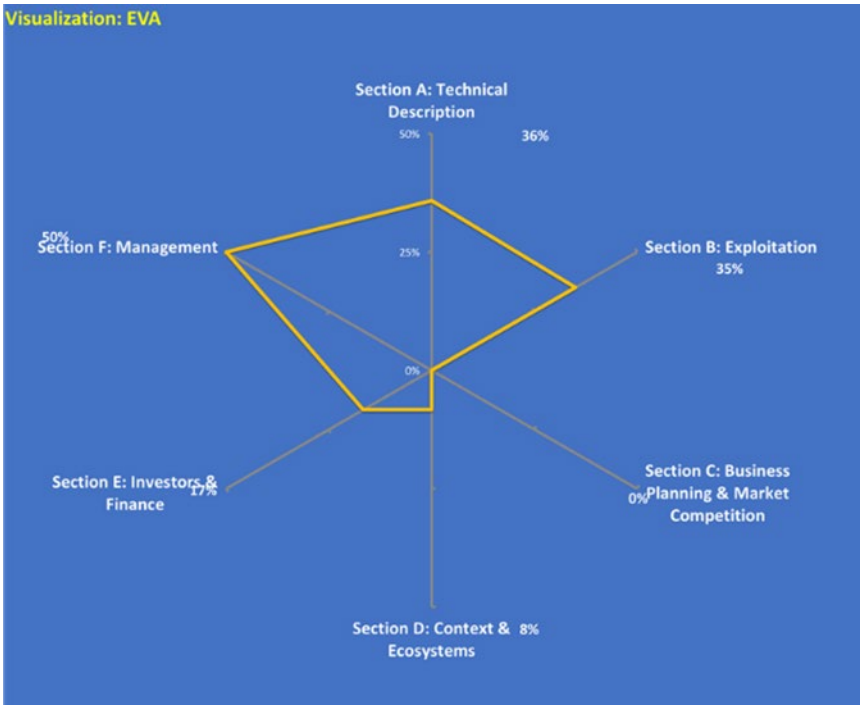

Figure 4: Visualisation EVA

3.2. FEEDBACK VISUALISATION: SESSION 2

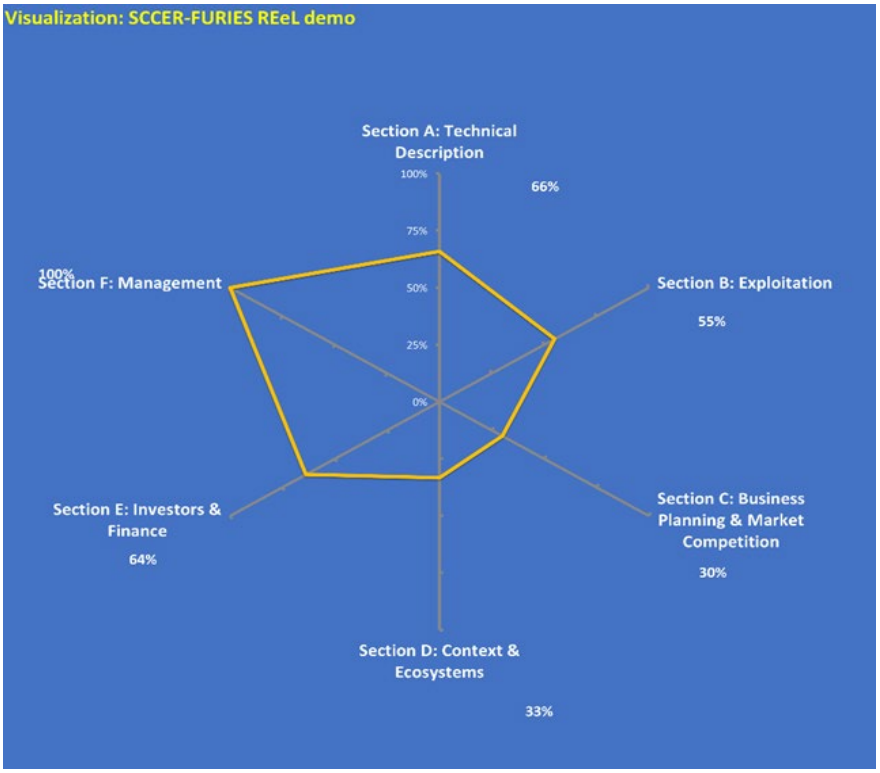

Figure 5: Visualisation SCCER-FURIES REel demo

Figure 6: Visualisation TDX ASSIST

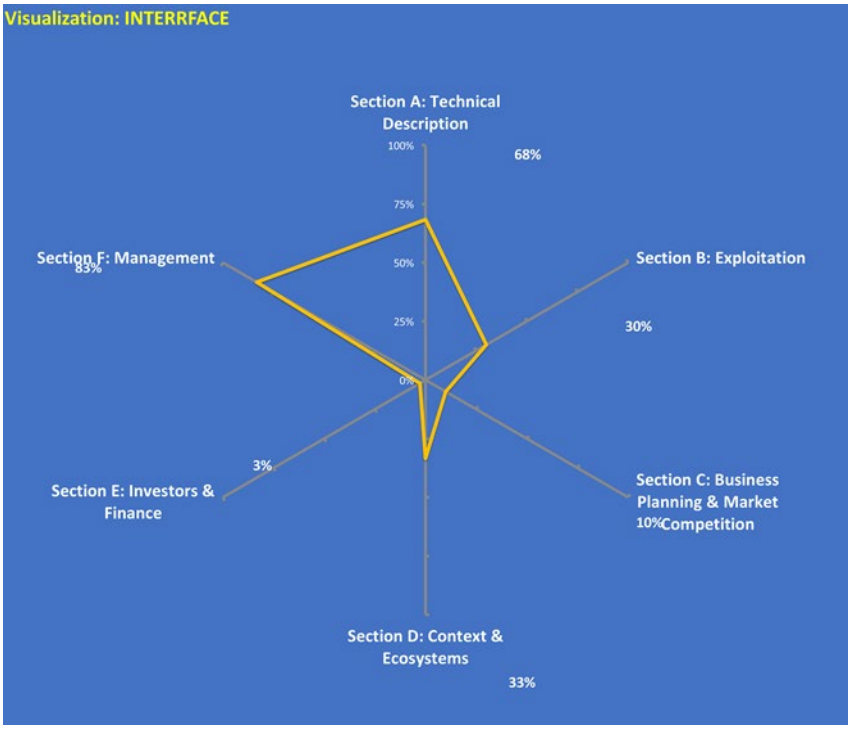

Figure 7: Visualisation INTERRFACE

3.4. FEEDBACK VISUALISATION: SESSION 3

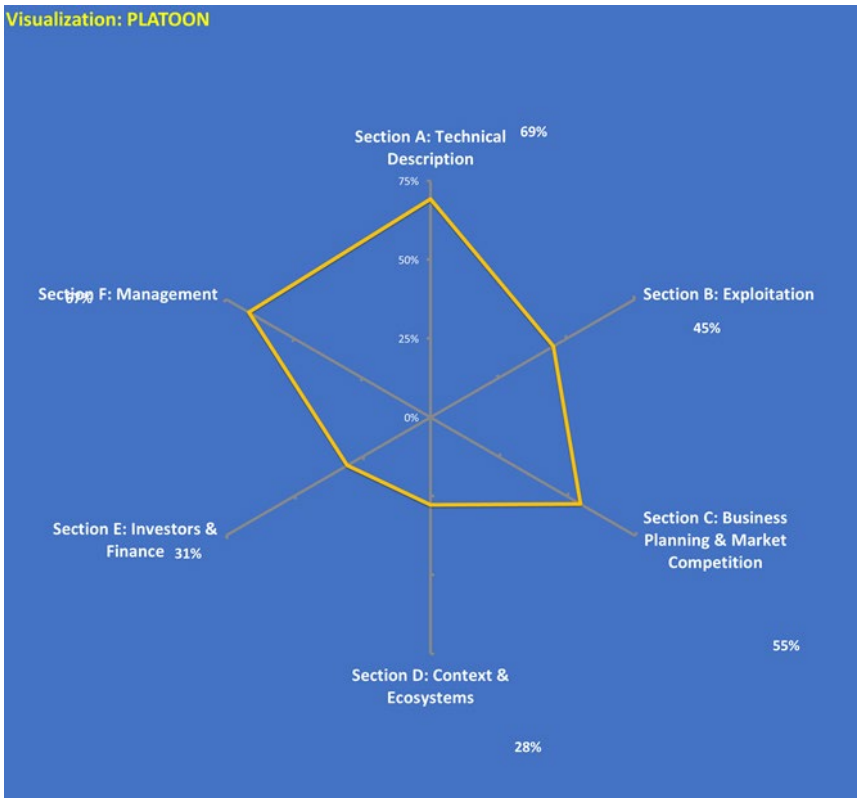

Figure 8: Visualisation PLATOON

Figure 9: Visualisation PLATONE

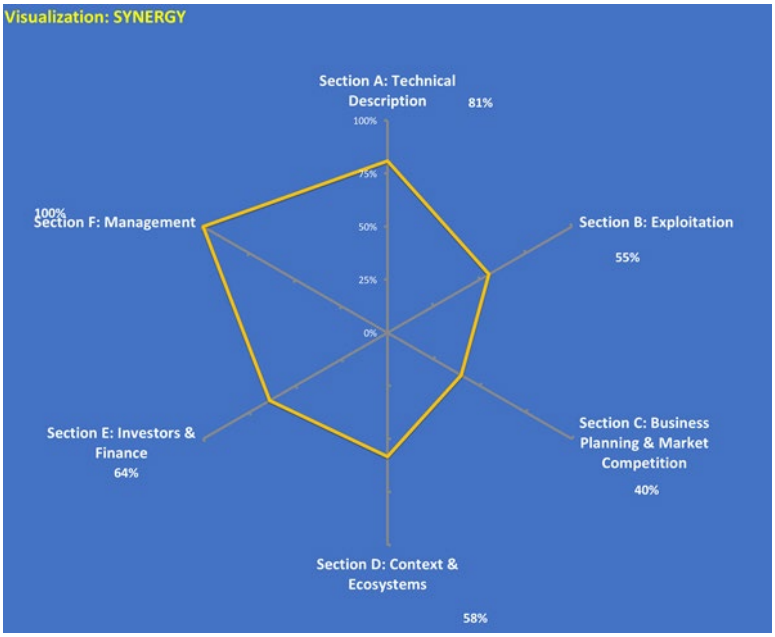

Figure 10: Visualisation SYNERGY

Figure 11: Visualisation REDAP

3.5. FEEDBACK VISUALISATION: SESSION 4

Figure 12: Visualisation SOLAR

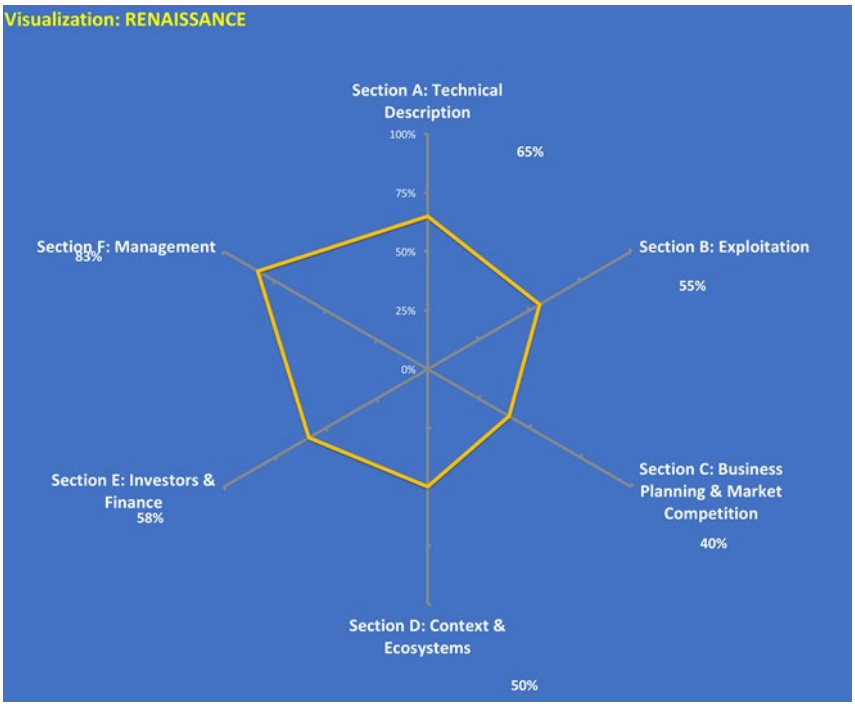

Figure 13: Visualisation RENAISSANCE