Table of Contents

[Table of Contents I](#_Toc58393187)

[Chapter 1 Introduction 2](#_Toc58393188)

[Chapter 2 Internal and external recommendations 3](#_Toc58393189)

[Chapter 3 Modular governance framework 4](#_Toc58393190)

[3.1 CCN structure 4](#_Toc58393191)

[3.2 Transversal activities [INOV] 4](#_Toc58393192)

[3.2.1 Partnership instrument [CNR] 4](#_Toc58393193)

[3.2.2 Cybersecurity training and awareness [BUT] 4](#_Toc58393194)

[3.2.3 Sustainable exploitation and IPR [SMILE] 4](#_Toc58393195)

[3.2.4 Certification organization and support [CETIC] 4](#_Toc58393196)

[3.2.5 Dissemination and communication [INOV] 4](#_Toc58393197)

[3.3 Scientific and technical activities [L3CE] 5](#_Toc58393198)

[3.3.1 Roadmap instrument [TUM] 7](#_Toc58393199)

[3.3.2 Programmes [L3CE] 8](#_Toc58393200)

[3.3.2.1 Program 1: T-SHARK – Full-spectrum cybersecurity awareness [L3CE] 8](#_Toc58393201)

[3.3.2.2 Program 2: CAPE – Continuous assessment in polymorphous environments [IMT] 10](#_Toc58393202)

[3.3.2.3 Program 3: HAII-T – High-Assurance Intelligent Infrastructure Toolkit [CINI] 12](#_Toc58393203)

[3.3.2.4 Program 4: SAFAIR – Secure and Reliable AI Systems for Citizen [ITTI] 14](#_Toc58393204)

[Chapter 4 Lessons learnt 16](#_Toc58393205)

[Chapter 5 Conclusions and perspectives 17](#_Toc58393206)

# Introduction

# Internal and external recommendations

# Modular governance framework

## CCN structure

## Transversal activities [INOV]

### Partnership instrument [CNR]

### Cybersecurity training and awareness [BUT]

### Sustainable exploitation and IPR [SMILE]

### Certification organization and support [CETIC]

### Dissemination and communication [INOV]

## Scientific and technical activities [L3CE]

SPARTA’s scientific and technical activities activities include the road mapping, research, innovation development and piloting activities. In this section we report on the key governance and management takeaways, with regards to the recommendations that were reported in deliverable *D1.2 Lessons learned from internally assessing a CCN pilot*, as well as to other initiatives that contributed to improving the activities and processes in scope.

As governance and management matured from the project bootstrap year (Year1) to the intermediate year (Year2), the focus also turned decisively towards the future CCN setup and operation. In this vein, it is important to emphasize that the purpose of D1.2 was to assess the governance of the pilot, not that of the project.

The D1.2 recommendations that directly concern the scientific and technical activities are presented in the following table.

| **D1.2 reference** | **WP scope****(WP3-WP7)** | **Description (taken from D1.2)** |
| --- | --- | --- |
| GC\_G4 | WP4, WP5, WP6, WP7 | **Cooperations:** Consider co-operation with external initiatives and initiation of independent proposals to extend SPARTA's technological scope. E.g.: calls, projects and initiatives for Secure Society, securing Open Source components, Open Hardware, lowering the barriers to formal verification, changing the "geeky" image of verification into the next cool thing (motto: "programming without verification is something for script kiddies"), etc. |
| GC\_G7 | WP4, WP5, WP6, WP7 | **Alternate Models / Contingency Planning:** Consider experiments for emulating the structure and operation of National Competence Centres and clusters, and for developing corresponding interaction models. One or multiple of the WPs for the technical programs might serve as a conduit:* The scenarios to be modelled can focus on Lithuania (WP4), Italy resp. Germany (WP5), France (WP6) and Spain (WP7).

All work packages, but notably WP5 and WP7, could use some support from ELSA specialists to determine the respective institutional and legal framework. |
| GC\_I1 | WP4, WP5, WP6, WP7 | **Technical Integration:** Clarify the desirable and feasible level of integration between the technical components and results produced by WP4-WP7. Clarify the achievable level of alignment between the four technical programs on the one hand and both WP8 and WP11 on the other. |
| GC\_I2 | WP4, WP5, WP6, WP7 | **ELSA aspects:** The technical work packages WP4 and WP7 actively address areas of potential ethical, social and political concern. They are low hanging fruits for intensifying WP2 (ELSA related activities). Some effort should be invested to determine whether areas of particular ELSA relevance could be located in WP5 and WP6. |
| GC\_I3 | WP4, WP5, WP6, WP7 | **Synergies:** WP5 develops methods for infrastructure and "systems of systems" analysis. Could the results be beneficial for other technical WPs? E.g., are these methods applicable to analyse parts of the technical setup of WP4 or of task 11.4? |
| GC\_I4 | WP4, WP5, WP6, WP7 | **Open Source:** WP5 and WP6 may need support to engage with the Open Source spectrum in an active and sustainable manner.Could the scope of WP11 be extended by an activity targeting relevant Open Source communities? Are there individuals within the consortium or its group of associates who can and are would act as champions? |
| GC\_M1 | WP3 | Four significant governance aspects are not fully covered yet. They all concern horizontal, co-operative and context-dependent activities:(a) Interaction with external entities and communities for validation and certification;(b) Potential joint activities with European agencies, external research programs and projects;(c) Roadmap updates to reflect new threats and cyber defence technologies;(d) Adjustments and extension of legal analysis to the (yet unknown) actual objectives of an ECCC / ECCN.It should be considered to track these four issues regularly and to include them in the list of risks to be managed. |

Table 2: Recommendations regarding scientific and technical activities (WP3, WP4, WP5, WP6, WP7).

In the following sub-sections, a report is provided for each of the roadmap and research programmes activities, detailing the pilot governance and execution improvements in Year 2.

### Roadmap instrument [TUM]

<Please read the introduction of Section 3.3 carefully. You are free to follow any suitable approach for this report. The following suggestions are merely indicative –hope they help. Quality is more important than quantity, but regarding the expected page count: half-page to two-pages is OK.>

<Analyse and report on how the recommendations in Table 2 applied to your WP in Year2, w.r.t. improvements of the activities and processes. Other governance and execution improvements in Year2 may also be relevant, if they contribute to increasing the overall governance maturity in SPARTA.>

**Adherence to SPARTA's research governance activities evolution**

<Describe how the bootstrapping activities evolved and matured in Year2>

**Roadmap sustainability**

<Topic to be developed: roadmapping sustainability and monitoring>

**Roadmap focusing mechanisms**

< Topic to be developed: learnings and further ideas how to handle roadmap under the changing external environment and evolving pilot by itself>

< Topic to be developed: ways to think about future categories / domains, how they should emerge and be incorporated>

**Societally enabled roadmapping of technical research**

<Topics to be developed: roadmapping of “soft” developments, i.e. future skills gaps, policy developments, societal developments (regulatory and other)>

**Friendly coopetition**

<Topic to be developed: integrity cross pilots, SPARTA contribution to cross-pilot workstream>

<Finally, please elaborate how learning from your ongoing experience and insights gathered so far, the “right” governance of EU research and innovation development should be governed in the future perspective and what are the key consideration points (takeaways) for EC while planning CCN governance. What and how EC should implement especially in the means of new/improved ways to govern research projects in the scope of future CCN>

### Programmes [L3CE]

#### Program 1: T-SHARK – Full-spectrum cybersecurity awareness [L3CE]

<Please read the introduction of Section 3.3 carefully. You are free to follow any suitable approach for this report. The following suggestions are merely indicative –hope they help. Quality is more important than quantity, but regarding the expected page count: half-page to two-pages is OK.>

<Analyse and report on how the recommendations in Table 1 applied to your WP in Year2, w.r.t. improvements of the activities and processes. Other governance and execution improvements in Year2 may also be relevant, if they contribute to increasing the overall governance maturity in SPARTA.>

**Adherence to SPARTA's research governance activities evolution**

<Describe how the bootstrapping activities evolved and matured in Year2 from your WP perspective. Impacts of piloting new governance ways, i.e. putting the experts in charge of programmes implementation.>

**Interaction with transversal activities**

< Topics to be considered: relationship between technical work and policy related activities in other WPs’ like certification, exploitation>

< Topics to be considered: directing future knowledge structure establishment, scientific potential development priorities in EU, designing future competence gaps – links to roadmappinig>

**Friendly coopetition**

< Topics to be considered: Friendly coopetation cross-pilot, authorities, national stakeholders. Inside coopetition (within programs, other WPS, among consortium partners. External coopetition with outside entities, leading industry markets, worldwide. International relations through science diplomacy.>

<Major leverage ideas to make it working the best for future research projects>

**Research focusing mechanisms**

< Topics to be considered: incl. different research programme management and governance insights (eg T-SHARK is large-scope, focusing more on national-level while SAFAIR is more focused on technology, niche industry specialization for CAPE, etc.)>

**Time horizon**

<Topics to be considered: time horizons of the research, innovation, SOTA, targeted solution and how to manage it. Is it solving existing (or round the corner) problems or future looking? When developed, will it be on time for market.>

**Societal and ethical perspectives**

<Topics to be considered: Key link with ELSA, towards more technical-societal integrated innovation approach, policy enablement, societally and ethically enabled research >

**Enabling partnerships in research governance**

< Topics to be considered: Engagement of wide stakeholder community (Arbitrage Group, CAPE partners structure). How to make scientific work more open. Going towards more proactive science. Increasing engagement <- explain the complementarity with Partnerships. Development of synergy between scientists, industry and end-users. Place of community and place of diversity in better organized research governance. Science with and for society.>

**Governing research outputs**

< Topics to be considered: early outputs for subsequent innovation or market adoption. Diffusion of innovation components in products, services, processes.>

<Finally, please elaborate how learning from your ongoing experience and insights gathered so far, the “right” governance of EU research and innovation development should be governed in the future perspective and what are the key consideration points (takeaways) for EC while planning CCN governance. What and how EC should implement especially in the means of new/improved ways to govern research projects in the scope of future CCN>

#### Program 2: CAPE – Continuous assessment in polymorphous environments [IMT]

<Please read the introduction of Section 3.3 carefully. You are free to follow any suitable approach for this report. The following suggestions are merely indicative –hope they help. Quality is more important than quantity, but regarding the expected page count: half-page to two-pages is OK.>

<Analyse and report on how the recommendations in Table 1 applied to your WP in Year2, w.r.t. improvements of the activities and processes. Other governance and execution improvements in Year2 may also be relevant, if they contribute to increasing the overall governance maturity in SPARTA.>

**Adherence to SPARTA's research governance activities evolution**

<Describe how the bootstrapping activities evolved and matured in Year2 from your WP perspective. Impacts of piloting new governance ways, i.e. putting the experts in charge of programmes implementation.>

**Interaction with transversal activities**

< Topics to be considered: relationship between technical work and policy related activities in other WPs’ like certification, exploitation>

< Topics to be considered: directing future knowledge structure establishment, scientific potential development priorities in EU, designing future competence gaps – links to roadmappinig>

**Friendly coopetition**

< Topics to be considered: Friendly coopetation cross-pilot, authorities, national stakeholders. Inside coopetition (within programs, other WPS, among consortium partners. External coopetition with outside entities, leading industry markets, worldwide. International relations through science diplomacy.>

<Major leverage ideas to make it working the best for future research projects>

**Research focusing mechanisms**

< Topics to be considered: incl. different research programme management and governance insights (eg T-SHARK is large-scope, focusing more on national-level while SAFAIR is more focused on technology, niche industry specialization for CAPE, etc.)>

**Time horizon**

<Topics to be considered: time horizons of the research, innovation, SOTA, targeted solution and how to manage it. Is it solving existing (or round the corner) problems or future looking? When developed, will it be on time for market.>

**Societal and ethical perspectives**

<Topics to be considered: Key link with ELSA, towards more technical-societal integrated innovation approach, policy enablement, societally and ethically enabled research >

**Enabling partnerships in research governance**

< Topics to be considered: Engagement of wide stakeholder community (Arbitrage Group, CAPE partners structure). How to make scientific work more open. Going towards more proactive science. Increasing engagement <- explain the complementarity with Partnerships. Development of synergy between scientists, industry and end-users. Place of community and place of diversity in better organized research governance. Science with and for society.>

**Governing research outputs**

< Topics to be considered: early outputs for subsequent innovation or market adoption. Diffusion of innovation components in products, services, processes.>

<Finally, please elaborate how learning from your ongoing experience and insights gathered so far, the “right” governance of EU research and innovation development should be governed in the future perspective and what are the key consideration points (takeaways) for EC while planning CCN governance. What and how EC should implement especially in the means of new/improved ways to govern research projects in the scope of future CCN>

#### Program 3: HAII-T – High-Assurance Intelligent Infrastructure Toolkit [CINI]

<Please read the introduction of Section 3.3 carefully. You are free to follow any suitable approach for this report. The following suggestions are merely indicative –hope they help. Quality is more important than quantity, but regarding the expected page count: half-page to two-pages is OK.>

<Analyse and report on how the recommendations in Table 1 applied to your WP in Year2, w.r.t. improvements of the activities and processes. Other governance and execution improvements in Year2 may also be relevant, if they contribute to increasing the overall governance maturity in SPARTA.>

**Adherence to SPARTA's research governance activities evolution**

<Describe how the bootstrapping activities evolved and matured in Year2 from your WP perspective. Impacts of piloting new governance ways, i.e. putting the experts in charge of programmes implementation.>

**Interaction with transversal activities**

< Topics to be considered: relationship between technical work and policy related activities in other WPs’ like certification, exploitation>

< Topics to be considered: directing future knowledge structure establishment, scientific potential development priorities in EU, designing future competence gaps – links to roadmappinig>

**Friendly coopetition**

< Topics to be considered: Friendly coopetation cross-pilot, authorities, national stakeholders. Inside coopetition (within programs, other WPS, among consortium partners. External coopetition with outside entities, leading industry markets, worldwide. International relations through science diplomacy.>

<Major leverage ideas to make it working the best for future research projects>

**Research focusing mechanisms**

< Topics to be considered: incl. different research programme management and governance insights (eg T-SHARK is large-scope, focusing more on national-level while SAFAIR is more focused on technology, niche industry specialization for CAPE, etc.)>

**Time horizon**

<Topics to be considered: time horizons of the research, innovation, SOTA, targeted solution and how to manage it. Is it solving existing (or round the corner) problems or future looking? When developed, will it be on time for market.>

**Societal and ethical perspectives**

<Topics to be considered: Key link with ELSA, towards more technical-societal integrated innovation approach, policy enablement, societally and ethically enabled research >

**Enabling partnerships in research governance**

< Topics to be considered: Engagement of wide stakeholder community (Arbitrage Group, CAPE partners structure). How to make scientific work more open. Going towards more proactive science. Increasing engagement <- explain the complementarity with Partnerships. Development of synergy between scientists, industry and end-users. Place of community and place of diversity in better organized research governance. Science with and for society.>

**Governing research outputs**

< Topics to be considered: early outputs for subsequent innovation or market adoption. Diffusion of innovation components in products, services, processes.>

<Finally, please elaborate how learning from your ongoing experience and insights gathered so far, the “right” governance of EU research and innovation development should be governed in the future perspective and what are the key consideration points (takeaways) for EC while planning CCN governance. What and how EC should implement especially in the means of new/improved ways to govern research projects in the scope of future CCN>

#### Program 4: SAFAIR – Secure and Reliable AI Systems for Citizen [ITTI]

<Please read the introduction of Section 3.3 carefully. You are free to follow any suitable approach for this report. The following suggestions are merely indicative –hope they help. Quality is more important than quantity, but regarding the expected page count: half-page to two-pages is OK.>

<Analyse and report on how the recommendations in Table 1 applied to your WP in Year2, w.r.t. improvements of the activities and processes. Other governance and execution improvements in Year2 may also be relevant, if they contribute to increasing the overall governance maturity in SPARTA.>

**Adherence to SPARTA's research governance activities evolution**

SAFAIR participates in the balancing strategic goals and adaptation to changes approach to program governance perpetuated in SPARTA. The SAFAIR program encompasses 7 partners, a small team focused on achieving the program technological and ethical goals. The program delegates representatives to the Executive Board, the body supervising the execution of the SPARTA mission. SAFAIR also contributed to the SPARTA Roadmap, Joint Competence Centre Infrastructure (JCCI) and ELSA aspects. SAFAIR maintains the SPARTA open leadership to foster scientific excellence. SAFAIR, at its core, builds digital platforms that seek to pre-emptively answer the needs of the market, anticipating the immense impact AI technologies will have in the near future, and dealing with some of the still unanswered questions regarding AI – its security, explainabililty and fairness.

**Interaction with transversal activities**

SAFAIR took an active role in the contribution to the development of SPARTA Roadmap. Moreover, the leader of WP3 – TUM – is one of the partners on the SAFAIR team. Similarly, SAFAIR contributes to WP2 – ELSA, while at the same time UNamur, who leads WP2 is part of the SAFAIR team. VICOM, who leads the work on JCCI is also on the SAFAIR team and has access to the artifacts produced by the program. Recently, in order to mainstream ELSA-relevant topics SAFAIR published a text on ethical dilemmas in cybersecurity authored by ITTI, available here: <https://sparta.eu/news/2020-12-10-ethical-dilemmas-related-to-cybersecurity.html>

On the other hand, SAFAIR is not (and does not plan to be) involved in any certification or standardization activities, rather focusing on quick progress, publications and demos.

**Friendly coopetition**

SAFAIR organises a competition (task lead by TUM) as external validation of the results of research conducted. The details of the competition are delineated in d7.3.

**Research focusing mechanisms**

SAFAIR is the smallest of the SPARTA programs, which allows to perpetuate certain governance concepts not available for larger structures. SAFAIR uses open and lean governance structure without any heavy-like management structures or procedures. The participatory leadership approach creates an environment conductive to research innovation. This is crucial because of the technology-focused nature of SAFAIR and allows to play to the strengths of the partners involved in SAFAIR, acquiring significant synergies. The results of those synergies are clearly visible when consulting the technology-focused deliverables: d7.1, d7.2 and d7.4.

**Time horizon**

SAFAIR is fully aware of the usefulness and prominence of cross-domain leverage, especially in subjects as ubiquitous as artificial intelligence. To boost the impact of research conducted in SAFAIR, the findings are adapted across different verticals, like cybersecurity or medical imaging. The work conducted in SAFAIR sits at the very forefront of scientific research, dealing with both some of the most pressing, and some of the newest, most current, emerging issues in AI. The horizontal nature of innovation in AI in general and in SAFAIR in particular, ensures that the artifacts produced maintain high relevance across different fields. The digital character of produced results provides quicker and easier adaptability, thus maximising the impact of the investment.

**Societal and ethical perspectives**

All data-related technologies are directly linked to ethical and societal aspects. SAFAIR holds a proverbial finger on top of the current legislative environment w.r.t. data protection and privacy protection. At the same time, one of the aspects of the SAFAIR program – fairness of AI – has strong roots in ELSA. One could say, that SAFAIR is the technological twin/arm of ELSA – focused on developing technologies to meet ELSA needs. The consequences of ethical aspects of the proliferation of AI are recognised in SAFAIR and a specific task on developing the fairness ensuring mechanisms is dedicated to that aspect in the program. By the same token SAFAIR remains in communication with the SPARTA-level ELSA work package (WP2). Recently, in order to mainstream ELSA-relevant topics SAFAIR published a text on ethical dilemmas in cybersecurity authored by ITTI, available here: <https://sparta.eu/news/2020-12-10-ethical-dilemmas-related-to-cybersecurity.html>

**Enabling partnerships in research governance**

< Topics to be considered: Engagement of wide stakeholder community (Arbitrage Group, CAPE partners structure). How to make scientific work more open. Going towards more proactive science. Increasing engagement <- explain the complementarity with Partnerships. Development of synergy between scientists, industry and end-users. Place of community and place of diversity in better organized research governance. Science with and for society.>

SAFAIR is a small scale focused research programme. We mainly engage with scientific community at high-quality events such as scientific conferences in cybersecurity or AI (such as CORE-ranked ICCs, IJCNN and ARES) etc.

**Governing research outputs**

The adoption of the results of SAFAIR research follows a similar pattern of the adoption of AI technologies, as SAFAIR is closely tied-in with those. Wherever AI is used in critical applications the need for security, explainability and, in many cases, fairness arises. Thus, components of the artifacts created in the SAFAIR program can relatively easily find their way to being adopted across multiple different verticals, and products, services and processes related to those.

<Finally, please elaborate how learning from your ongoing experience and insights gathered so far, the “right” governance of EU research and innovation development should be governed in the future perspective and what are the key consideration points (takeaways) for EC while planning CCN governance. What and how EC should implement especially in the means of new/improved ways to govern research projects in the scope of future CCN>

# Lessons learnt

# Conclusions and perspectives