



BANCSIA

Subjective Bayesian Cyber Intelligence Analysis

Research project proposal to improve societal security and emergency preparedness.

<https://www.forskningradet.no/en/call-for-proposals/2026/research-to-improve-societal-security-and-emergency-preparedness/>

1 About the project

1.1 Objectives

BANCSIA focuses on developing and validating new methods for cyber intelligence analysis and decision making that are needed in an increasingly complex global cyber threat landscape. BANCSIA's interdisciplinary research will combine Subjective Bayesian Networks and Causality, Cyber Treat Intelligence, AI, Computational Trust, Risk Assessment, and Psychology for Decision Making. The value of BANCSIA will be to strengthen our ability to understand and make decisions about cyber risks.

Secondary objectives

1. Investigate and develop methods that strengthen the ability of AI classifiers to reason with degrees of epistemic uncertainty, and to produce output that reflects the inherent uncertainty of the input. The result will be improved interpretability of results produced by AI classifiers.
2. Develop an extension of the Admiralty Code for intelligence analysis based on source trust assessment and computational trust using subjective trust networks. The result will be strengthened intelligence-based decision making.
3. Develop cyber threat and risk assessment tools that leverage AI and Bayesian reasoning to correctly represent the inherent uncertainty of risk assessments. The result will be strengthened risk-based decision-making.
4. Conduct experiments with both people and AI-agents to evaluate interpretation and cyber decision-making based on trust assessments, cyber intelligence and Bayesian analysis produced by the developed methods and tools. The result will be practical tools and methods which will enhance cyber situation awareness and decision-making by organizations and CERTs (Computer Emergency Response Team) to strengthen their protection against cyber threats.

These technologies will significantly shift the balance in favour of the defenders of lawful business processes in cyberspace, and in general harden the Norwegian society's resilience against cyber threats.



1.2 Summary

BANCSIA focuses on developing and validating new methods for cyber intelligence analysis and decision making that are needed in an increasingly complex global cyber threat landscape. BANCSIA's interdisciplinary research will combine Subjective Bayesian Networks and Causality, Cyber Treat Intelligence, AI, Computational Trust, Risk Assessment, and Psychology for Decision Making. The value of BANCSIA will be to strengthen our ability to understand and make decisions about cyber risks.

In particular, BANCSIA will:

- 1) Investigate and develop methods that enable AI models able to reason with degrees of epistemic uncertainty, and to produce output that reflects the inherent uncertainty of the input. This is necessary for making AI models more robust and for improving the interpretability of output results.
- 2) Develop an improved Admiralty Code model for intelligence analysis based on source trust assessment and computational trust using subjective trust networks.
- 3) Develop cyber threat and risk assessment tools that leverage AI and Bayesian reasoning to correctly represent the inherent uncertainty of risk assessments.
- 4) Conduct psychological experiments with interpretation and decision making based on trust assessments, cyber intelligence and Bayesian analysis produced by the developed methods and tools. This is to validate the level of improved situation awareness and decision-making in cyber risk management.

2 Excellence

2.1 Solidity

Knowledge needs and project objectives

Summarise the state of the art of the research area/field and describe the knowledge needs and challenges that justify the initiation of the project. Elaborate the primary and secondary objectives of the project in the context of the state of the art and knowledge needs. Max 5000 characters.

<Text here>



Research questions and hypotheses, theoretical approach and methodology

Give a detailed description that enables the panel to understand what you are proposing, how the project will be carried out and whether it is feasible. Refer to the work packages.

Make sure that the theoretical approach and/or choice of methods is well accounted for and described in detail, and that it is clear how the methods are adequate for addressing the research questions, hypotheses and objectives.

If relevant, specify why you have chosen an interdisciplinary approach.

Describe how you will involve/use relevant stakeholder/user knowledge.

If relevant, describe how to avoid potentially undesirable effects from the research on human and animal health, climate and the environment and society at large. Max 5000 characters.

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Ethical issues

Give a brief description of how you will deal with ethical issues to assure the panel that there is an appropriate plan for managing any such issues. The responsibility for ensuring that the standard for research ethics is followed lies with the individual researcher and organisation. Max 2000 chars.

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Gender perspectives

If relevant to the research in the project, describe how the gender perspective has been taken into account. This is about the content of the research and how the gender dimension is treated in research design and analyses. Gender perspectives can provide new insights, more precise and valid research results, and thus improve the quality and relevance of research to society.

If gender perspectives are not relevant, enter "not relevant" in the text field. Max 2000 characters.

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2.2 Originality

The panel will assess the application in light of the purpose of the call for proposals and the assessment points under the criterion. The assessment points can be found on the "Guidance" page. The purpose can be found in the call for proposals.

Potential for challenging the state of the art

Describe the potential for development of new knowledge beyond the current state of the art, including significant theoretical, methodological, experimental and/or empirical advancements.

Highlight particularly novel, original or ambitious aspects of the project, e.g., objectives, research questions/hypotheses, approaches and/or methodology. Max 5000 characters.

<Text here>

List of references

Enter references to relevant and important research the project is based on. Max 5000 characters.

<References here>

3 Impact

3.1 Potential

Academic impact

Building on the objectives of the project and the description of its originality, describe clearly why and how the project outputs may address important present and/or future scientific challenges and have an impact on the research area/field, if successful.

Describe how to ensure reproducibility and reusability of project outputs through open science practice such as FAIR data, software, models, algorithms, etc. Max 5000 characters.

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Societal impact



Building on your description of knowledge needs, explain why and how the project outputs, if successful, have the potential to meet the challenge(s) you have mentioned.

Describe how new knowledge and project outputs have the potential to address one or more of the UN's Sustainable Development Goals (SDGs). Max 5000 characters.

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The United Nations' Sustainable Development Goals

Explain which relevant sub-goal(s) under the UN Sustainable Development Goals the project will contribute to. Refer to specific sub-goals and substantiate the effects in light of the indicators defined by the UN for each sub-goal.

Check relevant goal, sub-goals and indicators in the Global indicator framework for the SDG and targets of the 2030 Agenda for Sustainable Development. Max 2000 characters.

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Potential for value creation

Describe why and how the project outputs will promote future value creation in industry, the public sector and/or civil society. Max 2000 characters.

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3.2 Knowledge sharing and exploitation

Measures for communication and exploitation

Describe how Open Science practices will ensure early and open sharing and wide distribution of research outputs.

Describe the target audiences, including stakeholders/users, of the project outputs (in or beyond the scientific community).

Outline the scope and plans for dissemination, communication and engagement activities.



Provide a brief description of the planned activities that will contribute to the realisation of the potential impacts of the project outputs (in or beyond the scientific field).

Describe how the stakeholders/users are involved in the dissemination and utilisation of the project results. Max 5000 chars

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4 Implementation

4.1 Competence

Describe the project group's overall expertise and experience and explain the relevance for carrying out the project with high quality. Explain how their expertise covers the project's scientific and methodological needs and high ability to implement.

For the project manager and up to four of the most central project participants, you can also enter individual résumés.

We use a flexible narrative CV template developed by UK Research and Innovation for the individual competency descriptions.

Everyone mentioned by name here must also be entered as under the menu item "Roles in the project" in the application. This is necessary in order for potential evaluators to be able to consider their impartiality before they are given access to the entire application.

Project team

Enter the names and give a brief description of the role each person will have in the project to give the panel an overview of the group.

Make sure that all names are also registered under "Roles in the project".

Describe the project group's overall expertise and experience and explain the relevance for carrying out the project with high quality. Explain how their expertise covers the project's scientific and methodological needs and a high ability to implement. Emphasize conditions that are of relevance to this project. Max 3000 characters.



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Project manager: Résumé for research and innovation expertise

Prof. Audun Jøsang, UiO, ORCID: [0000-0001-6337-2264](https://orcid.org/0000-0001-6337-2264)

M1: Highly recognized research results in cybersecurity and trust management:

- Most cited at IFI/UiO: > 230 publications, > 23,000 citations, h-index = 57.
- Developed Subjective Logic specifically for modeling trust in security contexts.
- Authored the widely cited and applied research monograph Subjective Logic (Springer, 2016).
- Provided the scientific basis and patents for [PONE Biometrics](#)' high-level security ID token.

M2: Extensive project experience:

- Has led several national and international research projects:
 - CyberHunt, UiO, NOK 15 million, funded by IKTPLUSS, RCN
 - P4C (Partnership for Cybersec), UiO. NOK 4 million, funded by IntPart, RCN
 - Oslo Analytics, UiO. NOK 14 million, funded by IKTPLUSS, RCN
 - ABRI , UiO. US\$400,000, funded by the US Army Research Labs, USA
 - WS Trust, QUT, AU\$300,000, funded by ARC, Australia.
- Initiated [AFSecurity](#) at UiO in 2008, the security seminar with the longest history in Norway.
- Participates in international [research projects](#).
- Established three courses on cybersecurity at UiO: [IN2120](#), [IN5080](#) and [ITEVU4230](#).
- Established two courses on security at QUT in Australia between 2000 and 2008.

M3: Substantial contributions to the wider cybersecurity R&I community:

- Founded the Digital Security Research Group at UiO.
- Supervised to successful completion:
 - 10 PhD students at UiO and QUT.
 - 100 Master students at UiO, QUT and NTNU.
- Regularly acts as examiner for PhD candidates, and reviewer for journals and conferences.
- Organizes the [Finse Cybersecurity Winter School](#).

M4: Leadership in cybersecurity:

- Steering committee leader of [NordSec](#).
- Norway's representative to [IFIP TC 11: Security and Privacy Protection in Information Processing Systems](#).



- Organized several international scientific security conferences, e.g. [IFIP SEC 2021](#), [ECCWS 2018](#), [NordSec 2009](#), and regularly, acts as co-chair e.g. for [FUSION 2026](#) in Trondheim.
- Regularly gives interviews and writes articles on cybersecurity in the [popular press](#).

Project participant 1: Résumé for research and innovation expertise

Prof. Geir Olve Storvik, UiO, ORCID: [0000-0001-8198-1426](#)

Structure the résumé into the four module headings M1 – M4.

Emphasize conditions that are of relevance to this project. If you want to add relevant references, enter the title of the article, the name of the journal and the year. Max 2000 characters.

M1: Explain your contributions to the generation of new ideas, tools, methodologies or knowledge.

<Text here>

M2: Explain your contributions to the development of others and maintenance of effective working relationships.

<Text here>

M3: Explain your contributions to the wider research and innovation community.

<Text here>

M4: Explain your contributions to broader research or innovation users and audiences and towards wider societal benefit.

<Text here>

Project participant 2: Résumé for research and innovation expertise

Dr. Christina Thunberg, UiO, ORCID: [0000-0001-6607-2689](#)

Structure the résumé into the four module headings M1 – M4.

Emphasize conditions that are of relevance to this project. If you want to add relevant references, enter the title of the article, the name of the journal and the year. Max 2000 characters.



M1: Explain your contributions to the generation of new ideas, tools, methodologies or knowledge.

<Text here>

M2: Explain your contributions to the development of others and maintenance of effective working relationships.

<Text here>

M3: Explain your contributions to the wider research and innovation community.

<Text here>

M4: Explain your contributions to broader research or innovation users and audiences and towards wider societal benefit.

<Text here>

Project participant 3: Résumé for research and innovation expertise

Dr. Martin Eian, Mnemonic, ORCID: [0009-0004-7461-3202](https://orcid.org/0009-0004-7461-3202)

Structure the résumé into the four module headings M1 – M4.

Emphasize conditions that are of relevance to this project. If you want to add relevant references, enter the title of the article, the name of the journal and the year. Max 2000 characters.

M1: Explain your contributions to the generation of new ideas, tools, methodologies or knowledge.

<Text here>

M2: Explain your contributions to the development of others and maintenance of effective working relationships.

<Text here>

M3: Explain your contributions to the wider research and innovation community.

<Text here>



M4: Explain your contributions to broader research or innovation users and audiences and towards wider societal benefit.

<Text here>

Project participant 4: Résumé for research and innovation expertise

Espen Nodeland, KraftCERT, LinkedIn: no.linkedin.com/in/espen-nodeland-774b03148

Structure the résumé into the four module headings M1 – M4.

Emphasize conditions that are of relevance to this project. If you want to add relevant references, enter the title of the article, the name of the journal and the year. Max 2000 characters.

M1: Explain your contributions to the generation of new ideas, tools, methodologies or knowledge.

<Text here>

M2: Explain your contributions to the development of others and maintenance of effective working relationships.

<Text here>

M3: Explain your contributions to the wider research and innovation community.

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M4: Explain your contributions to broader research or innovation users and audiences and towards wider societal benefit.

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4.2 2. BANCSIA Organisation

BANCSIA will be managed by the University of Oslo with a consortium of national partners. It is planned to have two PhD students funded by the project.



The call for project proposals has deadline is 10.06.2026. Given successful funding, the project starts in 2027.

List of proposed partners

4.3 Partner Rep.	4.4 Institution	4.5 Domain
Prof. Audun Jøsang	UiO, Informatics Dept.	Project leader, computational trust
Dr. Christina Thunberg	UiO, Psychology Dept.	Decision Making
Espen Nodeland	KraftCERT	Cyber Intelligence
A.Prof. Ida Scheel	UiO, Mathematics Dept.	AI and Bayesian Analysis
Dr. Martin Eian	Mnemonic, Norway	Cyber risk
Espen Nodeland	KraftCERT	Cyber Response

Prof. Audun Jøsang (project leader) is a cybersecurity expert with 230 publications cited 23000 times, and with h-index of 57. He is the author of textbooks on cybersecurity and has also published a research monograph on subjective logic. He worked internationally both in the industry and academic community for 15 years before joining UiO in 2008. He has managed research projects under national and international (Australia and USA) funding programs with significant outcomes. This background gives Prof. Jøsang the expertise and experience needed for ensuring valuable and groundbreaking outcomes of BANCSIA.