VeTSS RESEARCH INSTITUTE IN VERIFIED TRUSTWORTHY SOFTWARE SYSTEMS

Imperial College London

EPSRC Engineering and Physical Sciences Research Council

FUNDING CALL: DIGITAL SECURITY THROUGH VERIFICATION

Closing date: 20th January, 9am *Funded by the National Cyber Security Centre (NCSC)*

BACKGROUND

The Research Institute in Verified Trustworthy Software Systems (VeTSS, https://vetss.org.uk), hosted at Imperial College London, is a UK Academic Research Institute in Cyber Security, funded by the Engineering and Physical Sciences Research Council (EPSRC), 2017-2022. This VeTSS funding call is for approximately £300K to be spent between 1/4/2020 and 31/3/2021, funded by NCSC. PhD studentships will not be considered this year since the current VeTSS funding finishes on 31/3/2022.

THE CALL

Modern computer systems provide unprecedented benefits to society, science, technology and health, making their reliability and security of crucial importance. However, current methods for establishing such trust in our software are insufficient; system faults are pervasive, resulting in privacy violations, intellectual and monetary theft, and even loss of life. Verification techniques, in their broadest sense, are essential for validating the reliability and security of our international software infrastructure.

This VeTSS call on 'Digital Security through Verification' focusses on how to embed verification into the heart of our modern software systems. This call complements the current ISCF 'Digital Security by Design' programme, which has the specific focus on capability hardware, building on a proposed Arm processor and the work of the CHERI project at the University of Cambridge. As usual, proposals that focus on analysis, testing and verification of software in general are also very much encouraged.

- **Verified Software Development**. Mainstream developers are benefiting from scalable analysis tools used inside the large, open systems of technological giants, such as Amazon, Facebook and Google. Such tools are currently limited to lightweight bug-finding, but many of their underlying mathematical techniques can also be used for verification. This call welcomes proposals on the development of verification tools for the specialist, and eventually the mainstream, developer to verify programs written in traditional languages, such as C, C++, Java and JavaScript, and also more modern languages, such as Rust, Verona, and WebAssembly.
- **Verified Software Infrastructure**. A key challenge is to verify important parts of our software infrastructure, and understand how these verified parts interact with the rest of the infrastructure. Success stories include: the verified microkernel seL4; the verified C compiler CompCert; the verified autonomous helicopter software for the DARPA HACMS project; and the verification work at Cambridge associated with the ARM/CHERI project. This call welcomes proposals that explore the verification of such specialist software, paying particular attention to understanding how such verification can be simplified, extended, maintained and integrated within our software infrastructure. Given the current call on 'Digital Security by Design', this VeTSS call is particularly interested in the combination of verification with encapsulation techniques embedded in our hardware and programming languages.
- **Verified Continuous Software Behaviour.** Many modern applications use software that combines continuous and discrete behaviour: for example, the software associated with cyber-physical and hybrid systems; data systems; and reactive systems. The combination of continuous and discrete behaviour is a challenge for verification: for example, developers have a poor intuitive understanding of how their machine-learning algorithms behave, let alone of how to verify them. This call welcomes proposals to identify and solve significant verification challenges of software which combines continuous and discrete behaviour.

  These highlighted problems are by no means comprehensive. The expectation is that proposals for this call will address numerous problems associated with the aim of placing verified software at the heart of the overall software infrastructure.

PROPOSAL DETAILS

VeTSS would like to support excellent proposals that are perhaps more difficult to fund through EPSRC and industry: examples include proposals transferring technology from academia to industry; proposals on ambitious blue-sky research as a step towards more standard funding; and proposals focussing on the development of properly engineered tools rather than cutting-edge research. Finally, VeTSS would also support proposals for bringing talented international PhD students/RAs/academics to spend time with UK research groups, proposals for international workshops, and proposals for continuity funding for previously funded VeTSS projects, although the expectation is that these projects will be further funded through EPSRC and industry.

This is the fourth VeTSS call. The previous calls were highly competitive. Proposals should provide evidence of engagement with the international academic or industrial verification community, or the UK industrial community interested in applying such techniques to industrial practice.

APPLICATION GUIDELINES.

The application process for this call is deliberately lightweight. The submission should contain:

- A 3-page project proposal with an additional page for references, following EPSRC formatting guidelines: the font should be 11 point Arial or Helvetica, with 2 cm margins.
- 2-page CVs for each of the investigators and named researchers including: a list of current and past grants and a web link to publications.
- A separate list of publications relevant to the proposal.
- A 1-page detailed breakdown of costs, by year, with justification including, for example, investigator time, equipment, travel and expenses. Prices should be quoted without VAT. The research will be funded at 100% Full Economic Cost and will cover overheads, estates costs and any applicable indirect costs.

The expectation is that the costs will be between £50–£100K per proposal.

ELIGIBILITY AND CONDITIONS

The PI must be eligible to apply for EPSRC funding. Only one proposal will be accepted per PI. The investigators of projects funded in this call are expected to become core VeTSS members and to play an active role in VeTSS. They are required to complete a final report. The funders are committed to full and open publication of the research outputs of VeTSS in line with normal academic practice. The funding and contract will be under the NCSC's standard terms and conditions; a draft copy of the contract can be made available on request.

APPLICATION AND SELECTION

Applications should be sent to Teresa Carbajo Garcia by ***9am on 20th January 2020.*** Proposals will be assessed by a panel of verification experts from academia, industry and government, who will judge the proposals on quality, viability and significance. Enquiries regarding the academic scope and objectives of this call should be directed to Dr Petar Maksimovic, Academic Program Manager of VeTSS. Enquiries regarding the application process should be addressed to Teresa Carbajo Garcia, Administrative Program Manager of VeTSS.

KEY DATES:

CALL PUBLISHED	*1st January 2020*
PROPOSALS SUBMITTED	*20th January 2020 by 9am*
RESULT ANNOUNCEMENT	*By 4th February 2020*
RESEARCH PERIOD	*Usually 1st April 2020 – 31st March 2021*