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# STFC – NARIT 2017

**Capacity Building in Software & Hardware Infrastructure and Data handling through Astronomy Scoping Projects**

**Justification of Resources**

### COMPLIANCE WITH THE DATA PROTECTION ACT 1998

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### This template should be completed using Arial (or an equivalent) and a minimum font size of 11. A minimum of single line spacing and standard character spacing must be used. Margins must not be less than 2cm and the full document must be no more than **2 A4 pages**.

**Summary of combined total requested**

Please complete all boxes.

|  |  |  |
| --- | --- | --- |
|  | **In Thai Baht** | **In UK pounds** |
| Thailand funding requested |  |  |
| UK funding requested | 3832520 | 88368 |
| Total funding requested |  |  |

**UK Applicants – All PIs and Co-Is listed must be added to the JeS system**

Please provide the names, full affiliations and details of all lead and co-investigators.

|  |  |  |  |
| --- | --- | --- | --- |
| **Role (PI or co-I)** | **Name** | **Organisation** | **Division or**  **Department** |
| PI | Dr. James Mullaney | The University of Sheffield | Department of Physics and Astronomy |
| Co-I | Dr. Krzysztof Ulaczyk | The University of Warwick | Department of Physics |
| Co-I | Dr. Justyn Maund | The University of Sheffield | Department of Physics and Astronomy |

## Thai Applicants – All PIs and Co-Is listed must be added to the JeS system

Please provide the names, full affiliations and details of all lead and co-investigators.

|  |  |  |  |
| --- | --- | --- | --- |
| **Role (PI or co-I)** | **Name** | **Organisation** | **Division or Department** |
| PI | Dr.Utane Sawangwit | NARIT | Research and Development |
| co-I | Dr. Supachai Awiphan | NARIT | Research and Development |
| co-I | Dr.Natthakan Iam-On | Mae Fah Luang U. | School of IT |
| co-I | Dr. Surapong Uttama | Mae Fah Luang U. | School of IT |
| co-I | Dr.Anan Eungwanichayapant | Mae Fah Luang U. | School of Science |
| co-I | Dr.Tossapon Boongoen | Mae Fah Luang U. | School of IT |

## Justification of UK costs [One A4 page maximum]

|  |
| --- |
| We request funding for three UK partners: Mullaney, Ulaczyk, and Maund. All are needed for their unique roles within GOTO. Ulaczyk is involved with instrument development and in-house data processing, Mullaney has experience in adapting the LSST software stack to process and analyse GOTO data, and Maund has experience in developing ML algorithms for source classification. Mullaney and Ulaczyk will devote 20% FTE to the project. Maund’s FEC is funded via a Royal Society Fellowship, so he requests only travel funds to visit Thailand (see later).  We request a total of 10120 GBP to support visits to the UK by Thai partners and staff. This is broken down as follows: two staff visiting for a total of 14 days @ 100 GBP per day, one student visiting for a total of 1 month @ 60 GBP per day, one student visiting for 3 months @ 60 GBP per day (lower rate is based on self-catering rental accommodation, as opposed to hotels).  Outside the periods when the Thai students are visiting the UK, the UK partners’ time will be broken down approximately as follows (averaged over the year):   * one hour preparing for the weekly telecons. Reviewing notes from the previous week’s telecon and setting an agenda for the current week’s telecon. * one hour spent attending the weekly telecons. * two hours spent reviewing the progress of the Thai students. This will involve downloading the latest updates to the software from GitHub, testing this software and determining what is required to make improvements. * one hour addressing students’ questions. More time will be allocated to this during the first few months of the project as the students get up to speed with the project.   While the students are visiting the UK, the UK partners will spend the equivalent of one day per week working with the students.  Over the 24-month period of funding, the UK partners will allocate 200 hours each to the organization and preparation of the practical workshops. This will include working with the Thai staff and students in establishing appropriate cloud-based infrastructure and material for the workshops, planning the content of the workshop and preparing lectures, practical sessions, reading material, and homeworks.  The UK partners request funding for two return economy flights to Thailand per person per year, costed at 1000 GBP per return (total 12,000 GBP). One of these return flights will be to attend the practical workshop each July. The second of these flights will be roughly six months after each workshop to spend a week working alongside the Thai partners and students. From our experience from Phase 1, these face-to-face meetings are immensely important for providing ready feedback on current progress and work with the Thai partners and students to decide the direction of the project during the remaining 5-6 months.  We also request 2000 GBP to lease computing time on Amazon Web Service’s Elastic MapReduce system to test the feasibility of a HDFS GOTO database. This is based on a 4-core, 15GB memory system priced at 0.35 GBP per hour, averaging at 6 hours per day for 24 months (1520 GBP) plus 1TB storage for 24 months at 20 GBP per month (480 GBP). This also covers the cost of the using this service for the 5-day practical workshops.  The FECs for Mullaney, Ulaczyk and Maund are broken down as (values in brackets give STFC’s 80% contribution; all values in GBP):  Mullaney (The University of Sheffield):   * Dir. Incurred: Travel: 4000 (3200); Computing: 2000 (1600); Visits: 10120 (8440) * Dir. Alloc: Investigators: 23843 (19074), Estates: 4754 (3803), Infrastructure: 429 (343) * Indirect: 15577 (12462)   Ulaczyk (The University of Warwick):   * Dir. Incurred: Travel: 4000 (3200) * Dir. alloc.: Investigators: 18654 (14923), Estates: 6578 (5262), Infrastructure: 308 (246) * Indirect: 16198 (12958)   Maund (The University of Sheffield):   * Dir. Incurred: Travel: 4000 (3200)   Total: 110460 (88368) |

**Justification of Thai costs**

*Please break down your Thai costs, explaining why the resources requested are appropriate for the activities proposed, taking into account the nature and complexity of the proposal. It should* ***not*** *be simply a list of the resources required*, *please refer to the guidance provided for what to include. One A4 page maximum.*

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| (a) Cost of human resources (total of 1,112k Thai Baht): 6 Thai investigators contributing 4 months FTE (100k per month FTE + 25% overhead), 3 M.Sc. (144k each) and 1 Ph.D. student (180k) RAs are included in the project. They involve in the three major parts, each of which makes use of ML concepts and algorithms in delivering system/software prototype and publication(s):   * Development of data storage and retrieval that is effective for Big data and domain-specific requirements, with a well-designed connection to down-streaming analysis. One M.Sc. RA is responsible for this task, jointly supervised by Thai and UK investigators. * Development of image data preparation and feature extraction that will lead to an informative basis of classification modelling. One M.Sc. RA is responsible for this task, jointly supervised by Thai and UK investigators. * Development of ML models for data classification, including the exploration of various conventional and advance techniques. One M.Sc. RA is responsible for this task, while another Ph.D. RA will make a contribution with new ideas for this classification tasks. Both are jointly supervised by Thai and UK investigators.   (b) Cost of practical workshops held in Thailand (total: 500k Thai Baht): this is to disseminate the skills and knowledge the research team has acquired to general students, staff of NARIT, and associates. This will provide attendees with the skills to set up databases at their own institutes as well as give them a solid foundation in ML-based technique. As a result, a potential outcome would be an enhanced possibility for Thai students/researchers with an astronomy background to enter economically important sectors with a need for Big Data analyses (e.g., finance, insurance, medical, defence, etc).  (c) Cost of international travel (subsistence for UK delegates in Thailand, 336k Thai Baht): UK investigators will visit Thailand four times: attending each of the workshops, plus another meeting per year. Maund will cover the cost of his subsistence from his own grant. |

**Summary of Thai Costs (Baht)**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Year 1 | | Total (Baht) |
| Months 1-6 | Months 7-12 |
| Investigator salary costs |  |  |  |
| Salary of research assistant |  |  |  |
| Consumables/ materials |  |  |  |
| Other expenses |  |  |  |
| Equipment |  |  |  |
| International travel |  |  |  |
| Total per period (6 months) |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Year 2 | | Total (Baht) |
| Months 1-6 | Months 7-12 |
| Investigator salary costs |  |  |  |
| Salary of research assistant |  |  |  |
| Consumables/ materials |  |  |  |
| Other expenses |  |  |  |
| Equipment |  |  |  |
| International travel |  |  |  |
| Total per period (6 months) |  |  |  |