

# From Stars to Baht: Broadening the economic impact of astronomical data handling techniques in Thailand

## Justification of resources

### 1 Directly Incurred Costs: 20,819 (all values in GBP)

**Networking events:** We will hold three 3-day networking events in Chiang-Rai to be attended by all co-I's, students and representatives from the external partners (30 people). The first is to introduce the team to the external partners and to start to understand their needs, a second after six months to provide updates to all partners and ensure everything is on-track, and a third at the end of the project for feedback and to explore future prospects of the partnerships. Each event is costed at 2728 and covers: hotel and flight costs for 5 participants not based in Chiang-Rai (1172), transport within Chiang-Rai (234), food and drink (970) and meeting room (352). Total: 8184. **Transport to clients:** We have budgeted 773 for transport to the external partners' sites during the course of the project. **User training:** We will hold a six-day workshop to train the external partners in the use of our systems. For this, we have budgeted for: meeting room (703), food and drink (646), transport (609). Total: 1959. **Consumables:** We request 7500 to buy a network of five high-performance computers. This is the minimum needed to produce a working distributed database on which the external partners data can be stored and managed effectively. On this network, we will install the *Hadoop* databasing ecosystem - the most well known solution for distributed data storage, management and analytics system - and use it to both research the optimum data storage and management solutions for our external partners and to train the end users. The network will consist of 1×Hadoop cluster management module (Quad-core, 32 GB RAM; 1406), 1×Database service module (Quad-core, 32 GB RAM; 1406), 1×Hadoop Namenode (Quad-core, 32 GB RAM; 1406), 2×Hadoop Datanodes (Quad core, 64 GB RAM each; total for both 3281). **Outreach:** At the end of the project, we will host an outreach event in a public space (e.g., shopping mall) to demonstrate to the public and other businesses (i.e., potential future partners) the benefits of science in general and data science specifically. Total: 2403

### 2 Investigator Effort: 41,250

**Thai salaries:** There are seven Thai co-Is on the grant, six of which we request 0.2FTE each. We request an extra 0.2FTE for Dr. Boongoen to account for his managerial role on the project (resulting in 0.4FTE for him). The 0.2FTE is justified on the basis that all co-I's will attend the 3-day networking events (plus 1 day each to assist with organising the events) and the six-day workshop (18 days total). Each Thai co-I is then required to commit the equivalent of 1 day per fortnight to the project (24 days). This corresponds to 0.18FTE, which we round to 0.2FTE to cover any extra time spent on the project. Total: 23598 **UK FEC:** Following the same justification, we request 0.2FEC for Mullaney (salary, NI, pension, Estates, Indirect costs), of which STFC will cover 80%. Total STFC contribution: 17652

### 3 Indirect and Estate costs at Thai Institutions: 4,720

As stipulated in the guide, this is calculated at a rate of 20% of the total Thai investigator salaries.

### 4 Travel and subsistence: 6,568

**Thai co-Is/researchers:** We request 1000 per person to cover the costs of return flights from Thailand to the UK for two research students to visit the GOTO collaboration for one week. We also request 100 per person per day for hotels and subsistence. Total: 3400 **UK PI:** We request 1000 for each return flight for Mullaney to attend each networking event. Mullaney's accommodation and subsistence during the event are already included in the direct costs. Mullaney will stay for a further four nights after each event, for which we request accommodation and subsistence costs of 80 per day. Total STFC contribution (at 80%): 3168.

### 5 Total Request: 73,357