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Third ASTERICS DADI European school

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Abstract

The Third ASTERICS DADI European school was held in Madrid, 14-16 November 2017. The school gathered 33 people. The main objectives of the school were, on the one hand, to expose early-career European astronomers to the variety of VO tools and services available

today so that they can efficiently use them for their own research, and, on the other hand, to gather feedback and requirements from the participants, taking advantage of this intense and diverse usage. During the school, VO experts introduced such tools making use of real life science cases and tutored hands-on excercises, which took a large fraction of the time. Participants also had the opportunity to develop their own science cases. The school included short introductory presentations about the ASTERICS project and the Virtual Observatory.

The meeting was a success, with a great atmosphere favouring a lot of exchanges and discussions.

This was the third school of a series of four to be conducted on a yearly basis during the ASTERICS project

I. COPYRIGHT NOTICE

II. DELIVERY SLIP

	Name	Partner/WP	Date
From	E. Solano	INTA/WP4	2017, Dec. 22nd
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Approved by	R. van der Meer		2018, Jan 31st

III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	2018, Jan. 3th	First draft (V01) sent for comments to WP4 leader (F. Genova)	E. Solano/INTA
2	2018, Jan. 5th	Comments (VO2) sent to E. Solano	F. Genova/CNRS)
3	2018, Jan. 5th	New version (V03) sent to F. Genova	E. Solano/INTA
4	2018, Jan. 7th	New version ("Final") sent to the Project Manager and Project Scientist	F. Genova/CNRS
5	2018, Jan. 29th	Final version taking into account the Project Manager's comments	F. Genova/CNRS

IV. APPLICATON AREA

This document is a formal deliverable for the GA of the project, applicable to all members of the ASTERICS project, beneficiaries and third parties, as well as its collaborating projects.

V. TERMINOLOGY

A complete project glossary is provided at the following page:
http://www.asterics2020.eu/about/glossary/

VI. PROJECT SUMMARY

ASTERICS (Astronomy ESFRI & Research Infrastructure Cluster) aims to address the cross-cutting synergies and common challenges shared by the various Astronomy ESFRI facilities (SKA, CTA, KM3NeT & ELT). It brings together for the first time, the astronomy, astrophysics and particle astrophysics communities, in addition to other related research infrastructures.

The major objectives of ASTERICS are to support and accelerate the implementation of the ESFRI telescopes, to enhance their performance beyond the current state-of-the-art, and to see them interoperate as an integrated, multi-wavelength and multi-messenger facility. An important focal point is the management, processing and scientific exploitation of the huge datasets the ESFRI facilities will generate. ASTERICS will seek solutions to these problems outside of the traditional channels by directly engaging and collaborating with industry and specialised SMEs. The various ESFRI pathfinders and precursors will present the perfect proving ground for new methodologies and prototype systems.

In addition, ASTERICS will enable astronomers from across the member states to have broad access to the reduced data products of the ESFRI telescopes via a seamless interface to the Virtual Observatory framework. This will massively increase the scientific impact of the telescopes, and greatly encourage use (and re-use) of the data in new and novel ways, typically not foreseen in the original proposals. By demonstrating cross-facility synchronicity, and by harmonising various policy aspects, ASTERICS will realise a distributed and interoperable approach that ushers in a new multi-messenger era for astronomy. Through an active dissemination programme, including direct engagement with all relevant stakeholders, and via the development of citizen scientist mass participation experiments, ASTERICS has the ambition to be a flagship for the scientific, industrial and societal impact ESFRI projects can deliver.

VII. EXECUTIVE SUMMARY

The Third ASTERICS DADI School (deliverable D4.9) held in the framework of Task 4.2 ("*Support to the astronomical community*") was organised by INTA on 14-16 November 2017 at the Centro de Astrobiología in Madrid, Spain.

The school focused on PhD students and post-docs from all European countries, including non-partner countries. The first day, after a brief welcome talk, the ASTERICS project and the Virtual Observatory tools and services were introduced. Hands-on sessions were carried out the first and second day through six tutorials and a "Treasure hunt" activity, in order to make students familiar with the VO capabilities. The third day was entirely dedicated to the development, under the guidance of VO experts, of the scientific cases proposed by the participants. Some of the students presented their cases during a plenary session, showing how VO tools and services helped in their research. Feedback and requirements to improve the VO tools and services were collected via an anonymous survey and presented in a final session.

The two goals of the school, expose early-career European astronomers to VO tools and services so that they can efficiently use them for their own research, and gather feedback and requirements from the participants, were successfully achieved in the light of the participants' attitude and comments.

The organisation of the next DADI School in Strasbourg in 2018 will take into consideration the information gathered from this and previous schools.

Table of Contents

1. Introduction

The main goal of WP4 ("Data Access, Discovery and Interoperability") is to ensure that the ESFRI products are openly accessible via the Virtual Observatory framework to the whole European and also international communities. This supports new and novel approaches to data exploitation, and provides a natural repository where reduced, open data products (e.g. survey legacy data) can be reliably maintained and curated. As in many other key areas, training and educating the next generation of facility staff and users are essential in securing the success of this aspect of the ASTERICS programme.

The European Virtual Observatory (VO) initiative began to organise regular VO schools during the VO-AIDA FP7 project (2008-2010). The goals of these schools were twofold: on the one hand, to expose early-career European astronomers to the variety of currently available VO tools and services so that they can use them efficiently for their own research and, on the other hand, to gather feedback and requirements from this intense and diverse usage. During the school, VO experts guide the participants on the usage of the tools through a series of real life science cases. Participants also have the opportunity to develop their own science cases.

The usefulness of these schools was immediately obvious, and they were continued by the two small Coordination Actions on which the European VO activities relied from 2010 to 2015: Euro-VO International Coordination Empowerment (EuroVO-ICE, 2010-2012) and Collaborative and Sustainable Astronomical Data Infrastructure for Europe (CoSADIE, 2012-2015). They are currently scheduled on a yearly basis in ASTERICS DADI Work Package.

The Third ASTERICS DADI School, ASTERICS Deliverable D4.9, was organised by INTA in the Centro de Astrobiología in Madrid on 14-16 November 2017, using the first and second schools as template. The school was opened to participants from all European countries, including non-partner countries and it mainly focused on young people at PhD or post-doctoral level. The preparation of the school is described in Section 2 of this document. The profile of the participants and the meeting programme are reported in Sections 3 and 4 while the analysis and conclusions after the school are addressed in Sections 5 and 6. A detailed description of the participants' feedback and comments is given in Annex I and II, whereas some pictures taken during the school are shown in Annex III.

2. Plan: Preparation of the school

The first announcement of the school was released on 17 July 2017 with the deadline for registration originally set to 01 October 2017 and later extended to 15 October 2017. The school was widely advertised in the European astronomical community beyond ASTERICS through different channels:

- In the ASTERICS partner countries
  - Spain
    - Distribution list of the Spanish Astronomical Society.
    - Universities: Autónoma and Complutense Universities (Madrid).
    - Distribution list of the Spanish Virtual Observatory.
  - France
    - Distribution list of the French Astronomical Society.
    - Distribution list of the Action Spécifique Observatoires Virtuels France (French VO).
  - Germany
    - Distribution list of the German astronomical community.
  - Italy
    - Distribution list of the Instituto Nazionale di Astrofisica (INAF).
  - The Netherlands
    - Distribution list of the Dutch astronomical community (NAC).
  - United Kingdom
    - Distribution list of the Science and Technology Facilities Council.

- In countries outside the project
  - By participants in previous schools (Poland, Belgium, Greece, Slovakia, Portugal, Lithuania, Ireland, Hungary, Bulgaria).
  - Dissemination through the ASTRONET Network.
- Other channels
  - ASTERICS General Assembly distribution list.
  - Distribution list of the ESAC Science Faculty.

A website (https://asterics2020.eu/dokuwiki/doku.php?id=open:wp4:school3, see Figure 1) was set up to provide participants with all necessary information before and during the school: registration form, list of registered participants, programme, feedback form, information on venue and accommodation, as well as other links of interest. A twitter hashtag was created for the school: #IIIASTERICSVOschool (https://twitter.com/hashtag/IIIASTERICSVOschool?src=hash).

The venue of the school was the ESAC conference center[1], located 30 km north-west of Madrid. ESAC possesses the necessary infrastructure and technical support to efficiently manage hands-on meetings like the ASTERICS school. In particular, having an auditorium able to accommodate all participants in a single room allowed us to conduct the school in plenary sessions instead of parallel sessions, which ensured that all participants were brought to the same level of knowledge of the VO tools at the end of the school.

As ESAC is in the middle of the countryside and difficult to reach by public transportation, a bus service was organised to transport participants from the hotel to ESAC in the morning and back in the afternoon.

Participants were hosted on the outskirts of Madrid at the "*Hotel Aravaca Village*"[2], which offers a comfortable stay closer to ESAC and at 10 minutes from the city centre. It is also easily reachable by public transport from the airport.

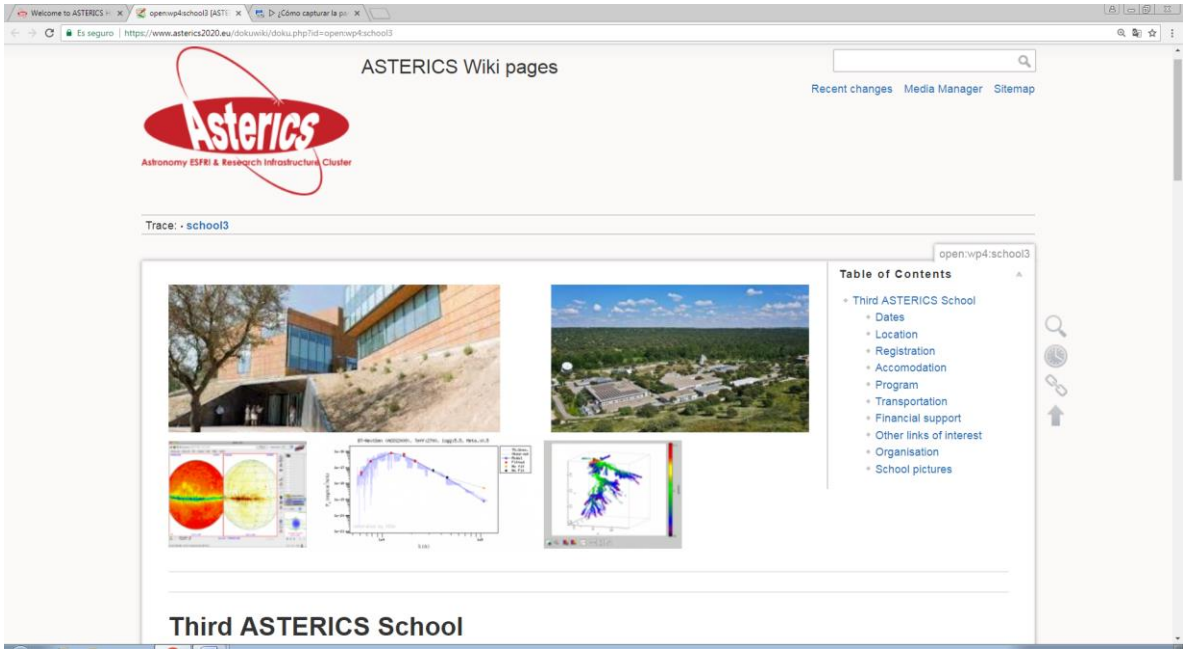


Figure 1. School website

1 http://www.esa.int/About_Us/ESAC

2 http://www.hotelaravacavillage.com

3. Participants

The school hosted 23 participants and 10 tutors. WP4 representatives from CNRS/CDS, EGO/VIRGO/ET, INAF, INTA, UEDIN and UHEI were present at the school.

The school was aimed at targeting early-career scientists. This requirement was fully achieved as demonstrated by the fact that the large majority of the 23 participants are currently carrying out their PhDs (17). Participants with a technical profile (1), undergraduates (2) and post-docs (3) also attended the school. The participants came from institutes in the following countries: Austria, Germany, Hungary, Italy, Poland, Spain and United Kingdom.

To take more advantage of the school, the students were encouraged to propose a scientific case related to their research and, if possible, a case in which their own data/images/spectra could be used. To be able to better help the students with the proposed cases, tutors iterated with them for several weeks, with the scope of better understanding the problems they wanted to deal with and trying to guide them before the practical session. This exchange of information with each student was helpful, on the one hand, to get to know their previous knowledge of the VO tools and services and to properly conduct their projects within the VO framework and, on the other hand, to get to know the expectations they had on the school to adapt our resources to their needs.

PhD students were requested to provide a letter of recommendation from their supervisor to guarantee that the school fits well with their research interests. Flight and accommodation expenses were covered by the ASTERICS project for all the participants.

4. Content: Programme

The programme of the Third ASTERICS School was similar to that of the first and second schools. It was divided into the following sessions: Introductory talks (45 minutes), tutorials (10 hours and 30 minutes), treasure hunt (1 hour), scientific cases proposed by the participants (3 hours), presentation of the results by the students (1 hour and 15 minutes), and feedback and wrap-up (45 minutes).

Introductory talks were about the ASTERICS project, the school, the Virtual Observatory and the new lines of research that can be addressed with it ("*VO Science*"), as a way to approach participants without a previous contact with the Virtual Observatory.

Seven tutorials were selected by the Organising Committee. Due to the heterogeneity in the knowledge of VO tools among the participants, it was decided to use tutorials of two different levels: Tutorials 1 to 4 were mostly oriented towards VO-beginners while tutorials 5 to 7 were

for intermediate/advanced users. Six tutorials were used in previous schools and were updated according to the feedback received at their end. All of them have been developed and tested by the school tutors, and were available at the school webpage. A printed version was also distributed at the beginning of the first day.

We are delighted to mention that the tutorial specifically created for this school ("Electromagnetic follow-up of gravitational-wave events") was prepared and conducted by an "ESFRI" partner (EGO/VIRGO/ET)[3]. A first version of the tutorial was introduced in the previous school held in Strasbourg. It was substantially modified and updated for this school, including now the identification, using VO tools like Aladin and TOPCAT, of electromagnetic counterparts of the recently discovered gravitational waves produced by the collapse of two neutron stars.

One of the activities defined in Task 4.2 is the "provision of on-line science tutorials". Therefore, we added the tutorials to the Euro-VO web page (http://www.euro-vo.org/?q=science/scientific-tutorials) which was updated accordingly. The tutorial list in the Repository of DADI Products (D4.8) was also updated (https://www.asterics2020.eu/dokuwiki/doku.php?id=open:wp4:dadiproductrepository).

The list of the tutorials is as follows:

- Tutorial 1: *"Discovery of brown dwarfs mining the 2MASS and SDSS databases"*. This is a tutorial with quite a simple workflow, to learn how to perform basic operations (filtering, cross-matching) in Aladin and TopCAT and how to exchange information between these tools using the SAMP VO protocol.

- Tutorial 2: "*The CDS tutorial*" constitutes an adequate starting point to introduce the SIMBAD database, the VizieR catalogue access tool, and the Aladin interactive graphical tool.

- Tutorial 3: *"Classifying the SEDs of Herbig Ae/Be stars"* explores how to handle other types of astronomical data than images or tables like spectra or spectral energy distributions (SEDs).

- Tutorial 4: "*Determination of stellar physical parameters using VOSA*" is based on the VOSA tool developed to gather photometry and fit the SED with models.

- Tutorial 5: "*Accessing and cross matching big data sets with ADQL*" describes the most important capabilities of the VO Astronomical Data Query Language (ADQL).

[3] EGO/VIRGO/ET participates in DADI as a large project of pan-European interest, on the same grounds as the disciplinary ESFRIs.

- Tutorial 6: "*Electromagnetic follow-up of gravitational-wave events*" uses Aladin functionalities not investigated in previous tutorials such as Multi-Order Coverage (MOC) method. As explained, this new tutorial was proposed by one of the "ESFRI" partners (EGO/VIRGO/ET).

At the end of these tutorials, a "*Treasure hunt*" was organised. It consisted of a series of challenging questions, each of which should be answered by the participants in 5-8 minutes using the knowledge acquired with the previous tutorials.

Three tutors were assigned to each tutorial: a main tutor to conduct the case and two back-up tutors to provide on-the-fly support to participants. This ensured that the tutorial was carried out smoothly and within the allocated time, providing the participants with personalized support to solve questions that may arise during the execution of the tutorial. All the tutors actively participated during the "*Treasure hunt*".

The third day was dedicated exclusively to the scientific cases proposed by the students. Students were divided into small groups (two or three persons per group) and assigned to a tutor before the beginning of the school. For them to efficiently develop their cases with the assistance of the tutor during the school, a questionnaire was sent a few weeks before the school to define their science cases in a detailed way. This questionnaire included the following questions:

- Which type of data are you interested in (Catalogues, images, spectra, other (specify))?
- Which wavelength range are you interested in (Radio, infrared, optical, ultraviolet, X-ray, high energies)?
- If you know, tell us the name of the archives/catalogues you want to work with.
- Which type of operations do you want to perform on the data (cross-correlation, filtering, image visualization and analysis, spectral energy distribution building and fitting, other (specify))?
- Other topics related to your science case (data management and/or publication)?

This method was time consuming (with dozens of emails exchanged with the participants), but rewarding given the successful outcome. All the participants with only one exception submitted a science case. This approach allowed the tutors to check the adequacy of the proposed projects with the VO remit beforehand and to identify the best methodology to conduct the project within the VO framework. A guide describing the science cases (Figure 2) and a list of the participant-tutor assignment were distributed among the tutors well in advance of the school.

At the end of the session devoted to the science use cases, the students who wanted, had the opportunity to make a short summary of their cases and to explain how VO tools and services helped them to carry out their science projects in an easier and more efficient way. Five were selected for presentations, all of them of very high scientific quality. Links to the presentations are available from the school web page:

http://www.asterics2020.eu/dokuwiki/doku.php?id=open:wp4:school3:program

One of the main objectives of the school was to gather requirements from the community. For this reason, the last session was dedicated to discuss the answers provided by the participants to the questions proposed in the feedback form. The questionnaire, available on the website and filled on-line during the morning session of the last day, included questions about the knowledge of VO before the school, the plans to use VO-tools after the school and on different aspects of the organization and structure of the school (see Annexes I and II for

- **Name: Alice Pérez Blanco**
- **Institute: University of Leeds**
- **Profile: PhD student**
- **Science case:**
  - I want to learn how to estimate astrophysical parameters of clusters of stars.
  - Keywords:
    - Cluster characterization
    - Herbig Ae/Be stars
    - Astrometric parameters (parallax and proper motion)
  - Want to know:
    - I am interested in learning about HR diagrams and estimation of the astrophysical parameters.
- **Previous usage of VO tools:**
  - No familiar with VO tools.
- **Do you have data to cross-match with catalogues? If so, which catalogues?**
  - My main catalog is TGAS, the parallax and proper motions are the principal parameters I am interested in. To be able to build colour-magnitude diagrams (B-V vs V or J-K vs K) I will cross-match with UCAC4 and 2MASS
    - VO tools → Aladin, TOPCAT
- **Are you interesting in determining physical parameters from SED fitting? If do, which models do you want to use?, and in which wavelength range?**
  - I am interested in determining physical parameters like age, mass, extinction. Also I want to be able to fit isochrones and evolutionary tracks.
    - VO tool → VOSA

more information on this).

Figure 2: Screenshot of the document describing a participants' science cases (published with permission of Alice Pérez Blanco)

5. Analysis

The Third ASTERICS School is the continuation of the project activities towards the science community. The first and second schools served to identify ideas for new tutorials, which were used in this third school.

The number of participants was slightly less than in previous schools. There were two main reasons for this:

- Last-minute cancellation of seven students from Italy, Lithuania, Poland and Serbia for various reasons (problems with visa, unable to get the letter of recommendation on time, coincidence with other meeting).

- The number of local students (i.e. from Madrid area) decreases with respect to the school organized in 2015 due to the coincidence with exams for those taking Master courses at Madrid universities.

In addition, some of the usual tutor teams (ESAC, INAF) were not able to participate this time because they had to attend competing events.

From the comments provided by the participants in the questionnaire form, we conclude that:

- Before coming to the school, from those who answered the question 14 students had used VO tools, and 7 students had never used them previously. This means that two thirds of the participants attended to expand and improve their knowledge on VO tools, and one third attended to get familiar with them. Hence, the approach of providing basic tutorials focused on beginners as well as more complex ones for advanced users was adequate.

- Tutorials were considered of normal difficulty on average tutorials #1, #2 and #4 being found easier, and tutorials #3, #5 and #6 more difficult. The "*Treasure hunt*" was found to be difficult or very difficult by more than half of the participants. This was expected as the school starts with easy tutorials and gradually increases difficulty, and the "*Treasure Hunt*" is expected to be challenging.

- The time allocated for each tutorial was judged to be about right with the exception of tutorial #5, for which half thought that the time was about right and the other half considered that the time allocated was too short. For the "*Treasure hunt*", students mainly thought there was not enough time to answer the questions and asked for more than the 4 questions that composed the challenge. We will fix this in the next edition of the school.

- Tutorials #1, #4 and #5 were found overall very useful by the participants; tutorials #2 and #3 were found useful or very useful, and tutorial #6 was found mainly useful. A small fraction of the participants (1 to 3) found the tutorials #3, #5 and #6 not useful. The "*Treasure hunt*" was considered useful and very useful. One participant judged it was not useful at all.

- In general, the school was rated to be excellent (11 students) and very good (7 students). Only 18 (out of 23) participants answered this question.

- The high quality of the presentations made by the students on their own science cases reflected not only that they had learnt how to handle data using VO tools and services but also that the tutor-student interaction was quite useful and positive. The interaction with the participants before the school to collect information about the science cases allowed us to optimize the time allocated for them, fixing potential problems well in advance.

- All participants expressed their intentions to use VO tools for their future research.

- Particular comments on the school were very positive overall. Hotel, transportation and organisation were also very well rated.

6. Conclusions and next steps

In light of the analysis of the feedback, we conclude that the school was successful since it achieved its objectives: dissemination of the Virtual Observatory among the astronomical community, and collection of feedback and requirements from the participants. Moreover, it is expected to have a positive impact on the utilization of VO tools to carry out astronomical research in Europe.

The diversity of scientific profiles of the participants clearly enriched the gathered feedback. Their comments and suggestions will be considered, on the one hand, to adapt the tutorials for next schools and, on the other hand, by the tools and service developers to perform the appropriate implementations to adjust them at best to the users' needs.

During the wrap-up session of the school, the following points were stressed:

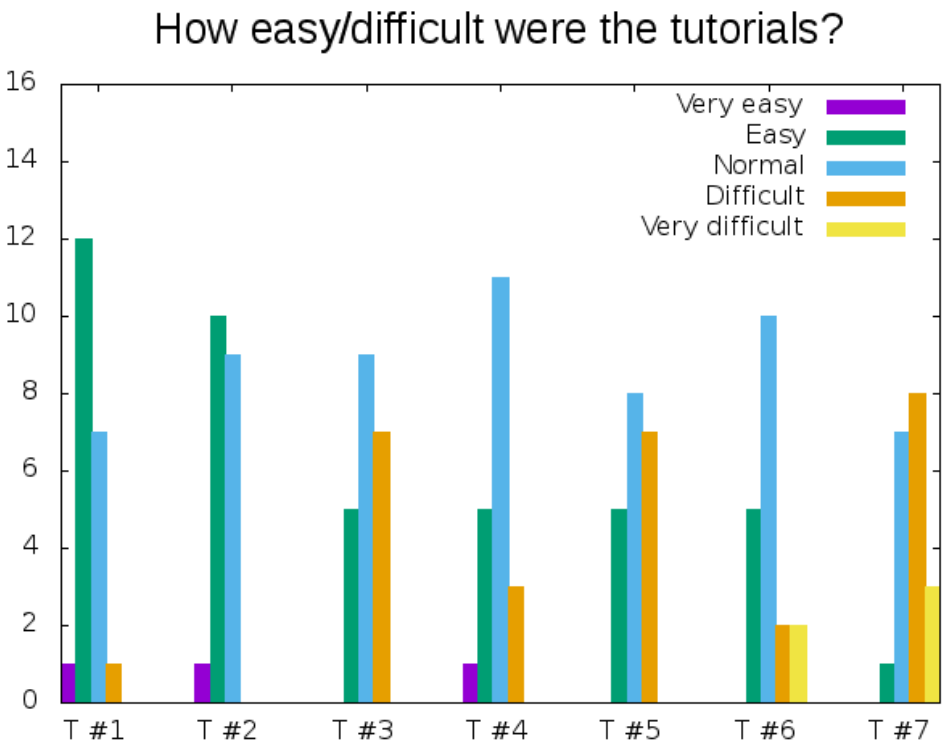
- A close contact will be maintained with the school participants along the duration of the ASTERICS project. In particular, a questionnaire will be submitted on a yearly basis with questions about the usage they are making of VO tools, the reasons why they gave up using them (if this happens) or if they have published or are preparing a paper

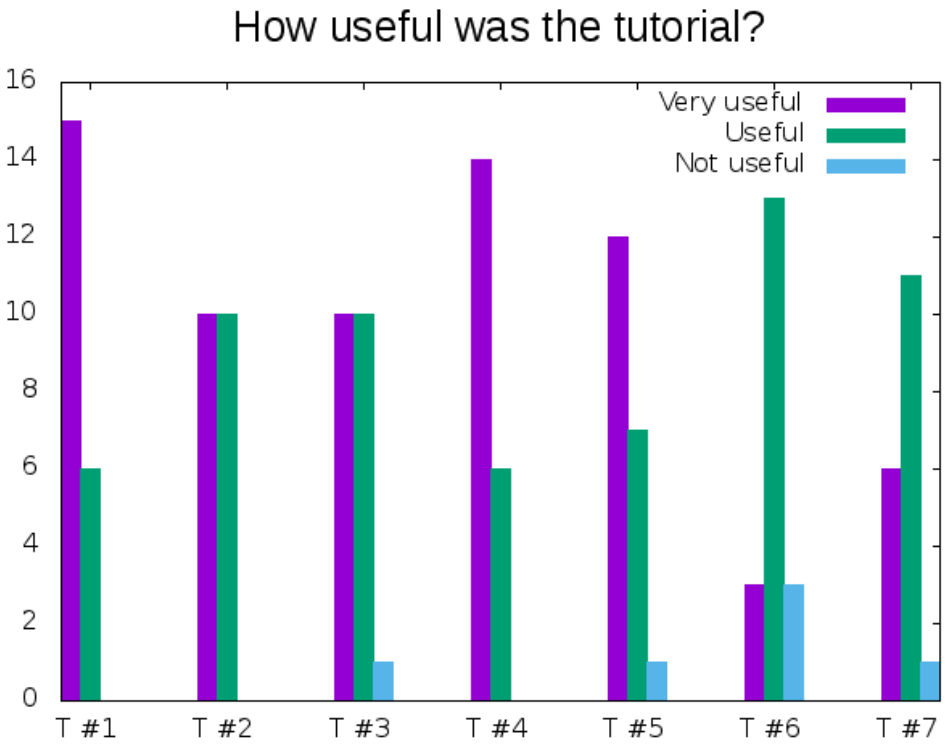
using them. They will also be asked for any improvement they would like according to their working experience achieved during the year.

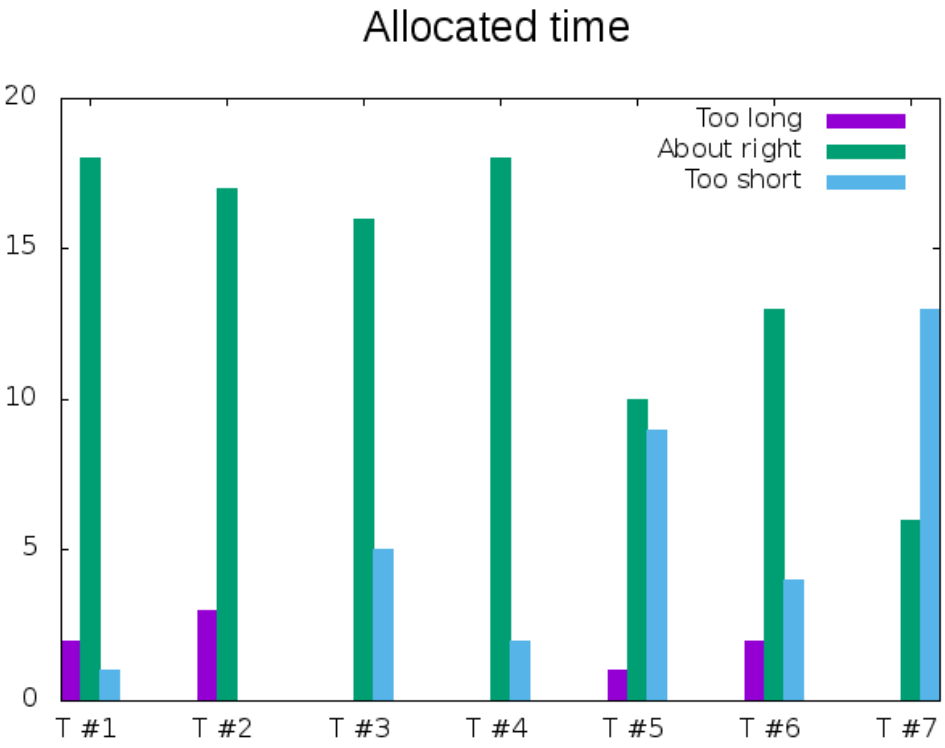
- Participants were encouraged to act as VO-ambassadors in their research institutes by giving informal talks with colleagues, seminars and scientific workshops and conferences, and making use of the material employed during the school. We set up two channels to send this information to the ASTERICS project: an email account and the #IIIASTERICSVOschool hashtag in Twitter.

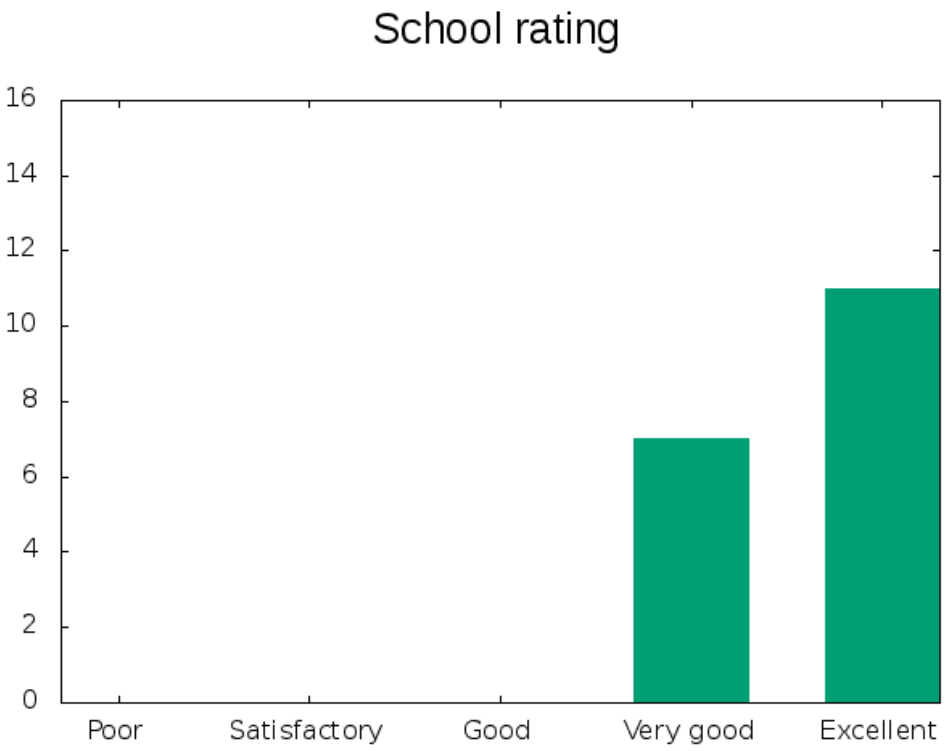
The next major milestone in Task 4.2 ("Support to the astronomical community") within WP4 will be the organization of the 4th VO school to be held in autumn 2018 in Strasbourg, France.

Annex I. Feedback analysis






Allocated time
Too long
About right
Too short
20
15
10
5
0
T #1
T #2
T #3
T #4
T #5
T #6
T #7


School rating
16
14
12
10
8
6
4
2
0
Poor
Satisfactory
Good
Very good
Excellent

Annex II. Participants' comments

- Comments on tutorial #1:
  - "In this tutorial, I learn new aspects about Aladin and Topcat I did know before and that I can apply in the future."
  - "The tutorial was easy because the script was perfectly made, and easy to follow"
  - "Very good tutorial"

- Comments on tutorial #2:
  - "With too long I mean there were many tasks to do. Maybe it is better to do less and learn more."
  - "I like the last to part of the tutorial where we work with Aladin: combining catalogue, changing the properties, making multi-views of the same image in different aspects and how to created and load scripts to do the same job that the GUI version."
  - "The tutorial was easy because the script was perfectly made, and easy to follow"

- Comments on tutorial #3:
  - "I never used SPLAT before, but I like the way it allows to build SEDs easily."
  - "The tutorial was easy because the script was perfectly made, and easy to follow"
  - "Might be entirely my fault but I could not follow the instructions almost at all, I was tired, it was in the end of the day and the pace was fairly quick"

- Comments on tutorial #4:
  - "Excellent way to obtain astrophysical parameters! ☺"
  - "The tutorial was easy because the script was perfectly made, and easy to follow"
  - "Excellent tutorial"

- Comments on tutorial #5:
  - "I would like to have more time to practice with ADQL and try to understand it better to be able to use it in the future."
  - "The tutorial was easy because the script was perfectly made, and easy to follow"

- Comments on tutorial #6:
  - "Is not my area of research, but work with the new Aladin was an excellent experience."

- "The tutorial was easy because the script was perfectly made, and easy to follow"
- "Had technical issues with Aladin, apart from this, it was my favorite tutorial"

- Comments on the "*Treasure hunt*":
  - "An excellent way to implement the knowledge we get during the school."
  - "I really liked this treasure hunt session, maybe it could be longer with some more exercises."
  - "Great idea"
  - "It was dynamic and was actual brainstorming, would like it to be longer"
  - "The problems themselves were not exactly hard, but for somebody who has not really used VO tools before the school, the time was short."

- Comments on missing capabilities found in VO tools?
  - "Maybe a bit more about exporting the results"
  - "I think that all the most important things that can be made with the VO tools have been covered"
  - "Multiplication of probability maps (e.g. pixel by pixel)"
  - "The possibility of searching for time series data."

- Participants' intentions of using VO tools for their future research
  Yes: 19
  No: 0

- Comments on the logistics

  - "Hotel amazing but a little too far from the city center; transportation well organized"
  - "Everything was OK :-)"
  - "Good logistics. It is understandable the use of this venue and the location of the hotel."
  - "The logistics have just been perfect at all points."
  - "It is superb. Everything just right and nice."
  - "Great"
  - "Hotel is perfect, will be nice to have lunch included and maybe short sightseeing of ESAC."
  - "All was good"
  - "Transportation time was long and we were far from the center of Madrid, but I do see how it was optimized to the maximum"
  - "The only problem I experienced was related to the firewall settings at ESAC. Restricting communication to standard HTTP and SSL ports on an open network is understandable, but made it difficult to use a few VO tools (e.g. TAP queries from Python)."

Annex III. School pictures

1 ***Introductory talks***

2 ***Support during the tutorial sessions***

3 ***Scientific interaction during the coffe break***

4 ***Group photo***