Identification Data of
Research Support Unit: Genomics, Cell culture and Microscopy

Name:

Research Support Unit: Genomics, Cell culture and Microscopy

Description:

The unit on was constituted and began its operation as a laboratory providing basic resources and methodologies in proteomics, transcriptomics and the culture of eukaryotic cell lines, as one of the objectives within the current PE. Different groups from the institute contributed equipment to this initial phase. The service expanded its capacities within the scope of genomics and cell culture, and also extended the offer to top-quality optical microscopy. The basic aim of the unit is to channel the use of equipment which by virtue of its cost, maintenance and need for renovation requires shared use to maximise the effectiveness and efficiency of the available resources necessary for the development of the work of an ample number of research groups in the IATA.

At present the unit comprises three adjacent independent laboratories: one dedicated to microscopy, a second specifically designed for cell culture, and a third more ample laboratory in which the rest of the equipment and offices are located.

The personnel assigned to the service have the appropriate technical background and scientific experiences required and are responsible for the management, use, regulation and maintenance of the facilities and equipment. They also assume responsibility for providing technical advice, assisting in experimental design and training users of the equipment. In certain cases they also undertake the processing of samples and the acquisition and analysis of results. The unit works in an integrated way, providing multidisciplinary solutions to researchers for the attainment of scientific objectives.

The attached file details the equipment currently available. The services provided by the unit are listed below. Briefly, as regards functional genomics our service undertakes experiments on descriptive and comparative proteomics by obtaining protein extracts, conducting bidimensional electrophoresis, staining, image acquisition and the identification of differential spots using commercially available software. The unit also performs complete DNA microarray hybridisation experiments and analysis for comparative genomics and transcriptomics. It also monitors gene expression by other high-throughput technologies such as real-time quantitative PCR.

The cell culture facility provides the infrastructure for managing human or animal model cell lines. Biological safety cabinets, CO2 incubators and an inverted microscope are all available in a designated and fully equipped laboratory. Various cell lines are currently maintained including mouse hybridomas for the production of monoclonal antibodies and intestinal epithelial cell for testing nutrient absorption and the adhesion of probiotics.

We also have a fully automated and motorized optical microscope for high-end research, equipped with epi-fluorescence technology, bright field, phase contrast and DIC contrast, as well as an advanced digital imaging head connected to a cooled digital camera. The imaging head has an additional port to which a confocal laser accessory can be attached for future expansion of the microscope's capabilities.

Technical director:
José Vicente Gimano Alcañiz

Scientific director:
Lorenzo Zacarías García

Service type:
Científico

Keywords:
Genomics, transcriptomics, proteomics, cell culture, microscopy, fluorescence, Nanodrop, quantitative real time PCR

Intervention scope:
Interno

New creation or emergent?:
YES

May the users communicate in english?:
Si

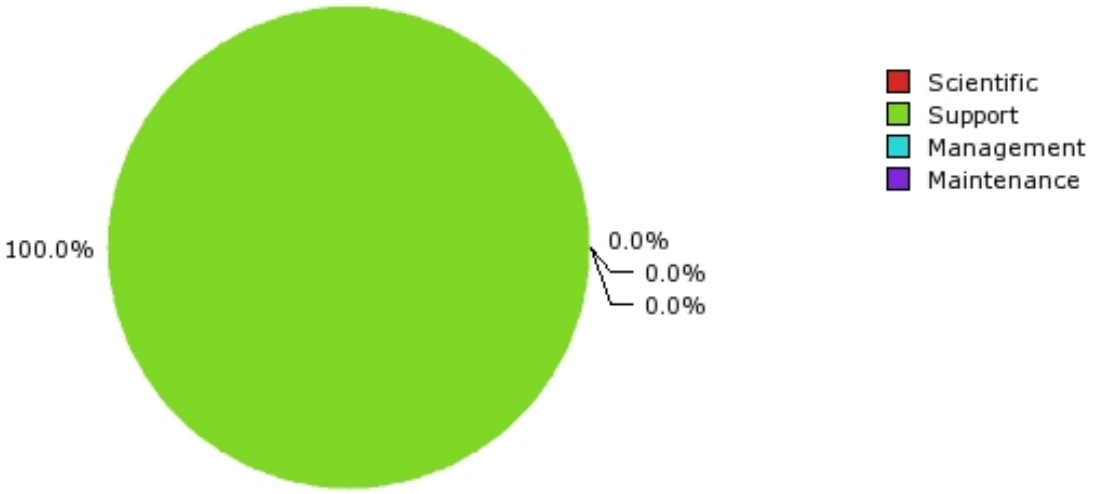
Full electronic management?:
NO

Integrated quality programs?:
NO

Has it ISO certifications?:
NO

ISO Certifications:

Staff



	Male	Female	TOTAL
Scientific	0	0	0
Support	1 (33%)	2 (67%)	3 (100%)
Management	0	0	0
Maintenance	0	0	0
TOTAL	1 (33%)	2 (67%)	3 (100%)

Scientific personnel by type

		Male	Female	TOTAL
Scientific	Research Professor	0 - %	0	0
Civil Servant	Research Scientist	0 - %	0	0
	Tenured Scientist	0 - %	0	0
	Full University Professor	0 - %	0	0
	University Professor	0 - %	0	0
	Other	0 - %	0	0
Scientific	Ramón y Cajal	0 - %	0	0
Hired	JAEDOC	0 - %	0	0
	Other	0 - %	0	0
Scientific	JAEPREDOC	0 - %	0	0
Training	Other	0 - %	0	0
	Scientific personnel	0 - %	0	0

Facilities/services

Features offered

- Genomics and Proteomics
- **Internal fare:** 0 **External fare:** 0 **SU:** 30
- **Description:** Expert advice about experimental design.
Nucleic acids extraction from samples of different origin. Analysis of RNA quality.
Fluorescent labelling of RNA (through cDNA synthesis) and genomic DNA for microarray hibridization.
RNA amplification (cRNA) for fluorescent labelling with direct o indirect method.
DNA Microarray hybridization, scanning and analysis of data through appropriate bioinformatic software.
Detection and quantification of nucleic acids by quantitative real time PCR.
Extraction of protein samples from different sources.
2D Protein Electrophoresis, staining of 2D-gels silver, fluorescent dyes or Coomassie blue, and Image capture of stained gels. Data analysis and diferential spot identification through appropriate bioinformatic software.

- Cell culture
- **Internal fare:** 0 **External fare:** 0 **SU:** 10
- **Description:** Expert advice about experimental design.
Propagation and maintenance of cell lines. Detection of potential contaminations (Mycoplasma) by PCR and DAPI staining.
Specific tasks of maintenance within the cell culture area.

- Micropscopy
- **Internal fare:** 0 **External fare:** 0 **SU:** 15
- **Description:** Specific training to users. Organization of formative sessions and seminars.
Advice on experimental design, sample preparation and microscopic techniques.
Analysis by different techniques: bright field, phase contrast and fluorescence.
Digital capture of microphographs and analysis through appropriate software.
Different specific tasks of maintenance

Economic Data

Costs	2003	2004	2005	2006	2007
Staff	0	0	0	0	0
Execution	0	0	0	0	0
Maintenance	0	0	0	0	0
Total	0	0	0	0	0

Income	2003	2004	2005	2006	2007
Fares(Internal)	0	0	0	0	0
Fares(External)	0	0	0	0	0
Total	0	0	0	0	0

Subsidies	2003	2004	2005	2006	2007
Centre	0	0	0	0	0
CSIC	0	0	0	0	0
Other institutions	0	0	0	0	0
Total	0	0	0	0	0

Usage Data

	2003	2004	2005	2006	2007
Internal users	0	0	0	0	0
External users	0	0	0	0	0
Total	0	0	0	0	0

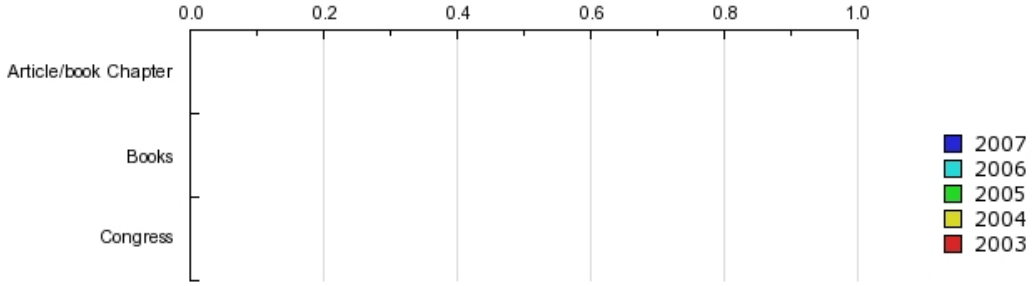
	2003	2004	2005	2006	2007
Internal services	0	0	0	0	0
External services	0	0	0	0	0
Total	0	0	0	0	0
Efficiency level**	0	0	0	0	0

* Facilities SUs computed using the data registered in the Service facilities table
** The efficiency level is the ratio between the total of the Service SUs units and the total cost in k€

Publications by type

Article / Book chapters by impact

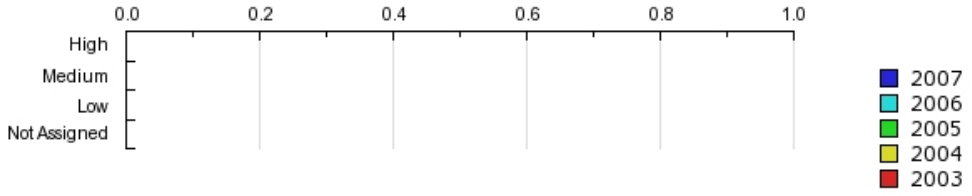
Type	2003	2004	2005	2006	2007	Total
Article/Book chapter	0	0	0	0	0	0
Books	0	0	0	0	0	0
Congress	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0



Article / Book chapters by impact

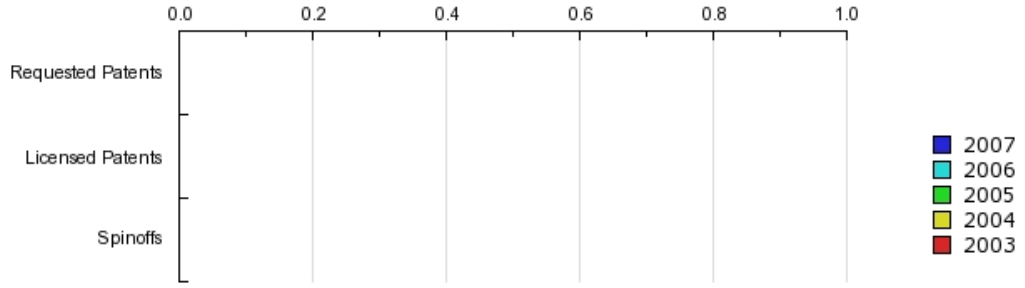
Article / Book chapters by impact

Type	2003	2004	2005	2006	2007	Total
HIGH	0	0	0	0	0	0
MEDIUM	0	0	0	0	0	0
LOW	0	0	0	0	0	0
Not assigned	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0



Totals by type

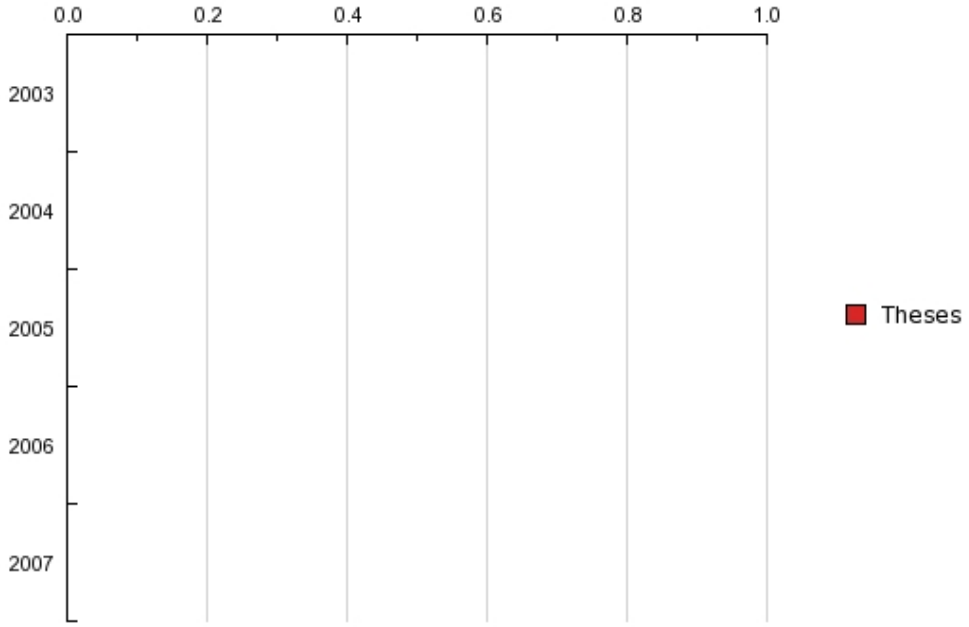
Type	2003	2004	2005	2006	2007	Total
Requested patents	0	0	0	0	0	0
Licensed patents	0	0	0	0	0	0
Spinoffs	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

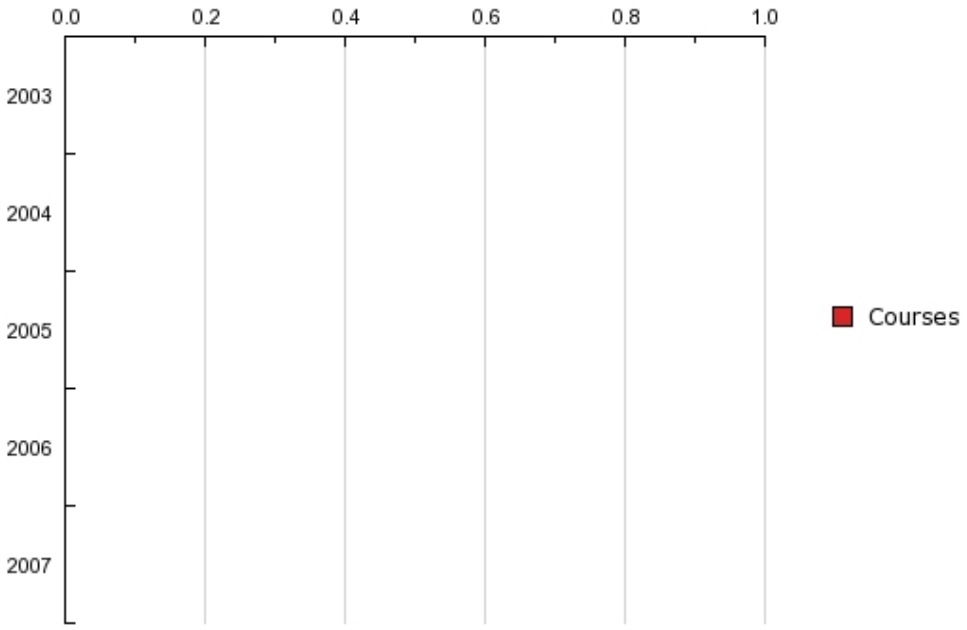


Training by type

Training by type

Type	2003	2004	2005	2006	2007	Total
Theses	0	0	0	0	0	0
Courses (hours)	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0

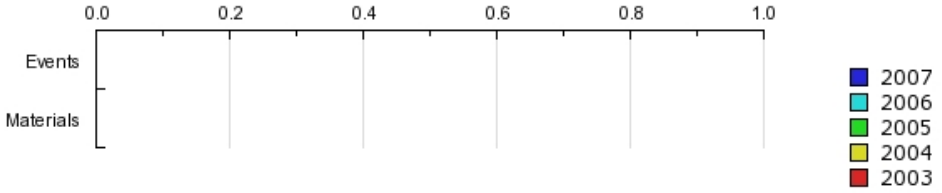



0.0
0.2
0.4
0.6
0.8
1.0
2003
2004
2005
2006
2007
Courses

Science divulgation activities

Science divulgation activities

Type	2003	2004	2005	2006	2007	Total
Events	0	0	0	0	0	0
Materials	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0



SWOT

Weaknesses

- - It is a relatively new service which still needs to be improved and optimized in its operation. It currently lacks a clear directive that defines the relationship between the service and its users; nor does it have a scientist in charge.
  - A regular mechanism of financing of the service does not exist that would permit the purchase of small equipment, material and reagents of general use. Users finance their own experiments with the individual purchase of specific reagents.
  - The implantation of high throughput methodologies such as DNA microarrays or proteomics requires a strong bioinformatics resource. A significant part of the service requires major input from computer science and statistics that goes beyond the use of commercial computer programs. Within the service, and by extension in the IATA, there is an urgent need for personnel with experience in the development and use of bioinformatics tools for the optimal operation of the service and the equipment available, as well as for the expansion which is anticipated in the near future.
  - As regards proteomics, a significant component of these experiments cannot be completed due to the lack of equipment to perform image acquisition of fluorescent-labelled proteins in 2D gels and protein identification by mass spectrometry.
  - The foreseeable expansion in terms of the acquisition of new equipment and users is going to require additional laboratory space.
  - The use of certain equipment is already at saturation. This is the case for the carousel-based system for real-time quantitative PCR and the inverted microscope located in the cell culture laboratory.
  - Certain methodologies that are complementary to existing ones and have been requested by a significant number of investigators of the IATA are still lacking, such as flow cytometry, automated microarray hybridization, and confocal microscopy.

Threats

- - A perceived threat is the existence of comparable units within the CSIC itself or those belonging to external institutions such as the University of Valencia or the Centro de Investigación Príncipe Felipe that offer similar services with better equipment. This could result in the disuse of our equipment. Nevertheless our unit offers the competitive advantage of proximity to IATA-based users and the absence of additional costs. This potential threat can be exploited as an opportunity when used to foment the cooperation with these institutions.
  - The Unit offers its services in a very competitive area that is in a state of constant development and requires continuous training of the technical personnel and frequent renovation of equipment to maintain its competitiveness.

Strengths

- - The conception, development and operation of the unit are supported by an ample number of investigators of the IATA who are users and guarantee its continuity.
  - Since it is located within the institute the unit offers proximity to researchers and ?personalization? of the service based on the particular needs of each project.
  - Effectiveness in the management of resources. The supervision, control of use and maintenance of equipment that has multiple users improves its use and conservation.
  - Within the framework of the current expansion of the IATA, additional space is available for future expansion of the service..

Opportunities

- - Other such service units, be they within the CSIC or in other institutions, present a collaboration opportunity that is already being exploited to complement the technologies offered by our service and foment the exchange of knowledge.
- Our offer includes methodologies of interest for an large and growing number of researchers at the IATA. The existence of the unit has allowed certain groups of the institute to tackle approaches not previously contemplated. Taken together, this assures a significant number of users and therefore the survival of the Unit.
- The function and capabilities of two pieces of existing equipment in the IATA and the unit can be significantly enhanced with the acquisition of specific accessories providing technologies nowadays not available at IATA and avoid the need for investigators to use external services. This is the case for the FLA3000 scanner to which a laser head can be incorporated to read bidimensional fluorescent protein gels, and the fluorescence microscope to which a confocal head can be connected that would allow the expansion to laser confocal microscopy.
- Our scientific environment and physical location facilitate participation in training courses for technical personnel and users of the unit's services.

RA (Relational Analysis)

Competitor groups

- **Microarrays Analysis Facility**

  - **Institute:** Príncipe Felipe Research Center (CIPF)
  - **Institution:** Generalitat Valenciana,
  - **Address :** Avda. Autopista del Saler, 16, 46012 Valencia, España,
  - **Web:** www.cipf.es
  - **10 Recent articles:**

- **Proteomics Facility**

  - **Institute:** CIPF
  - **Institution:** Generalitat Valenciana,
  - **Address :** Avda. Autopista del Saler, 16, 46012 Valencia, España
  - **Web:** www.cipf.es
  - **10 Recent articles:**

- **Cell Culture Facility**

  - **Institute:** SCSIE, Faculty of Pharmacy
  - **Institution:** UVEG
  - **Address :** Avda. Vicent Andrés Estellés s/n, 46100 Burjassot, España
  - **Web:** http://scsie.uv.es
  - **10 Recent articles:**

Colaborator groups

- **Proteomics Facility**

    - **Institute:** CNIC
    - **Institution:** National Center for Cardiovascular Research
    - **Address :** C/ Melchor Fernandez Almagro 3, E-28029 Madrid, España,
    - **Web:** http://www.cnic.es/proteomica/.
    - **10 Recent articles:**

- **Microscopy Facility**

    - **Institute:** nstitute of Plants Molecular anId Cellular Biology
    - **Institution:** CSIC
    - **Address :** Avda. Los Naranjos s/n, 46022 Valencia, España;
    - **Web:** http://www.ibmcp.upv.es/menu4.php
    - **10 Recent articles:**

- **Animal Production Facility**

    - **Institute:** SCSIE, Faculty of Pharmacy
    - **Institution:** UVEG
    - **Address :** Avda. Vicent Andrés Estellés s/n, 46100 Burjassot, España
    - **Web:** http://scsie.uv.es
    - **10 Recent articles:**

- **Genomics Laboratory**

    - **Institute:** IBMCP
    - **Institution:** CSIC
    - **Address :** Avda. Los Naranjos s/n, 46022 Valencia, España
    - **Web:** http://www.ibmcp.upv.es
    - **10 Recent articles:**

- **Laboratory of DNA Chips**

    - **Institute:** SCSIE
    - **Institution:** UVEG

- **Address :** Dr Moliner, 50, 46100 Burjassot
- **Web:**
- **10 Recent articles:**

Leading groups

- **Proteomics Facility**

  - **Institute:** Center for Genomics and Proteomics, Proteomics Unit, Faculty of Pharmacy ? UCM
  - **Institution:** University of Comunidad de Madrid (UCM)
  - **Address :** Pza Ramón y Cajal, s/n, 28040 Madrid
  - **Web:** http://www.ucm.es/info/gyp/proteomica/presentacion.htm
  - **10 Recent articles:**

- **Microscopy Facility**

  - **Institute:** IBMCP
  - **Institution:** CSIC
  - **Address :** Avda. Los Naranjos s/n, 46022 Valencia, España
  - **Web:** http://www.ibmcp.upv.es/menu4.php
  - **10 Recent articles:**

- **General Scientific Services**

  - **Institute:** Parc Científic de Barcelona
  - **Institution:** University of Barcelona, Modular Building
  - **Address :** Josep Samitier 1-5, 08028 Barcelona
  - **Web:** http://www.pcb.ub.es/scc-pcb
  - **10 Recent articles:**

- **Cell Culture Facility**

  - **Institute:** SCSIE Faculty of Pharmacy
  - **Institution:** UVEG
  - **Address :** Avda. Vicent Andrés Estellés s/n, 46100 Burjassot, España
  - **Web:** http://scsie.uv.es

- **10 Recent articles:**

- **Microarrays Analysis Facility**

  - **Institute:** Príncipe Felipe Research Center (CIPF)
  - **Institution:** Generalitat Valenciana
  - **Address :** Avda. Autopista del Saler, 16, 46012 Valencia, España
  - **Web:** www.cipf.es
  - **10 Recent articles:**

Selective Advantages

With regard to internal users (researchers at the IATA), proximity it is a competitive advantage compared to other external services.

The absence of added costs additional to those derived from each experiment (reagents, etc?) is also an advantage compared to other services.

General Objectives

General Objectives,Goals?

To continue the improvement and expansion to new technologies of the unit, in order to facilitate the use of high-throughput functional genomics, top-end optical microscopy and eukaryotic cell culture to the IATA scientific community. Specific targets of novel technologies to add that complement the existing ones will be flow citometry, protein identification by mass spectrometry, metabolomics, and confocal microscopy. The vision of the unit will continue to be the shared use of equipment and personnel resources to maximise the effectiveness and efficiency of the available budget.

Scientific objectives

Knowledge Transfer objectives

Training objectives

Outreach objectives

Internationalisation objectives

Common services objectives

Gender equality objectives

Quality programmes objectives

Electronic management objectives

Efficiency objectives

Self-funding objectives

General Strategy

Summary

- The preparation of a code of practice for the service, ideally by a commission in which users, the personnel of the service and IATA's management team are represented. The code of practice should define the operation and relationships of the service with the rest of the IATA community.

- To designate a person in charge from the scientific personnel of the institute, responsible the supervision of the service's function and the relation with the management team and researchers of

the IATA.

- The establishment of a system of financing for the service. Different alternatives should be analysed that would depend on user needs and methodology.

- The establishment of external collaborations with services from other institutions complementary to the services provided in order to alleviate deficiencies that cannot be corrected within the PE action. To obtai recognition of the IATA as an internal user in the Universities and Public Centres of Investigation in our locality (for example, SCSIE of the University of Valencia, Prince Felipe, etc?).

- Attendance of the personnel of the service in training courses and demonstrations of equipment and methodologies relevant to the service.

- To request personnel. At least one research assistant position (bachelor degree level) with experience in bioinformatics will be sought, to complement existing personnel.

- Equipment resources requested:
1. Small equipment needed for the functioning of the laboratories. Ultrapure water generator system, ?Speed-Vac?, UV cabinet, furniture, and freezers.
2. Flow cytometer.
3. A laser head to attach to the FLA3000 scanner and allow detection of samples labelled with fluorescent dyes.
4. Inverted microscope with digital imaging capabilities.
5. Digital confocal laser head to attach to the E90i microscope and provide confocal microscopy.
6. Liquid nitrogen storage system for frozen cell lines preservation
7. Automated microarray hybridization system.
8. MALDI-TOF mass spectrometer.

Strategy Analysis

Summary

As a result of the previous Strategic Plan of the IATA, a general genomics/proteomics/cell culture and microscopy service was created. The notable benefits that this has been seen to provide to the research groups of the IATA leads us to conclude that expansion of this service will be an important factor in maintaining the competitiveness of the IATA. In this regard, new equipment will be sought including a flow cytometer, an ultracentrifuge, a confocal microscope laser head, and a MALDI-TOF mass spectrometer. The different research lines of the IATA have set objectives for the period 2010-2013 that will require the maintenance and expansion of this service.

A general concept of the designed strategy is that at the current stage, the service unit can not cover all the activities and requirements needed by the different groups of the IATA. The service is now established to give advice and support in several technologies that are of general interest and also to settle down at the IATA new techniques for common use. At that stage it is not affordable, nor convenient neither realistic to implement all these new, complex and sophisticated technologies is such a limited service. Rather, actions should be taking to establish an efficient basement providing initial support to many research groups, and also to create the nucleus around which future actions and methodologies will be established.
The objectives defined are quite large, required high-cost equipments, and qualified personal that clear choices should be taken to establish priorities in the actions to be implemented. Collaborations with current platforms in the two Universities of Valencia and other research institutes should be

implemented. First, to gain experience in these areas via collaboration and also to consider if the investment required to implement specific techniques is affordable and strictly required or may be provided by other platforms.

In order to establish internal priorities, cell culture unit is the first option to be boosted, as it is almost fully equipped and may be expanded. The service may be a source of incomes to self-maintenance and also for external users. Proteomic requirements may be fulfilled if close collaboration with Principe Felipe Institute is established for protein sequencing. A first step in metabolomic may be addressed via collaboration with the recent service of the IBMCP and experience and skills may be gained in collaboration before considering future actions.

Within the research line Food Quality and Properties, the subline 'Meat products', requires the adquisition of a LC-MS/MS. This mass spectroscopy instrument is essential for the expansion of proteomics and will have major applications in food science in particular and in biological science in general. Nano-HPLC coupled to MS detectors (LC-MS/MS) has become a basic piece of equipment in many research institutions due to its great discriminating power in the identification of peptides and other biomolecules which exceeds that of other biochemical tools such as normal HPLC, electrophoresis and immunoassay. Complex protein mixtures can be analyzed in a single experiment through identification of different peptide fragments. There are many groups at the IATA interested to gaining access to this proteomic technology in order to develop competitive research projects.

The research line Preservation and Safety mainly uses the cell culture facility. Their use of this facility is focussed on two areas: 1) the analysis of cell damage markers in human cell lines exposed to toxic trace elements and involves the identification at the protein level of cell membrane located transporters involved in the intestinal absorption of these toxins; 2) The research conducted by the Food Analytical Immunotechnology group is centred on the development of rapid analytical tools based on immunochemical methods for the detection of contaminants and pesticide residues in food. Monoclonal antibodies obtained from in vitro cultured hybridomas (lymphocyte-myeloma) are key biological reagents crucial for achieving this objective, hence the importance of the cell culture service to this line of research.

The research line Food Biotehnology has a number of objectives that are related to this service, which include: gaining an overall view of the biology of the organisms under study (filamentous fungi, yeasts, bacteria and plants) using biochemical and molecular biological approaches as well as the new high throughput technologies (genomics, transcriptomics, proteomics, metabolomics, fluxomics). The information obtained will be used to 1) obtain microorganisms that provide greater yield in industrial fermentative processes, improved product quality and safety, and generate novel products; 2) the design of strategies to monitor physiological and pathological changes based on the characterisation of the mechanisms of these two processes; 3) study the metabolic routes involved in quality/nutritional attributes in fruit; 4) study the functionality of ingredients by characterising the mode of action of probiotics, nutaceuticals and bioactive peptides. In order to achieve these objectives, the following equipment will be required in the service: a confocal microscope head, flow cytometer, ultracentrifuge, MALDI-TOF mass spectrometer. Additional personnel will also be required including laboratory assistants and a degree level research assistant with expertise in bioinformatics who will be able to help researchers in the analysis of data.

Progress Indicators (Quantitative objectives)

Progress Indicators (Quantitative objectives)

	Indicator	2010	2011	2012	2013
Funding(k€)	Self financing[(1)]				
Efficiency	Relative efficiency respect to				
Knowledge Transfer	Requested priority patents				
	Licensed priority patents				
	Spin-Offs				
	External services				
Training	Courses				
Outreach	Events				
	Material				
Internationalisation	Services in English?				
Management	Electronic management				
Quality programme	ISO certification				

Resources

Human resources

Personnel(number)	2010	2011	2012	2013	Total
Tenured Scientist	0	0	0	0	0
Higher Scientific Officer	0	1	1	0	2
Intermediate Specialist Technician	0	0	0	0	0
Research assistant	0	1	0	0	1
JAE-Senior	0	0	0	0	0
JAE-Doc	0	0	0	0	0
JAE-Pre	0	0	0	0	0
JAE-Tec	0	0	0	0	0

Financial resources

Action	2010	2011	2012	2013	Total
EQUIPA(k€)	0	40	97	0	137

- **Justification:** The general strategy indicated in the IATA main document will need of all those

resources as prioritaries and are justified there.