International Agency for Research on Cancer

World Health Organization

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REQUESTS FOR SUPPORT FROM THE GOVERNING COUNCIL SPECIAL FUND: A. SCIENTIFIC EQUIPMENT B. CORE IT INFRASTRUCTURE AND SERVICES

1. An inter-disciplinary research approach is embedded within the current IARC Medium-Term Strategy (MTS) (2016–2020), with close integration of laboratory sciences, biostatistics, bioinformatics and epidemiology. This strategy, as well as the proposed MTS for 2021–2025 (see Document SC/57/4B) requires high quality laboratories and state-of-the-art scientific equipment. It also requires support to research platforms, of which histopathology is increasingly important to most cancer research studies across the Agency.

2. Three pieces of equipment have been identified as necessary: a) to undertake digital imaging of histology slides; b) to perform automated staining of slides (Haematoxylin and Eosin) to protect staff from hazardous chemicals, including carcinogens; and c) to provide replacement facilities for frozen sections of tissue samples. Covering the cost of new major equipment on the regular budget has not been feasible over the last 15 years and obtaining designated funds through competitive grant applications has proven difficult for such platform technologies given the limited number of such opportunities open to the Agency as an international organization.

3. The histopathology laboratory within the WHO/IARC Classification of Tumours (WCT) Group provides essential support to a number of high-profile projects within the Agency, including Mutographs [Genetic Epidemiology Group (GEP)], the Study of Tattoo Ink related Toxins relevant to Cancer in Humans – STITCH [Environment and Radiation Group (ENV)], the Epidemiological iNvestigatIon of Gastric MAlignancy – ENIGMA [Prevention and Implementation Group (PRI)] and the Genomic analysis of inherited Lung cancer – GeniLuc [GCS], to name but four. The tissue samples from these projects are all dealt with within the histopathology laboratory, which provides critical support and services in obtaining material for examination of the tumour and molecular analysis.

4. The annual maintenance costs of the requested equipment will be covered through the histopathology cost recovery scheme.

5. A second part of this request concerns Information Technology (IT) core infrastructure and services. IT is a fundamental resource enabling IARC to deliver its strategic goals. This proposal aims to outline the technological investments needed to foster a modern IT organizational culture and practices, in line with the new MTS and the Information Technology Roadmap 2021–2025.

6. The Director would like to request the Governing Council, at its next regular session in May 2021, to provide the allocation of €70 000 from the Governing Council Special Fund (GCSF) for the purchase of the scientific equipment described under Section A, as well as the allocation of €350 000 for core IT infrastructure and services (for a period of four years), described under Section B.

7. The proposed investment of a total of €420 000 (see Section C) is first submitted to the Scientific Council for its consideration.

A. Purchase of scientific equipment

Digital scanner

8. Digital imaging of histology slides is becoming an increasingly important part of multi-centre clinical studies and is particularly important in cancer studies to permit review of diagnosis for those patient samples included in studies. It also provides a permanent record of all samples included in a study and forms part of the scientific record. Beyond this, there is an increasing move towards computational pathology, combining digital pathology with image analysis and artificial intelligence to extract information. Individual cells can be identified and counted automatically. There is a molecular research opportunity here too, as it improves the ability to use in situ methods such as immunohistochemistry and RNA hybridization methods to assess individual cell populations within cancers. Digital imaging is a core IARC facility within the histopathology laboratory, but our existing Leica (previously Aperio) SCN400 scanner is over eight years old and is obsolete. The software is not replaceable and is now being maintained within the Agency to keep it going a little longer than the company advises. The resolution of the images is poor and insufficient for computational pathology.

9. Digital pathology is key to the future work of the Agency. Current needs are to scan up to 50 slides a day, 200 days per annum – or a total of 10 000 slides per annum. This is regarded as medium throughput for modern equipment. We currently have a small single slide scanner (Glissando) which, while limited to the scan of two slides per run, provides very high resolution and is used mainly for the WHO Blue Books. It is possible to upgrade this scanner to scale up the digital imaging process, therefore providing a cost-effective solution to our needs.

10. The low throughput Glissando scanner won a competitive bid two years ago and can be upgraded at lower cost than replacement (quoted at 20 000 euros).

Histostainer – Automated slide staining

11. The current automated staining machine in the pathology laboratory is very old (19 years) and has ceased working reliably. A replacement has the advantage of better protection for staff from hazardous chemicals including formalin, staining reagents, alcohols, and glues used in the production of Haematoxylin and Eosin (H&E) stained slides, and special stains (e.g. Giemsa, PAS, van Gieson).

12. The consistency of staining is important for digital methods and this is therefore required to get the best value from the investment in digital scanning equipment.

Cryostat

13. Cryostats are microtomes used to produce very thin sections (around 6 micrometres) for histological examination of frozen tissue samples. These sections are then stained by H&E for examination by a pathologist, including annotation of digital images to provide a record of the material cut from the frozen tissue for genetic analysis. This is an essential first step in the process and one which many IARC scientific projects rely on.

14. The single cryostat within the laboratory is used for the Mutographs and other projects, is around 15 years old and is now at the end of its life. It is well overdue for replacement. The current situation is clearly a risk to projects that need frozen sections, and therefore requires replacement.

B. Core IT infrastructure and services

15. Core IT infrastructure and services are, inter alia, institutional web sites, research web sites, web applications, file services, administrative tools such as our ERP, workflows and business intelligence platforms, email services, printing and development environments.

16. Currently, the hardware and software running these services are made available through a four-year rental agreement of second-hand equipment, which provides servers, storage systems, operating software and disaster recovery capabilities.

17. The above agreement was financed from the budget previously used to fund the maintenance of our core IT infrastructure. This contract will expire at the end of 2022. If this proposal is accepted, we envisage that the second half of 2021 will be dedicated to the elaboration of the detailed technical specifications, followed by a round of market consultations at the beginning of 2022, leading to the procurement process and finally implementation in the second half of 2022.

18. This request will allow ITS, following the Information Technology Roadmap 2021–2025, to:

a) Adopt a cloud-first strategy, meaning that we will consider cloud-based technological solutions before all others. Cloud-based solutions will bring higher levels of service availability than our current on-premises solutions and increase flexibility for capacity growth. They will also provide enhanced security functionality and enable IT staff to concentrate more time on added-value activities.

b) Replace our current on-premises hardware with modern, highly performant servers and storage systems to run the services and tools that will not be migrated to the public cloud. This will mitigate the risk of running critical services on older second-hand equipment, as well as increasing their performance and reliability.

c) Identify the most effective way to provide disaster recovery (DR) services to ensure our ability to recover from major technical issues. Currently IARC maintains a second server room in another building on the campus, which is primarily dedicated to restoring IT services in the case of a disaster in our principal computer room. This generates costs due to the need to maintain redundant IT hardware as well as the electrical, physical and air conditioning costs associated with a server room. One option is to move the DR site to public cloud providing IARC with a more cost-effective, modern model as well as moving the physical location further away from our premises, again mitigating risk. If this is not possible, we will modernize the equipment currently used to provide on premises DR service.

19. The funding requested for this proposal is €350 000 for a period of four years. To ensure that we can cover the full scope of this proposal some additional funds will be made available from internal IT budgets previously associated with maintenance contracts of core infrastructure. Given that the execution of this project will take place 6 to 12 months after its potential approval and that the exact split between cloud and on-premise solutions will be specified in finer detail closer to the execution of the project, coupled with the significant saving which can be negotiated from public cloud providers when entering into long-term agreements, we propose to report back in full transparency to the Governing Council the final breakdown of costs once the project has been completed.

C. Requested budget

20. The Scientific Council is requested to consider the above proposals, with the below budget summary, for support from the Governing Council Special Fund and to make its recommendations to the Governing Council.

	Approximate cost (€)
Equipment for the Histopathology laboratory	
Digital imaging upgrade	20 000
Histostainer	30 000
Cryostat	20 000
Sub-total for equipment	**70 000**
Core IT infrastructure and services	
Cloud Services	
Storage Systems	
Servers	
Software Licenses (Virtualization, Disaster Recovery, Backup, Monitorization)	
Sub-total for Core IT infrastructure and services	**350 000**
Total requested budget	**420 000**