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D2.2: Sustainability and Governance Models for Experimental Infrastructures

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This report describes the sustainability and governance models for Experimentation-as-a-Service within the FMI ecosystem considering the role of experimental infrastructures and platforms. The approach utilises the models established by Bristol Is Open, that seek both public and private partnerships considering technology development and strategy with universities, social partners with local authorities, strategic industry sponsors, and creating engagement activities for innovative SMEs and citizens. The models will be enhanced after incorporating the lessons learned from Open Call 1.

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EXECUTIVE SUMMARY

Outlined within this document are the sustainability and governance models for EaaS based on the experience of FLAME's partners and from replicators operating in European urban regions. This will form the basis for the exploitation strategy primed for FMI ecosystem building a disruptive experimentation. There is no definitive EaaS business model applicable to European Smart Cities that can be adopted to the FLAME platform due to ecosystem variations between existing smart cities. To facilitate a model of experimentation under the FLAME platform we have utilised the Bristol Is Open's business and governance model as a proxy to facilitate experimentation on the FLAME platform within urban FMI ecosystems. The governance model has incorporated the PPP model that the BIO model operates under and is recommended for European replicators. However, we do accept that there will be unique ecosystems within each new replicator city which may require the model to be adapted accordingly.

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ABBREVIATIONS

BCC	Bristol City Council
BiO	Bristol Is Open
EaaS	Experimentation as a Service
FMI	Future Media Internet
GDPR	General Data Protection Regulation
IOT	Internet of Things
NGO	Non-governmental organisation
PM	Project Management/Manager
PPP	Public-Private Partnerships
SME	Small-Medium sized enterprise
SOW	Statement of Work
UOB	University Of Bristol
SDN	Software Defined Networking
VLAN	Virtual Local Area Network

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1 INTRODUCTION

The purpose of this document is to provide a sustainability and governance model for Experimentation-as-a-Service (EaaS), considering the role of Bristol Is Open as an experimental infrastructure. The document will describe the current governance and structure of Bristol Is Open as an EaaS test-bed, in addition to the sustainability model of the infrastructure in terms of technology and business perspective. At this point no experimentation has taken place on the Bristol is Open infrastructure within the FLAME project, and so BiO will be working on governance processes for third parties to experiment as EaaS utilising the FLAME platform in the coming months, and the process of replication. The second version of this document will adapt the model adding in lessons learned and knowledge sharing from the 1st Open Call, validation experiments, and replication within FLAME.

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2 GOVERNANCE

2.1 VALUE PROPOSITION

Bristol Is Open is a smart city research and development platform which combines multiple experimental facilities and capabilities within a city operating system. These capabilities include (but are not limited to):

- Ultrafast network connectivity across Bristol City Centre
- Internet of Things (IoT) hosting
- Cloud computing resources

The R&D platform enables Bristol Is Open to offer City Experimentation as a Service, with open, flexible and programmable functionalities for partners seeking to test smart city technology within a physical world setting.

These capabilities are facilitating BiO's partners with a real-world City environment to test and validate new technologies for smart city use cases designed to improve the quality of life of citizens and the local services they interact with.

The operating system allows for a user-defined physical experimental environment, without disrupting the existing city ecosystem, with physical and emulated technologies under realistic, controllable, secure and repeatable conditions.

BiO's offering allows for multiple tenancies within the network simultaneously, however there are limitations placed on partners depending on their level of agreement, and the assets they require access to. BiO has no standard defined access policy yet, however access to the network is determined on a case by case basis for each partner, depending on the aims of their research and development utilizing the test-bed. Limitations on current access wholly depend on engineer availability and current project pipeline determined through senior management.

2.2 OWNERSHIP AND PARTNERSHIPS

Bristol is Open is a joint venture between University of Bristol (UoB) and Bristol City Council (BCC). It is an external organisation to both stakeholders, however BiO's success is reliant on strong collaboration with both BCC and UOB in the management of the test-bed environment across the city and knowledge sharing across the three organisations to develop smart city projects. BiO is also reliant on corporate partners and local SME's for the operation of the infrastructure and the provision of new hardware deployed in the test-bed. These relationships operate under a Public-Private Partnership.

Sustaining these partnerships is integral to maintain a functioning test-bed environment as these stakeholders provide access to their own assets to deploy hardware and software capabilities for the test-bed.

- Test-Bed Assets

All the physical city infrastructure assets are owned by Bristol City Council e.g. lamp posts, and

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street cabinets. These assets are utilised as hosts for sensors and active nodes across the city. BiO is dependent on BCC on gaining access to appropriate assets and their preferred contractors to deploy and maintain hardware on these assets.

- SME Server Rooms

  BiO has strong partnership with local SME's and the University of Bristol to provision BiO with access to their server rooms which are located around the test-bed environment. These partners allow for the hosting of switches and access to active nodes for BiO engineers.

BiO has a range of strategic partners contributing to the venture on the evolution of the programmable city network. They provide services and technological capabilities to facilitate BiO's development of an open programmable city. BiO collaborates with them in the deployment process to ensure the sustainability of commercial projects throughout their lifecycle.

2.3 Revenue Streams

2.3.1 Commercial

BiO's revenue is generated by making available the experimental test-bed to multiple commercial partners, who wish to use the test-bed for experimentation with innovative hardware and the implementation of smart cities use cases. BiO has a partnership program with varying levels of contracted agreements with several partners which includes the following services:

- Utilisation of the BiO infrastructure for research and development within a contracted time frame.
- The provision of designated engineering support for deployment, validation and maintenance.
- Partners will provide BiO with assistance to fulfil the service agreement of deployment and maintenance.

BiO offers the several types of agreements within the program to commercial companies wishing to use the test-bed for experiments or showcase new hardware capabilities. Some agreements are based on Public – Private Partnerships, with commercial companies granting support in driving the innovation of BiO's hardware and software to test such capabilities within a physical world setting. The specific types of agreements are outlined in the table below.

Table 1 BIO's commercial partnership model.

Agreement	**Service**
Partnership	Allows partners to run several technical experiments as part of the agreement, for a period of 3 years.
Collaboration	Allows collaborators to donate/provide hardware or software solutions and showcase on the infrastructure free of charge.
Experimentation	Allows experimenters to use only certain parts / elements of the infrastructure to showcase their solution on the infrastructure for free of charge, provided the experimentation kit remains at BIO (the loan of the equipment would be arranged on a case by case basis, depending on length of experimentation, and necessary upgrades to equipment).

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2.3.2 European Commission Horizon 2020 Projects

BiO also participates on many EU Horizon 2020 Projects contributing to different areas of research to further the smart city agenda in Europe. These projects provide additional revenue to BiO and are expected to run to 2021.

2.4 COST STRUCTURE

BiO has specified the cost structure in the lifecycle of the current test-bed environment from the initial set up costs, which will incorporate the purchase of hardware, and the contractor cost for installation. Experimentation execution will involve labour costs for the deployment, testing and validation of experimentation including engineer labour costs, and the costs of organising with stakeholders within the city. Maintenance of network is also considered should the network need to be extended, and improved to maintain the existing experiments, or to extend to additional markets. Upgrades to the network is listed to provision new hardware to be hosted in street level assets, these may be suggested or provided by commercial partners.

Table 2 BiO's cost structure through set-up lifecycle.

Stage	**Cost**
Initial Setup	Initial assembly of testbed, organisation costs for deploying hardware, and contractors for installation.
Experimentation Execution	Testing and validation, engineer support for experiment projects and organisation costs.
Maintenance of network	Extension of the network, maintenance costs on existing hardware.
Upgrades to network	Provision of new hardware from commercial partners deployed to the test-bed.

2.5 PROJECT LIFECYCLE AND GOVERNANCE

2.5.1 Governance

BiO's commercial and EC H2020 project structure incorporates the roles in the table below. Additionally, the diagram below illustrates the strategic governance of projects and the flow of the decision-making process, during the inception and management of projects. Figure 1 illustrates the project roles, and how they interface with BiO's join venture owners, BCC, and UOB. This is mainly based on BiO's commercial project structure, however in EC H2020 projects where experimentation is needed this same structure is utilised. There are two separate Project Management teams: commercial and EC H2020.

Table 3 BIO's project roles

Role	**Responsibility**
Project Board	Strategy and management of BIO's programmes.

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Role	Responsibility
Project Management Team	Day to day management of BiO's current projects. This is separated within BiO into an EC H2020 team and commercial team.
Delivery Team	Engineering and External contractors who will work in deployment of hardware and software.

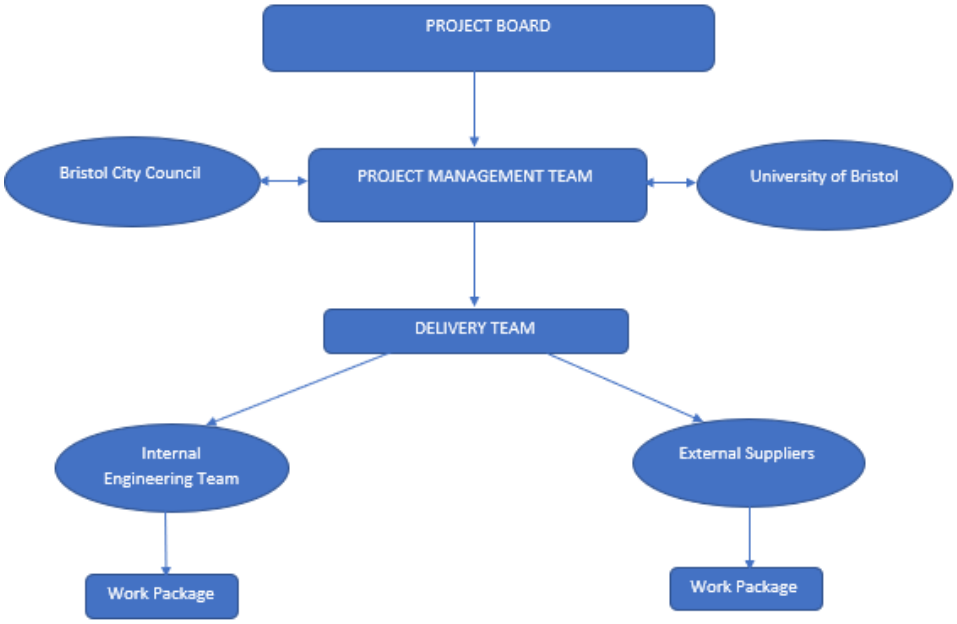

Figure 1 BiO Project Team Structure

The key stages that BiO undertakes for initiating and carrying out R&D projects with experimentation partners are illustrated in Figure 2. These stages are undertaken by management, and engineering staff and require the engagement of Bristol City Council and installation contractors.

Prior to the initiation of projects, BiO's project board will meet with potential experimenters and review proposed projects and identify whether the project is within the scope, technical and operational capacity of BiO. Considerations are made on the following factors:

- Suitability of the proposed project to Bristol City setting.
- Council's agenda for the city (i.e. reducing congestion, improving air quality). BiO also needs BCC to approve projects which will utilise their street level assets. The process will involve BCC assessing the ethical implications of the project and identifying if it will pose risk to the public. If hardware is to be deployed on their assets they will need to review the equipment to ensure it complies with regulations i.e. power draw of the equipment, colour of equipment, and height of installation.
- Technical capabilities of the current test-bed and whether improvements will need to be made to accommodate the project.

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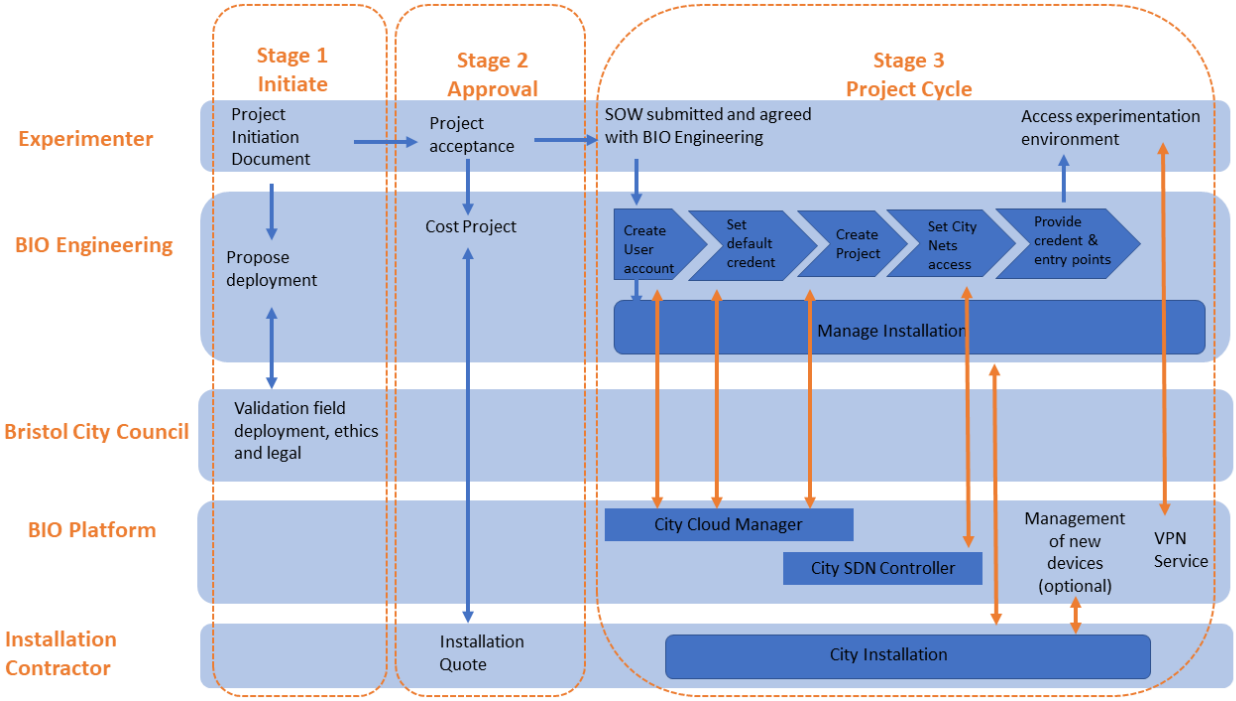

Figure 2. Key stages to running experiments on the BiO network

2.5.2 Lifecycle

2.5.2.1 Stage 1: Initiation

The project board will introduce the project management team to the 'experimenter' once a viable project has been identified. The Project Management team will further investigate the feasibility of the project and collaboration ensuring considerations are made on the technical viability, data privacy legislation, scheduling and infrastructure capabilities.

The PM team will then ask the experimenter to complete a Project Initiation Document (PID). The PID should contain the initial business case and data privacy impact assessment for the project which will be reviewed at each stage boundary to ensure the project remains within scope. Upon receipt of the PID the PM and engineering delivery team should have sufficient information to review the proposed project and estimate the required work, budget and resources needed. PMs will work with BCC and the experimenter to ensure the proposed field deployment; ethical and legal factors have been agreed upon.

2.5.2.2 Stage 2: Approval

Once the project has been deemed viable by the council and the PM and delivery team, BiO and the experimenter will accept the project. A proposal/contract will be agreed between both parties detailing the timeline, expected quality, and scope of BiO's delivery. The BiO engineering team will collate costs based on the required devices for deployment, the installation costs, and labour involved. During this stage the timeline of the deployment and validation will be agreed, once confirmation has been received from the installation contractor.

The PM team on receipt of a signed proposal will compile a project management plan to be shared with the experimenter and project executive. The plan will be updated and reviewed at the boundary

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between each stage of the project and will incorporate a timeline of planning, deployment, validation and acceptance.

2.5.2.3 Stage 3: Project Cycle

The experimenter will collate a statement of work based on the feedback from BIO during the first 2 stages and input from third party contractors and Bristol City Council. This will be sense checked with the delivery team. An outline of work packages will then be agreed between the delivery team, experimenters and PMs. The stages involved within the work package should include:

- Deployment
- Validation
- Acceptance

When this has been agreed, the PMs will begin the process of planning the deployment and validation stages in consultation with the delivery teams.

The course of some projects may involve the deployment of commercial customer or research partner's assets by BIO or contractors. To manage this BIO will request the customer to complete an asset deployment form, detailing the equipment its location and responsibility of BiO.

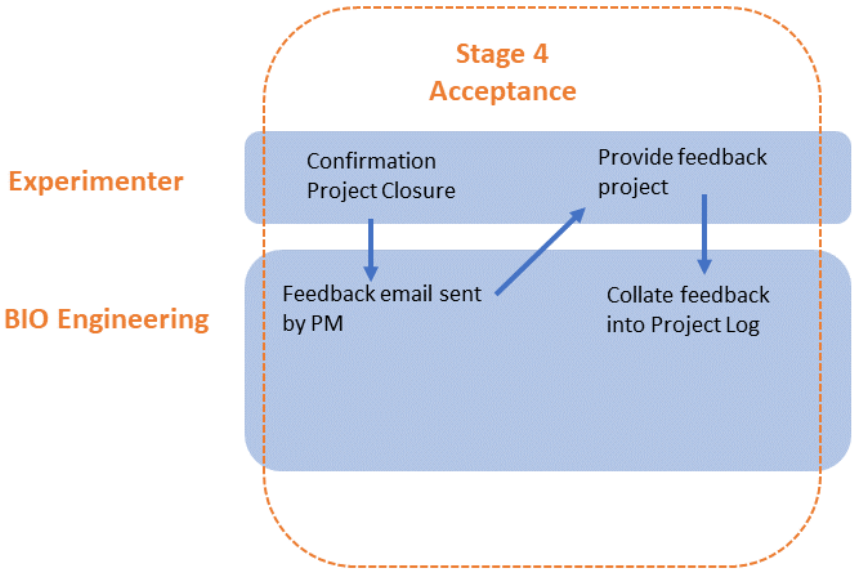

Figure 3 BIO Acceptance Stage process

2.5.2.4 Stage 4: Acceptance

After the engineering delivery team have completed the project. The PMs with consultation from the customers will confirm the project closure. Outlined in Figure 3 is the acceptance process taken by BiO.

To ensure that BiO can improve on its project delivery in the future, the PMs will request the customer to provide feedback. Initially this will be done via email, and then a closure meeting to discuss with the customer. This feedback will be collated into the PMs' project log of project feedback.

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2.5.3 Project Management Processes and Documentation

2.5.3.1 Communication Management Approach

Within the project proposal the communication management approach will be outlined detailing the frequency of email updates from BiO's Project Managers to the customer. In addition to the frequency of face to face project update meetings.

Furthermore, it is expected that there will be a project kick off and project closure meetings with the customers which will be organised by BiO's PMs.

2.5.3.2 Asset Deployment Register

Some projects may require customer's equipment to be deployed by BiO. To ensure the safety and security of the hardware during the project BiO will request the customer to complete an asset deployment register.

2.5.3.3 Privacy Impact Assessment

BiO asks that all customers complete a privacy impact assessment during the initiation stage as part of the project initiation documentation. This should identify the type of data to be collected, the flow of data, potential risks and identified solutions. This will be assessed internally by BiO's PMs in accordance with legal guidance to ensure that any data BiO processes are compliant with GDPR legislation. The outcomes of this assessment will be incorporated into the project plan. This will be reviewed throughout the stage boundaries to ensure that the data to be processed remains secure and compliant.

2.6 ACCESS TO BIO'S RESOURCES PROCESS

Due to the high number of BiO's partners and projects that require the use of both BiO engineering resources and its network capabilities, BiO must follow a project review and justification process prior giving access to its assets.

2.6.1 Project Initiation

Prior to BiO taking on any of the initial tasks from the experimenter or partner, BiO's Project Team will meet and review the Proposal and Scope of Work (SoW) to identify whether the project is feasible from the point of technical, operational and, where applicable, financial capacity of BiO. Considerations are made on the following factors:

- Suitability of the proposed project to Bristol City setting.
- Bristol City Council's (BCC) agenda for the city (e.g. reducing congestion, improving air quality) and the need for them to approve projects as BIO require BCC's assets to deploy as well as BCC's approval for ethical and public safety considerations.
- Technical capabilities of the current test-bed and whether improvements or significant changes will need to be made to accommodate the project as well as their impact on the test-bed at large.
- Data Impact Assessment based on the GDPR legislation. As a data processor BiO needs to ensure the experimenter (controller or receiver of data) has outlined the type of data that is to be collected and processed through the BiO network. This will need to be reviewed by

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Project Managers during the initiation stage. A data controller and processor agreement will also be drawn between BiO and the experimenter.

- Timelines of the ongoing projects and any significant conflict in resource or infrastructure use.

This process will be in consultation with the Delivery Team and Project Managers.

Upon confirmation of the feasibility of the project, the BiO Delivery Team will provide the necessary access to the network to the partner in accordance with the project requirements.

Should the SoW or the proposal not be accepted against the qualifying criteria above, secondary negotiations between BiO and the partner will be required to define the new project scope.

2.6.2 Project Cycle

Throughout the lifecycle of the project the Delivery Team will monitor the use of the BiO resource and either extend or limit the access as needed with prior notification and agreement with the partner in question.

Any required changes to the access or the use of infrastructure must be agreed upon between all parties involved and documented accordingly.

2.6.3 Project Closure

Upon completion of the project, BiO Delivery Team and Partner or experimenter team will follow the pre-agreed process of removing/restricting access to BiO resources and removing any project-specific equipment, if applicable.

Should any equipment need to be removed, BiO will oversee the process and ensure there is no impact on any part of the infrastructure. The removal should be documented by the BiO team and shared with the partner/experimenter as part of the project closure documentation.

2.7 COMPLIANCE

For BiO to deploy new infrastructure into the city centre we must comply with requirements set by Bristol City Council, University of Bristol and local SME's who provision BIO with space in server rooms for active node locations. These vary from health and safety, approval for deployment, or ethical approvals. These factors are all considered by Project Managers when planning project timelines. Table 4 lists the compliance requirements and action necessary for BiO to take.

Table 4 Compliance actions for BIO's stakeholders

Stakeholder	Compliance	BIO Action
Bristol City Council	Access to lampposts and street cabinets.	Seek authorisation through the BCC Infrastructure management who will review the technical compliances of hardware and assess if there are any ethical implications which need to be escalated for instance installation of cameras in public squares.
Council Preferred Contractors	Scheduling of installation of hardware on street level with	Schedule installation with contractors accommodating for BCC planning restrictions.

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	contractors Select Electric.	
Local SME partner's	Planning approval from SMEs for installing hardware.	Liaise with local SME estates team and gain approval through their internal processes.
Users/Citizens	Ensuring safety of Bristol citizens.	Following health and safety procedure of Select Electric. Seeking ethical approval through BCC and UOB (only if UOB resources are a stakeholder in the project they will then need to undertake ethical review of the project in question). Anonymity of data associated with camera feeds.

2.8 CITIZEN ENGAGEMENT

BiO is in the process of developing a strategy for engaging users to drive the innovation of the BiO testbed and research use cases. Currently BiO's business model seeks to drive innovation through technology deployments within the city setting. It is imperative that in the future BiO integrate this innovation driven approach with engaging citizens to ensure the efficiency and usability of smart city projects for Bristol.

BiO do currently have ongoing EU Projects that require engagement with local communities on the viability of use cases, in which we collaborate with Bristol City Council who are the WP leaders on the engagement work packages. However, we are developing engagement with several different types of stakeholders within various projects and when assessing engagement methods, the following factors are considered and evaluated:

- Demonstrating Impact, i.e. presenting the usefulness of engagement with users to the development on BiO's R&D activities.
- Demographics, i.e. how to engage with users depending on location/age/gender/access requirements and how to present scientific and technical information to them.

The strategy defined in this documentation is led by Project Management Staff and approved by the project board. We hope in the future once we have a clarified engagement strategy the Bristol Citizens will play a large part in driving the usage and innovation of BiO's R&D network.

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3 SUSTAINABILITY

The sustainability of EaaS infrastructures within the FLAME project utilises the current proposed sustainability plan from Bristol Is Open. It is our intention to update this deliverable in M30 with lessons learned from the implementation of experiments at these infrastructure locations. The information outlined below is based on the evolution of the BiO and i2cat assets and offering within their own ecosystems.

To sustain EaaS infrastructures in replication cities beyond the FLAME project, integration with the local government, citizens and environment is critical. Assessing methods to serve the city in improving efficiency and quality of life by the local government and SMEs can lead to projects that integrate replication test-beds with the development of the city setting. These potential projects may arise with investment from local government to integrate test-bed technology with local services and SME's economic development.

The viability of these projects will need to be assessed in line with the following factors: the technical capabilities of each replication city, limiting factors within the city setting, the opportunities local governments are seeking out and major challenges defined within the city. It is crucial that the infrastructure operators in replication cities ensure that they remain relevant to local government and SMEs, and to address arising challenges faced by city governments and local citizens.

3.1 TECHNICAL SUSTAINABILITY

Outlined below are the methods which BiO maintain and plan to innovate the platform and infrastructure currently deployed in Bristol City centre.

3.1.1 Platform Sustainability

'Platform' here is the infrastructure platform and it will need alignment with the developments in areas such as OpenStack and SDN. Here, partnerships with Zeetta as technology provider would come in as well as the training provided to the DevOps team.

3.1.1.1 SDN

BiO operates the City of Bristol's private fibre infrastructure on behalf of Bristol City Council.

A Software Defined Networking solution is being developed for BiO by a technology partner, which will further develop BiO's offering as an EaaS. The first layer added to the fibre is an optical switching solution that manages slicing. The method of slicing divides the optical network into sandboxed areas for isolated testing and experimentation. The control mechanism forms part of the overall Software Defined Networking solution currently being developed to be deployed on BiO's network. The implementation of the SDN mechanism will enable BIO infrastructure engineers to manage the slicing of the network and furthering the EaaS model. Managing the switching capability using this method will facilitate operating multiple simultaneous FLAME experimenter projects.

3.1.1.2 OpenStack

OpenStack is currently used as a cloud controller provider environment for experimentation across the BiO platform and hardware. Using VLANs BiO is currently capable of slicing the network for experimentation. Planning is being undertaken to develop the capabilities the OpenStack can provide

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to the management and operation of the network and infrastructure deployed. These developments can be done in collaboration with the evolution of the FLAME platform.

3.1.2 Infrastructure Sustainability

To maintain and develop the current infrastructure deployed within the BIO testbed environment consultation with the local council is required. BiO as a joint venture between UOB and BCC has processes in place with the local council to implement changes in the physical infrastructure; this requires BiO to use council's preferred contractors as BCC street assets are hosts for physical devices.

BiO intends to develop the current infrastructure in line with H2020 and commercial research projects which will facilitate deployment of new technologies within the city and beyond the current deployment areas.

BiO within D5.1 [1] recommended a higher resource scenario for an EaaS infrastructure to extend beyond the city centre environment. The higher resource scenario from D5.1 [1] is described below, as an example of how BiO could potentially extend its current infrastructure. It is expected that the higher resource scenario will have similar capabilities to the Bristol functionalities but would cover a greater geographical area requiring more Wi-Fi, fibre connectivity and switching points.

- Wireless connectivity – wireless network hubs across multiple locations within and beyond the city centre utilising radio technologies on multiple points. The high resource scenario would be expected to range across a regional area connecting city conurbations and satellite towns. This would require the collaboration with different local governments and the utilisation of their street level assets. Requirements would need to be identified to co-ordinate the compliances for each local government organisation e.g. hardware installation requirements, public safety and legal compliances.
- Fibre connectivity – fibre connections extending the wider range of Wi-Fi devices. In this scenario the fibre ring would be extended from the city locations to conurbations of the city that would have service users in need of fibre connectivity i.e. community centres, media hubs and local colleges. This would allow the higher resource replicators to access the fibre access nodes and connect to the larger network of Wi-Fi/IoT devices.
- Switching technologies – switching nodes could be deployed within the areas of the of the fibre extension, as has been done in the Bristol scenario allowing for engineers to access for maintenance and improvement works within the community centres, media hubs or colleges.
- Network Slicing and Visualization – given the extended physical resources, this scenario would require increased capability to accommodate the greater demand of experimenters and users on the network. The platform would still require slicing capabilities using VLANs, but the operator would need to accommodate the maintenance and operation within their operational resources e.g. staffing, compute, memory and storage capabilities. With this greater capability and demand for experimentation additional monitoring would need to take place across the FLAME platform.

The higher resource scenario will be deploying hardware to a greater geographical location within a metropolitan area. Depending on the size of the city this would need to be managed based on city limitations i.e. physical barriers, local government regulations. It is recommended that these should be managed within clusters. For example, defining clusters based on geographical location (North and South Clusters) or depending on the size or capabilities. This management system would not only be for the maintenance requirements but the network monitoring and project management.

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3.2 FINANCIAL SUSTAINABILITY

3.2.1 Funding Beyond FLAME

To sustain the EaaS infrastructure beyond the FLAME project, BiO would recommend seeking out national and regional funding from government and private calls within the development of connectivity testing e.g. 5G trials.

Within the UK, the Department for Digital, Culture, Media and Sport and Innovate UK offers funding to develop the technology and development of business models and use cases, which could be applied to future media use cases on the FLAME infrastructure.

Additionally, many commercial companies may have opportunities to partner with EaaS infrastructure testbeds to drive the innovation of new technologies within a real-world city environment. The unique value proposition of EaaS can offer R&D opportunities for such collaborations.

3.2.2 Wider Market Offering

Potential EaaS customers within FLAME can include:

- media service providers who wish to test the FMI capabilities;
- network service providers and equipment vendors;
- local government and service providers.

Partnerships (similar to BiO's Public Private Partnerships) can be established with these customers who can offer innovation of the infrastructure in the form of testing new capabilities and equipment or use cases to scale up service provision or business offerings. This PPP model can be scaled based on the size of the commercial organisations and skill level. The types of organisations could vary from local service providers e.g. transport providers, to large technical equipment providers, so one model would not be suitable for all partners.

These partnerships would help to sustain hardware on the infrastructure and scale up the provision of technical operations, for instance the monitoring capabilities of the network.

3.3 FMI ECOSYSTEM ENGAGEMENT

3.3.1 Strategic Local Partnerships

BiO maintains strategic partnerships with local partners in the operation of the network and as potential customers of EaaS.

Target users of the EaaS include local service providers i.e. media organisations looking to scale up current use cases. The infrastructure needs to be accessible to these users to manage their experimentations through slicing. At the project initiation stage a feasibility check is essential to ensure use cases are within the remit of the current infrastructure and ethical offerings. As the infrastructure develops the number of experiments running efficiently should increase, as does the EaaS offering.

Additional strategic partnerships would be required to host switching locations and fibre connection points if the network was to be extended further. Currently BiO has a number of partners who host this in their server rooms, but this is within the city centre. If the network was to be extended, a

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partnership agreement would be required of organisations offering access and connectivity within their property.

3.3.2 Adoptability to Replicators

The emerging nature of the technologies and business models within FLAME for replicators are in development by the consortium and it is anticipated that the preferred methodology adapted by FLAME will be valuable to replicators. These processes and methods defined could form the basis of a consulting service to efficiently lead in replication. This could involve the practice of webinars, training and helpdesk services by BiO and i2CAT.

The implementation of this service could provide a quicker turnaround time for replication, and co-creation of new service models based on the varied governance structure of replicator cities, as it is expected that not all will have the same structure to that of BiO and may well be based out of the UK, which could further add value to the FLAME business model and consulting services beyond FLAME.

As part of the service advice could be provided on the following themes:

- Financial: locating sources of funding, partnership models, and cost structure for replication.
- Engagement: engaging with local customers and potential partners, establishing EaaS.
- Technical: hardware and software recommendations, compliances for hardware deployment and integration from municipal governments.
- Logistics: the process of deployment, limitations from local government and timeline of experimentation.

3.3.3 Customer Engagement

The EaaS offering would need to be focused on regional SME's and larger organisations perhaps on a national level. Events to engage the different type of customers that could use the network would be necessary. For instance, for larger technology companies who have the necessary skill set and resourcing BIO could engage with them and discuss technical feasibility checks, however for smaller SMEs or NGOs, a workshop would be useful to tease out the requirements of their use cases to match to BiO's technical capabilities and understand what technical support would be required. Currently, part of the project initiation stage of BIO's project governance requires a SOW which will be assessed by engineering staff. This needs to be catered for different audiences to efficiently pick out their requirements.

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4 CONCLUSIONS

In this document we have illustrated BiO's current governance and sustainability model, both from a technical and business perspective. This model will be used in the process of replication within FLAME, but the update to this document will incorporate insights from the 1st Open Call, validation experiments, and replication with i2CAT, and further knowledge sharing between the 2 initial infrastructure providers within FLAME.

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5 REFERENCES

[1] D5.1 FLAME Replication Process V1. January 2018

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