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The Big Picture Workshops (2022/23) Report

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Summary

The Big Picture Workshops, facilitated by JNCC and 3KQ in November, December 2022 and January 2023, were a series of seven online sessions and one two-day in-person session aimed at advancing the field of benthic imagery acquisition and analysis. The workshops targeted each of the themes outlined in the Benthic Imagery Action Plan (BIAP), including governance and coordination, imagery acquisition, overarching guidelines, annotation approaches, software and machine learning, training and quality assurance, and data flows. The workshops brought together experts from academia, government, and consultancies to share knowledge and explore new techniques and technologies. The goal of the workshops was to refocus the ambitions of the group, driving progress towards standardised and comparable benthic ecosystem datasets.

Contents

1 Background

Prior to the events described in this report, there have been two workshops. The first, called ‘BIG PICTURE’ and hosted by JNCC, was held as an in-person event. The workshop brought together 29 organizations from the marine monitoring and assessment field in the UK and beyond. During the event, which took place from 19 to 22 March 2019, experts addressed a variety of topics related to collecting, analysing, and sharing benthic imagery. They worked together to find solutions and opportunities, while exploring ways to integrate new technologies like computer vision and machine-learning into their current workflows.

The BIG PICTURE workshop yielded two primary results: the creation of the Benthic Imagery Action Plan (BIAP) for the UK and the establishment of the Big Picture Group. The BIAP comprises 87 tasks grouped into seven coherent workflows, which incorporate and prioritise all the recommendations from the workshops. It has received the endorsement of the Healthy & Biologically Diverse Seas Evidence Group (HBDSEG) in the UK, and progress towards its achievement is reported to the Northeast Atlantic Marine Biological Analytical Quality Control Scheme (NMBAQC). The seven themes have undergone changes since this workshop, they are currently:

- Governance and co-ordination
- Overarching guidelines and purposes for imagery
- Acquisition of imagery
- Imagery annotation approaches
- Image annotation software and machine learning
- Data flows
- Training and Quality Assurance

The Big Picture Group comprises of experts in the field of benthic imagery acquisition and analysis. Representing a broad spectrum of organizations from across the UK, including government, research, and academic institutions, as well as private consultancies, they aim to collaborate to resolve common challenges in benthic imagery. Tasks are implemented through the BIAP and by maintaining contact and updating progress through an online communications platform, hosted by JNCC. The Group's activities are performed by Project Working Groups (PWG), each dedicated to a particular theme in the BIAP.

After the 2019 workshop, the COVID-19 pandemic restrictions led to the second workshop 'BIG PICTURE II' being held exclusively online in March 2021. Nevertheless, the event brought together 74 stakeholders for three days and showcased two years of benthic imagery innovation and collaboration, demonstrating progress and accomplishments from the BIAP.

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2 Online workshops

In November and December 2022, a series of seven 2.5 hour workshops were held, focused on different themes in the Benthic Imagery Action Plan (BIAP). The sessions were designed for members of working group to come together and review progress, outputs, and discuss the way forward for each theme. However, they were open to anyone in the Big Picture community who was interested.

Each of the sessions was led by JNCC and hosted by the relevant project working group lead. In addition, a facilitator from the business consultancy 3KQ guided the discussion, aided by an online whiteboard platform called Conceptboard, to which everyone in the session had access. There was high engagement with each workshop, which produced interesting and useful discussions. Notably many of the participants attended many of the workshops.

The outcomes from each session were then made available for the Big Picture community to view and comment on before the face-to-face workshop, which took place on Wednesday 18 and Thursday 19 January 2023 in Birmingham.

In addition to the summaries that follow, full details of task updates are provided in v1.7 of the BIAP (the BIAP tracker can be downloaded from the NMBAQC website).

2.1 Governance and Coordination

This workshop was held on the 29 November 2022, and included the PWG lead, James Albrecht. During the review of tasks in the workshop, it was noted that some tasks have been advanced or finished while others may need to be re-evaluated and potentially reassigned to another theme. Additionally, the possibility of adding a new task to this theme was considered.

Progressed and completed tasks include:

- **Task 2:** Create an Action Plan managing body and systems for coordinating projects across UK.
- **Task 4:** Create working group file-sharing and collaboration site.

It was noted these tasks include an ongoing commitment to the maintenance of the group. There was feedback that there is a need to streamline how the collaboration and networking works; this includes creating clearer channels to make it easier for people to join project working groups and get more involved.

This theme includes some tasks that did not fit into other themes when the BIAP was originally developed. The rationale behind the tasks is sometimes unclear and more detail around task rational should be included in the BIAP going forward.

It was suggested that **Tasks 10** and **11** should be moved into the Image Annotation and Machine Learning theme, and **Task 8** should be moved into the Data Flows theme. There is also a need to manage dependencies on other tasks especially when these are across project working groups.

Creating a new task along the lines of “Connection to other organisations and international organisations and initiatives” would enable us to gain a higher-level view. It could involve mapping and reviewing existing connections and finding new ones.

2.2 Overarching guidelines and purposes for imagery

This workshop was held on 30 November 2022, and included the PWG lead, James Albrecht. Discussions during the online workshop revealed that some tasks in this theme have been completed and progressed, and some tasks require follow up.

Completed tasks:

- **Task 12:** Identify and define range of main purposes for using benthic imagery.
- **Task 13:** Identify standard requirements for grouped main purposes and create standard table and decision tree flowchart.

Progressed tasks:

- **Task 14** (which also incorporates Tasks 15, 16, 18, and 19)**:** Guidance for entire imagery analysis workflow (design, analysis, randomisation, annotation, statistics), including decision tree flowchart.
- **Task 17:** Develop minimum data standards for imagery core purposes.

Tasks requiring follow up:

- **Task 16:** Alignment of imagery acquisition parameters with minimum sample size recommendations and sample selection criteria for each core purpose. Huge task depending on many parameters, and technical content depends on outputs from other working groups.
- **Task 18:** Develop minimum requirements for acquisition that meets the needs of each common purpose, to include assurance that minimum sample sizes are attained for each purpose. Requires follow up with Cefas.
- **Task 19:** Develop minimum standards for data quality and apply to in-house and contracted analyses, including time and budget estimates in contract specifications. Relies on tasks above (and Task 6), Marine Directorate keen to engage.

The Centre for Environment, Fisheries and Aquaculture Science (Cefas) has been making significant progress in **Task 14** and aims to provide guidance to the Big Picture Group in early 2024. Natural Resource Wales (NRW) has implemented straightforward Standard Operating Procedures tailored to individual projects. Marine Scotland is in the process of creating streamlined workflows, and the National Oceanography Centre (NOC) has a funded project that aims to incorporate the work of quantitative working groups, specifically regarding sample sizes, into its workflow.

Proformas have been developed to MEDIN standards for **Task 17**, and some of this task has been completed by developing iFDO MEDIN standards, though they are not yet implemented.

All tasks that require follow-up are dependent on the completion of other tasks by different working groups. These tasks may need to be tackled in a collaborative manner. This interdependence of tasks should be more evident in the BIAP and flow diagrams for clarity.

There is a need to improve task engagement and the sharing of reasoning, progress, and working behind tasks, especially when they are interconnected. To address this, JNCC intends to establish a system that facilitates clear and effective communication.

2.3 Imagery annotation approaches

This workshop was held on 5 December 2022, and included the PWG lead, James Albrecht. Discussions in this theme showed progress in some tasks, as well as highlighting a lack of clarity in some others as a reason they have not moved forward.

Progressed task include:

- **Task 37:** Develop Epifauna Identification Protocol (EIP) to improve consistency of taxonomic nomenclature.
- **Task 38:** Review morphological classification systems and recommend optimum approaches for future.
- **Task 40:** Carry out pilot test to explore combined use of morphology-based classification system (e.g. CATAMI) and Epifauna Identification Protocol (EIP).

We were told in the workshop that for **Task 37,** Epibiota Identification Protocol (EIP) workshops were held with industry analysts and taxonomic experts who decided on identification level expectations of taxa based on the quality of the image. This helps with truncation of datasets and later comparison with other datasets. Cefas has been working on all the Cefas imagery / faunal data and compiling them into a SQL database, using the EIP as guidance.

JNCC is working on **Task 38** based on a questionnaire that went out to the project working group. CATAMI remains important in the short term, particularly as it involves a global set of species. SMarTaR-ID builds on CATAMI and often allows for higher resolution identification using imagery, though at present concentrates on deep sea fauna. There has been a lot of work, primarily by Cefas, and by JNCC on Task 40. CATAMI based label trees used in BIIGLE when enumerating taxa. Cefas has been asked to provide their methodology in the form of an SOP so that others can learn from their experience.

It was suggested that there could be a separate task to investigate best practice in the use of annotation systems to help analysts choose the correct methodology. JNCC have commissioned a literature review that will help to inform this.

Notable tasks without progress that need a follow up:

- **Task 34:** Review taxonomic identification approaches for benthic imagery.
- **Task 35:** Develop guidance on minimum sizes of organisms that should be counted (e.g. 10 mm in 1 m^2).
- **Task 36:** Explore whether taxonomic identification should only be carried out for certain taxa groups that an analyst is confident to annotate.

Task 34 requires more clarification and a more specific question if it is to move forward. It was suggested that **Task 35** be altered to specify that we're writing high level guidelines to identify what people should be thinking about, rather than specific use cases, and that it could be incorporated into the EIP. The question was deemed too vague for **Task 36**, though of this task is answered in the EIP but it may not be possible to implement (e.g. what denotes confidence and how do you know this?).

2.4 Image annotation software and machine learning

This workshop was held on 1 December 2022, and included the PWG leads Mark Burton and Kerry Howell. The theme has two working groups focused on image annotation software

and machine learning for benthic imagery. It was noted that while the image annotation software working group hasn't made much progress on the tasks, the usage of image annotation software has increased, especially BIIGLE, since 2019. Improved communication channels between group members should be established to enhance collaboration, as discussed at the governance and coordination workshop.

To tackle **Tasks 52** and **56** and attract new members, it was proposed to conduct an online survey to assess user needs for image annotation software.

The machine-learning approaches for benthic imagery working group has made progress on four tasks:

- **Task 55:** Define data format specifications necessary for machine learning algorithms to work, as well as export formats for biologists to use (e.g. csv files).
- **Task 59:** Scope out international expertise in machine learning and explore options for how to collaborate.
- **Task 61:** Explore potential uses and value of image annotation and machine learning approaches to support Quality Assurance procedures, training, development of reference collections.
- **Task 63:** Develop confidence assessment approaches for machine learning outputs.

Two tasks were identified for potential removal:

- **Task 56:** Review image annotation software and machine learning approaches for benthic imagery analysis purposes to explore differences in user interface, open-source versus contracted, point versus polygon/boxes, stills versus video.
- **Task 62:** Explore use of google imagery to substitute machine learning needs.

2.5 Data flows

This workshop was held on 7 December 2022, and included the PWG leads, Dan Lear and Graeme Duncan. Discussions during the online workshop revealed that all but two of the tasks in this theme have progressed.

Progressed tasks:

- **Task 64:** Consider what data should be shared and how it could be archived. Training aspects of this task have been completed.
- **Task 65:** Identify current data-sharing flows and gaps for benthic imagery. Some work ongoing through other initiatives. Recommended routes have been progressed through DASSH providing an archive for imagery. Infrastructure and hosting videos are very challenging due to costs. Some of tasks 65 and 66 will be explored in NOC Digital Twin project in the next 6 months.
- **Task 66:** Target data-sharing gaps for imagery, explore potential data-sharing options products and recommend routes for organisations to follow to make their data available. Linking all catalogues is still under consideration.
- **Task 67:** Develop online common image library/catalogue to collate and share reference collections across the UK. DASSH development of the MEDIN Automated Image Management System (MAIMS). JNCC and DASSH both use Resource Space based solutions.

- **Task 68:** Explore options for ownership/management of central/common image library of reference collection and, potentially, other annotated imagery. Development has progressed in terms of DASSH fulfilling this purpose.

Notable tasks without progress that need a follow up**:**

- **Task 69:** Develop confidence assessment approach for image library reference collections. No comments during workshop.
- **Task 70:** Identify knowledge gaps in reference collections and address. No comments during workshop.

Graeme Duncan gave a presentation about reference catalogues and data servers.

Tim Schoening has progressed work significantly regarding the infrastructure needed for image data and metadata to comply with a community standard, making marine image data FAIR (Finable, accessible, interoperable, and reusable) with IFDOs.

There was a suggestion to break down tasks to make them more realistically achievable in steps. Originally tasks were top down driven but if have an active working group with scope to develop the task, tasks could be refreshed based on user needs.

A suggestion was made to break down tasks into smaller, more achievable steps. Instead of approaching tasks from a top-down perspective, an active working group with the ability to shape the task could refresh them based on user needs by breaking them down.

Large scale funding is needed for the task in this theme and funding requests from other working groups could be used to support it.

2.6 Training and quality assurance

This workshop was held on 7 December 2022, and included the PWG lead, Jaime Davies. Rather than addressing specific tasks, this workshop took the form of a lively and informative discussion. During the workshop there was a strong feeling that better communication is needed so that theme members can understand what everyone is working on; this could generate better coordination and centralisation.

It was suggested that a consortium / peer-review approach to taxonomy QA would be useful, for example using a pool of expert taxonomists. JNCC already does something like this by sending 10% of its imagery from a project to a second contractor. There was broad agreement from theme members that some kind of assessment should be designed to test taxonomists on a known subset of species and habitats. These types of accreditations are popular in other fields and could make choosing contractors more straightforward.

Taxonomy training at universities could be significantly improved, perhaps an accredited course could be developed. Marion Harrald (SEPA) is already developing a training scheme at SEPA for underwater camera video. Several online resources were suggested, such as MEDIN’s online training portal, NMBAQC’s Epibiota scheme and SMarTaR-ID.

3 Big Picture Workshop 2023 (in-person)

The Big Picture Group workshop, held on 18 and 19 January, brought together a diverse group of experts from academia, government, and stakeholders to share progress, explore funding opportunities, and discuss the challenges of innovation in the field of benthic imagery. The main goal of the workshop was to provide a platform for attendees to exchange ideas, examine the latest advancements, and to delve into the challenges of developing standards and working collaboratively within the UK. The event aimed to provide a comprehensive overview of the current state of benthic imagery and to identify areas for future growth and development; it was planned around the outcomes of online workshops that took place in December 2022.

3.1 Day 1

The first day of the workshop featured three presentations starting in the afternoon of 18 January. The first presentation was given by Kerry Howell of Plymouth University about an online species identification platform called SMarTaR-ID. The second presentation was given by Graeme Duncan and covered the infrastructure and backend requirements for storage and sharing of images in a standardized and open manner. The third presentation was by James Albrecht and was about JNCC's progress on a project about understanding image enumeration approaches for still imagery. The focus of the workshop was to bring together experts in the field of imaging to discuss the latest advancements and to identify areas for future development. The presentations provided valuable insights into the challenges and opportunities in the field and attendees were able to engage in lively discussions.

3.1.1 Presentation 1. Kerry Howell: ‘SMarTaR-ID’

The discussion after Kerry Howell's presentation about SMarTaR-ID focused on the limitations and challenges in using the platform. Several participants were interested in how they might add their own data to SMarTaR ID, and Kerry explained the steps; these include finding an imagery dataset, populating an Excel spreadsheet with morphological and taxonomic features, and sending it to Plymouth for manual review. Gardline uses SMarTaR-ID for monitoring deep-water species in certain contracts, but like JNCC it faces difficulties as most of the species they monitor are shallow-water species, which are not well represented in the SMarTaR-ID database. The group discussed the need for more shallow-water species in the database and the potential for organizations to upload their own image libraries to populate the database. JNCC is working on improving the CATAMI structure to incorporate platforms like SMarTaR-ID and applying for funding for the implementation of various taxonomic groups. The group also discussed the importance of separating deep-water and shallow species to avoid mislabelling and the plan to standardise taxonomic identification with the help of WoRMS taxonomists.

3.1.2 Presentation 2. Graeme Duncan: “Toward a multilevel imagery infrastructure”

The focus of the discussion following Graeme’s presentation was about how to build a system that could be accessed with a text-based query through an API, making it useful for both machines and people. It was suggested that SMarTaR-ID could be rewritten to incorporate this standardisation, and this could be used as a good opportunity for a pilot study. The importance of storing images in the same place long-term was discussed, with the suggestion of setting up a monolithic UK-based data resource being considered (with the need for considerable governance oversight).

The International Image Interoperability Framework (IIIF) was mentioned as having a large user base, making it a potential solution for persistence of standards, and a framework for updates when standards inevitably change in the future.

The discussion also touched upon certain data use cases, such as recording sensitive species, where it may be a requirement that some parts of the data are hidden (e.g., hiding exact location information from some but not all users); this would not be possible in an open standard and would instead require withholding any sensitive information. It was pointed out that while there is guidance, there is no requirement for every field of metadata to be filled out – the *standard* being discussed is the structure of the data, not the extent of the detail it contains.

3.1.3 Presentation 3. James Albrecht: "Understanding enumeration approaches"

James Albrecht presented on understanding enumeration techniques in which he discussed the importance of having an enumeration methodology that can answer the scientific question being asked, while also factoring in flexibility for the future use and comparison of the data. A literature review on this subject has been commissioned and is currently being written; after peer review it will be presented as guidelines by the Big Picture Group. There was interest in incorporating a decision tree in the guidelines to aid in choosing the correct methodology under different circumstances. The guidelines will focus on benthic habitats and species captured using downward facing cameras and still images. However, it was suggested that the methodology could also be applied to BRUVs (Baited Remove Underwater Videos). It was noted that the methodology would not be suitable for oblique angled ROV (Remotely Operated Vehicle) cameras due to difficulty in estimating their depth of field. The discussion also highlighted the importance of considering cost and time vs benefit when selecting an enumeration method.

Using the information gathered in the literature review, JNCC intend to design statistical studies around the effectiveness of different techniques, as well as their efficiency, cost, and benefits.

3.2 Day 2

On the second day of the workshop, the day was divided into two plenary sessions. The time in each session was further divided to cover several themes from the Benthic Imagery Action Plan (BIAP), with project working leads giving updates on their progress and their plans for future work. The following are short summaries of some of the themes discussed.

3.2.1 BIAP theme: Image annotation approaches

Working group leads: James Albrecht, Jon Hawes

3.2.1.1 Identification processes (James Albrecht)

Completed work

- Epibiota Identification Protocol workshops.
- Review of the morphological classification systems people are using (Belle and Barnes, CATAMI and SMarTaR-ID are the most popular).
- Work on CATAMI.

Main priorities

- Higher level morphology work (e.g. CATAMI), they would like to see progression on the work on shelf species, including further develop of SMarTaR-ID. Kerry Howell, one of the authors of SMarTaR-ID, is working on UKRI funding bid for this work.
- If the UKRI funding is not available, it would be worthwhile to concentrate on a smaller section of taxa (e.g. concentrating on echinoderms, which are not a very diverse group in UK waters, so present a smaller workload). The funding would need to cover expert taxonomists and would hopefully start in the next financial year (2023–24).

When the group meets for a project working group meeting, they will report on their progress in an online meeting. It is currently undecided on how often this will be, but it would be open for all members, and any new members who would like to join.

3.2.1.2 Enumeration approaches (Jon Hawes)

Main priorities

- Enumeration approaches literature review – in progress.
- Set up a standard procedure to make data comparable across statutory conservation.
- Review the enumeration report and have a meeting to discuss the outcomes, planning what to do with the results (possibly updating NMBAQC guidelines).
- Looking into machine learning approaches, for difficult-to-count taxa (e.g. cup corals).
- Setting up a meeting to discuss what is involved in achieving these priorities, along with their projected time requirements and costs.

3.2.2 BIAP theme: Annotation software and machine learning

Working group leads: Kerry Howell and Mark Burton

3.2.2.1 Annotation software

Main priorities

- **Task 52:** Define features that software platforms must have for annotation and machine learning.
- **Task 56:** Review image annotation software and machine learning approaches for benthic imagery analysis purposes to explore differences in user interface, open-source versus contracted, point versus polygon/boxes, stills versus video.
- A report on the progress of the group, expected in April 2023.
- Better communication within the working group.

To help prioritise the needs of the community, they have developed two questionnaires that will survey people on what the methodology they are using now, and their requirements for the future. The questionnaire has been reviewed by the working group and should go out to everyone in February 2023.

3.2.2.2 Machine learning

Progress in this section of the theme appears to be limited, however theme members known to be working in this field were unfortunately unable to make it to the workshop. A request was made for suitable training datasets for machine learning purposes.

3.2.3 BIAP theme: Acquisition of imagery

Working group leads: Jon Hawes

Main priorities

- Updating guidelines.
- Coastal shelf Marine Protected Area (MPA) work.
- Setting up a training day to better understand the context of MPA work.

The progress made so far has been limited, in part due to uncertainty about who the members of this project working group are. The group has also encountered difficulties due to the vagueness of the questions, making them difficult to address.

To overcome this, the group intends to focus their efforts on coastal shelf marine protected areas and combine **Tasks 13**, **14**, and **20** to clarify their objectives. This plan is expected to be implemented in the next financial year (2023/24).

These tasks will be combined as one:

- **Task 13:** Identify standard requirements for grouped main purposes and create standard table and decision tree flowchart.
- **Task 14:** Guidance for entire imagery analysis workflow (design, analysis, randomisation, annotation, statistics), including decision tree flowchart.
- **Task 20:** Develop short guidance for minimum suitable conditions for imagery acquisition on surveys.

To optimize the selection and use of various data acquisition techniques such as ROVs and drop cameras, the group aims to determine the best equipment for specific purposes. A decision tree approach will be employed to guide the selection of the most suitable method for acquiring a certain type of data (e.g. imagery for indicator taxa).

The group are currently experimenting with photogrammetry and Simultaneous localization and mapping (SLAM) using existing ROV data. Cefas are building a camera that has onboard, real-time machine learning. They have considered protocol guidelines for rejection of imagery based on quality, as well as quality assessments on imagery (e.g. considerations for image format storage, environmental conditions, etc.). There needs to be more flexibility in terms of when to collect imagery (e.g. avoiding acquiring imagery in bad weather, since the data might not actually be useful).

4 Actions

4.1 Session 1: Themes

Action 1: JNCC will query Big Picture Group members via a Microsoft Form, gathering information on the current members of each project working group, and those who would like to join. In addition, there will be a question about how contact details may be shared (in line with GDPR guidelines).

Action 2: JNCC to set up initial working group meetings for each group by the end of April. This should include the working groups that didn't manage to have discussions at the workshop (Data Flows, and Training and Quality Assurance).

Action 3: JNCC to transcribe flipcharts and send them to each working group lead, so that they can develop a short summary of what they discussed.

4.2 Session 2: Network experience feedback

Action 4: JNCC to set up a webpage about the Big Picture Group (reviewing flipcharts with ideas for this), it will include the JNCC TheBigPicture@jncc.gov.uk email address so that new members can join.

Action 5: Steering group to update the terms of reference, roles and expectations of working group leads and steering group members (e.g. how often they should meet, etc.).

Action 6: Steering group to check any existing / related vision statements and draft a high-level statement with options for comments and feedback. Working group leads to also develop a mini vision statement for each theme.

Action 7: JNCC to coordinate quarterly / biannual newsletters to share updates (requiring input from working groups from their meetings).

Action 8: JNCC to invite members of the Big Picture group to see if there is a volunteer to act as the project working group lead for the theme 'overarching guidelines and purposes of imagery.' The lead could pause some of the work streams covered by other themes.

Action 9: Steering group to find an ambassador(s) or champion for the Big Picture Group who will present on behalf of the group at any relevant conferences, etc. Any member may nominate themselves or others for this role.

Action 10: JNCC and 3KQ to have a workshop wash-up meeting to collate actions.

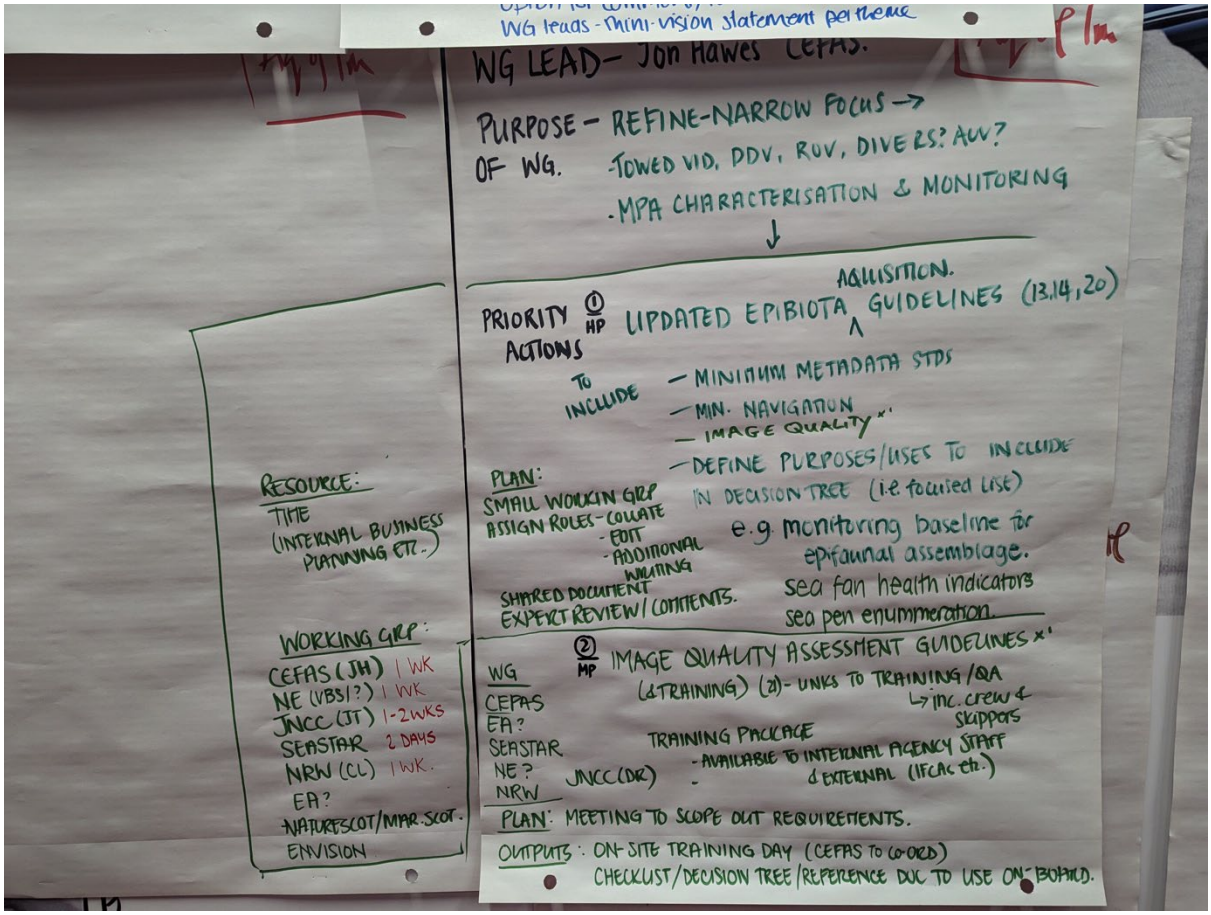
Action 11: JNCC to compile and share the workshop report first with the steering group, then all members of the Big Picture Group. Feedback will be gathered for the report to be finalised by early April.

Appendix

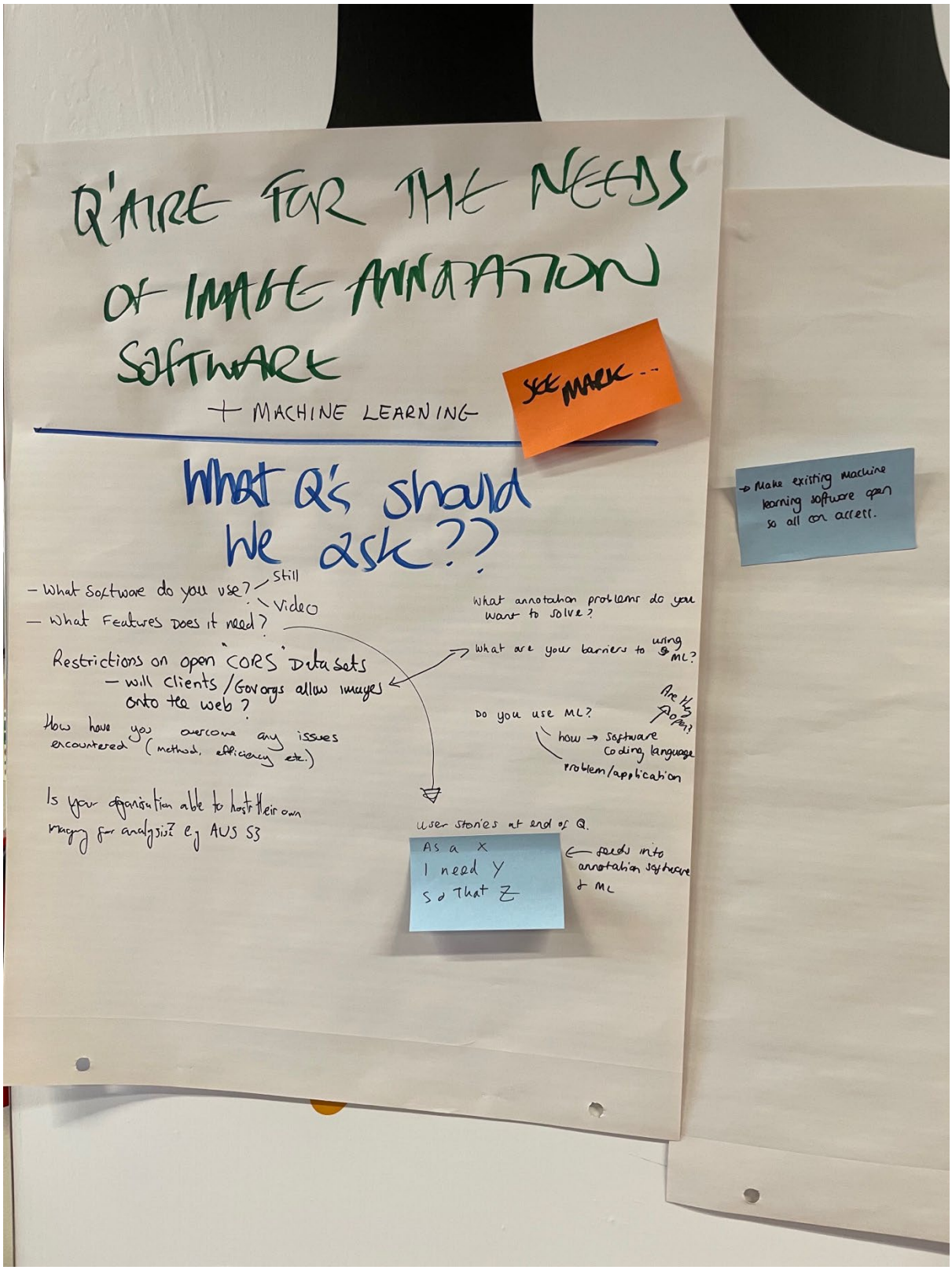
Provided in the appendix are photographs of some of the flipcharts created during the plenary sessions.

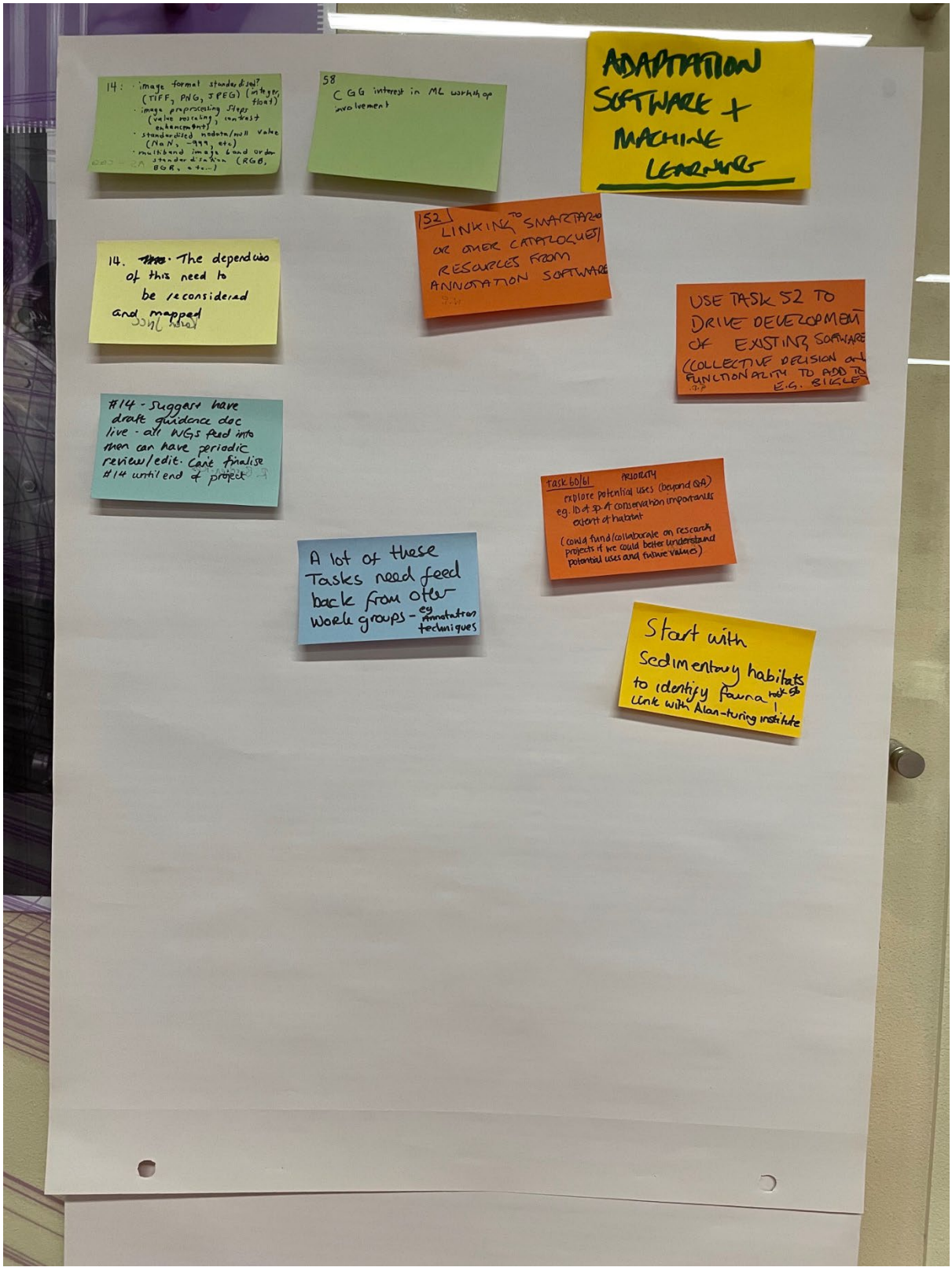
Plenary 1: Flipcharts

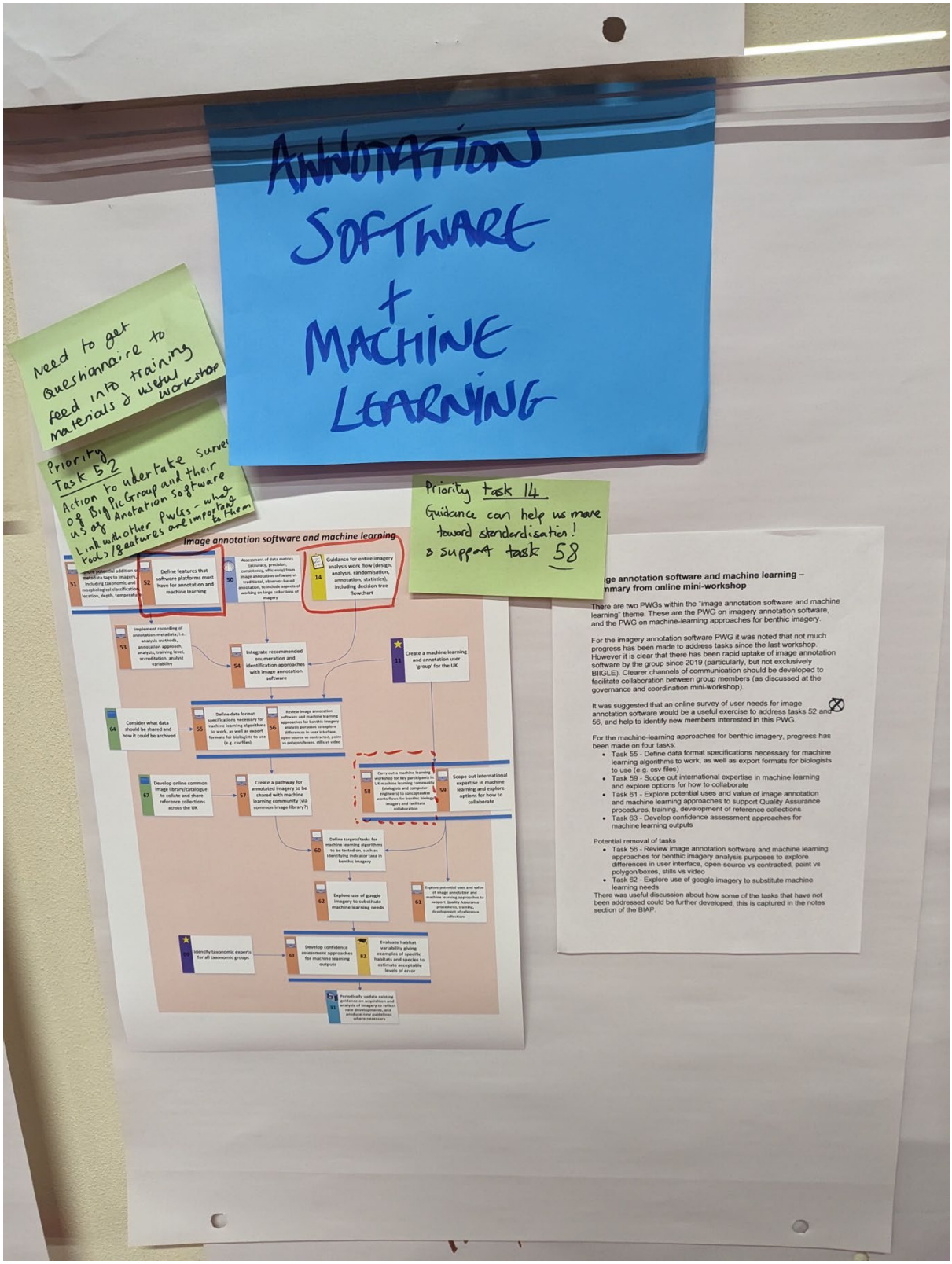
Acquisition of imagery


WG leads - mini-vision statement per theme
WG LEAD- Jon Hawes CEFAS.
PURPOSE - REFINE-NARROW FOCUS →
OF WG. -TOWED VID, DDV, ROV, DIVERS? AUV?
-MPA CHARACTERISATION & MONITORING
PRIORITY ACTIONS
① HP
UPDATED EPIBIOTA GUIDELINES (13,14,20)
AQUISITION.
TO INCLUDE
- MINIMUM METADATA STDS
- MIN. NAVIGATION
- IMAGE QUALITY x'
- DEFINE PURPOSES/USES TO INCLUDE IN DECISION TREE (i.e. focused use)
e.g. monitoring baseline for epifaunal assemblage.
sea fan health indicators
sea pen enummeration.
PLAN:
SMALL WORKING GRP
ASSIGN ROLES - COLLATE
- EDIT
- ADDITIONAL WRITING
SHARED DOCUMENT
EXPERT REVIEW/ COMMENTS.
RESOURCE:
TIME
(INTERNAL BUSINESS PLANNING ETC.)
WORKING GRP:
CEFAS (JH) 1 WK
NE (VBS!?) 1 WK
JNCC (JT) 1-2 WKS
SEASTAR 2 DAYS
NRW (CL) 1 WK.
EA?
NATURESCOT/MAR.SCOT.
ENVISION
② MP
IMAGE QUALITY ASSESSMENT GUIDELINES x'
(+TRAINING) (2)- LINKS TO TRAINING/QA
↳ INC. crew & skippers
WG
CEFAS
EA?
SEASTAR
NE?
NRW
JNCC (DR)
TRAINING PACKAGE
- AVAILABLE TO INTERNAL AGENCY STAFF & EXTERNAL (IFCAs etc.)
PLAN: MEETING TO SCOPE OUT REQUIREMENTS.
OUTPUTS: ON-SITE TRAINING DAY (CEFAS TO CO-ORD)
CHECKLIST/DECISION TREE/REFERENCE DOC TO USE ON-BOARD.

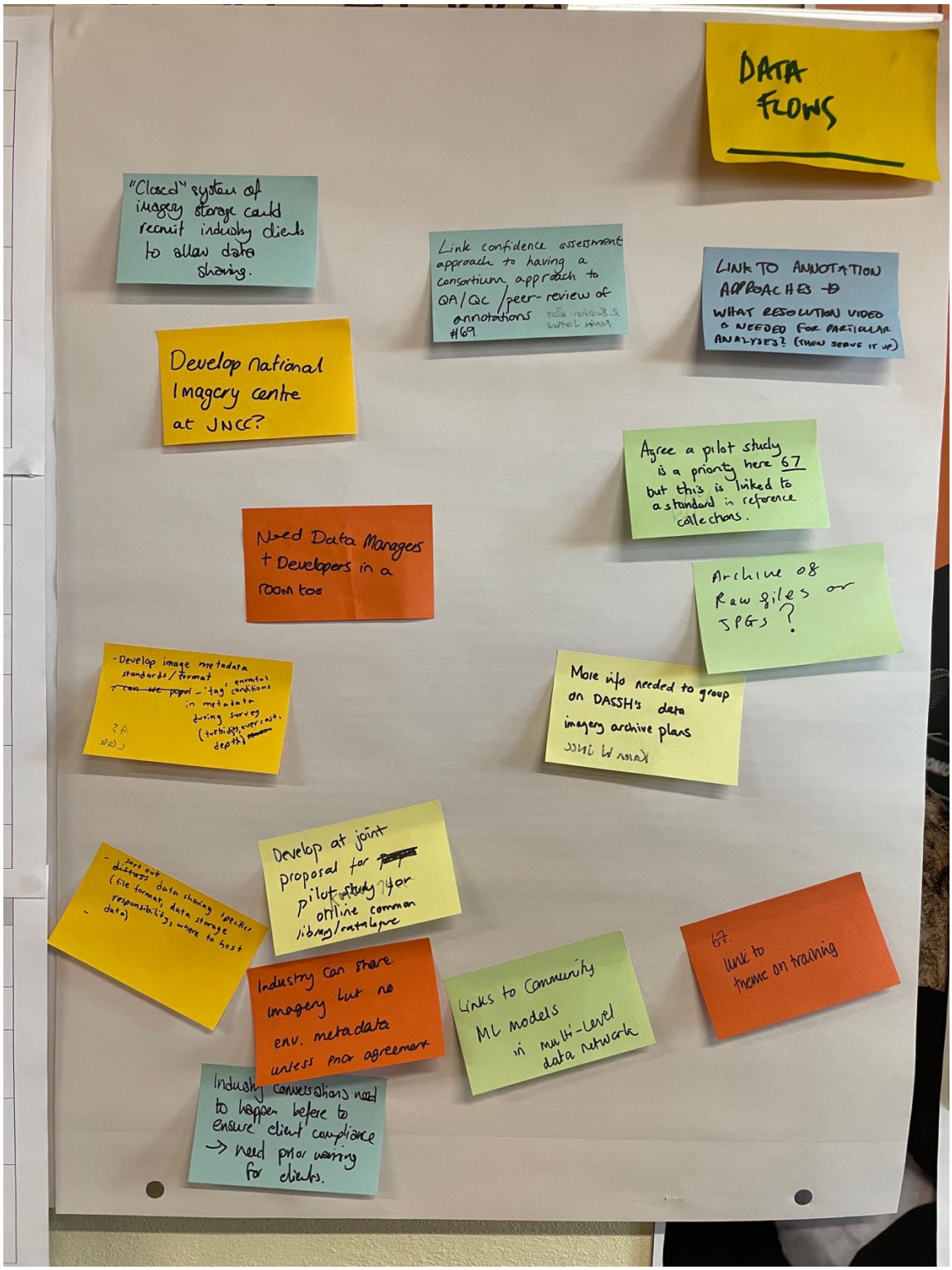
Annotation software and machine learning

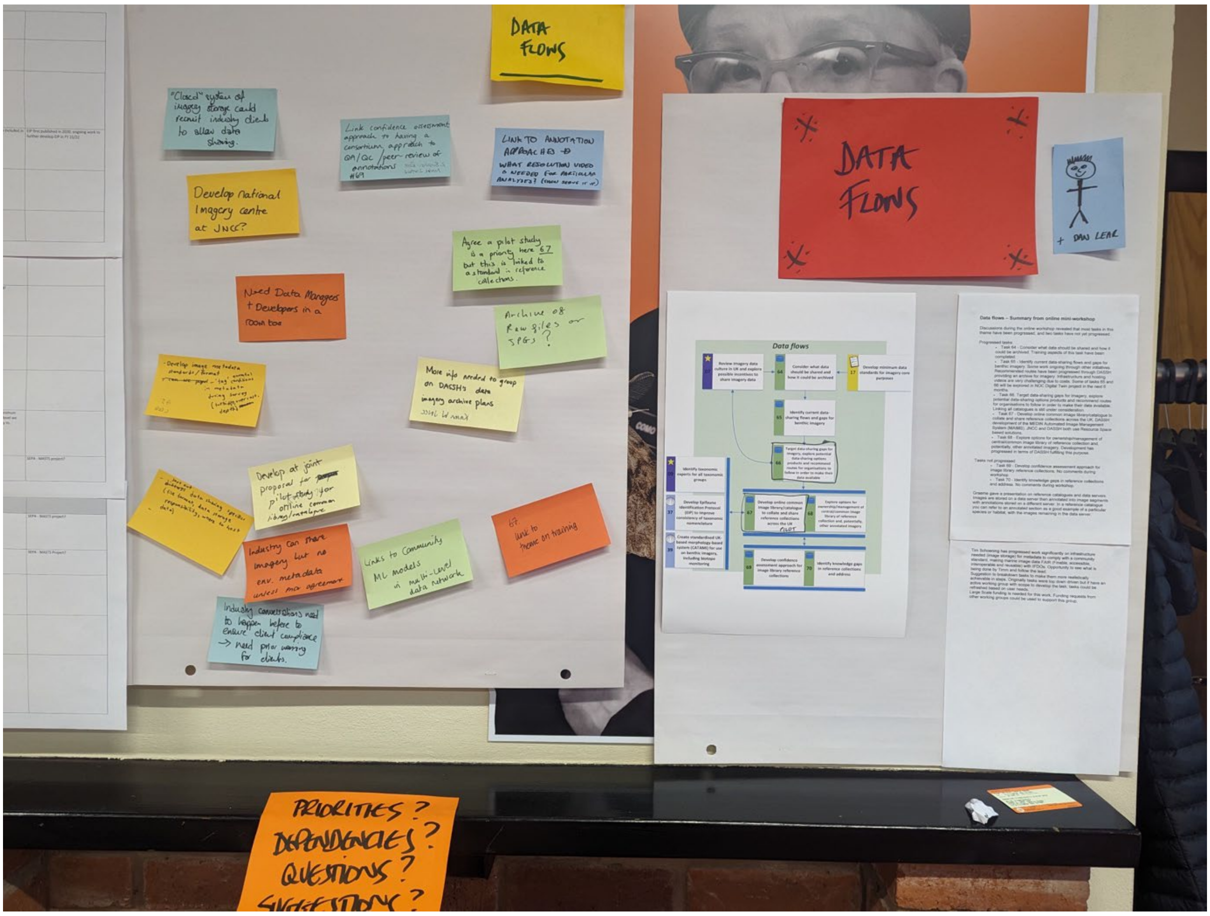



14: · image format standardised? (TIFF, PNG, JPEG) (integer, float)
· image preprocessing steps (value rescaling, contrast enhancement)
· standardised nodata/null value (NaN, -999, etc)
· multiband image band order standardisation (RGB, BGR, etc...)
58
CGG interest in ML workshop involvement
ADAPTATION SOFTWARE + MACHINE LEARNING
52
LINKING TO SMARTAR2 OR OTHER CATALOGUES/ RESOURCES FROM ANNOTATION SOFTWARE
14. The dependencies of this need to be reconsidered and mapped
USE TASK 52 TO DRIVE DEVELOPMENT OF EXISTING SOFTWARE (COLLECTIVE DECISION ON FUNCTIONALITY TO ADD TO E.G. BIIGLE
#14 - Suggest have draft guidance doc live - all WGs feed into then can have periodic review/edit. Can't finalise #14 until end of project
TASK 60/61 PRIORITY
explore potential uses (beyond QA) eg. ID of sp. of conservation importance extent of habitat
(could fund/collaborate on research projects if we could better understand potential uses and future values)
A lot of these Tasks need feed back from other work groups - eg annotation techniques
Start with Sedimentary habitats to identify fauna
Link with Alan-turing institute

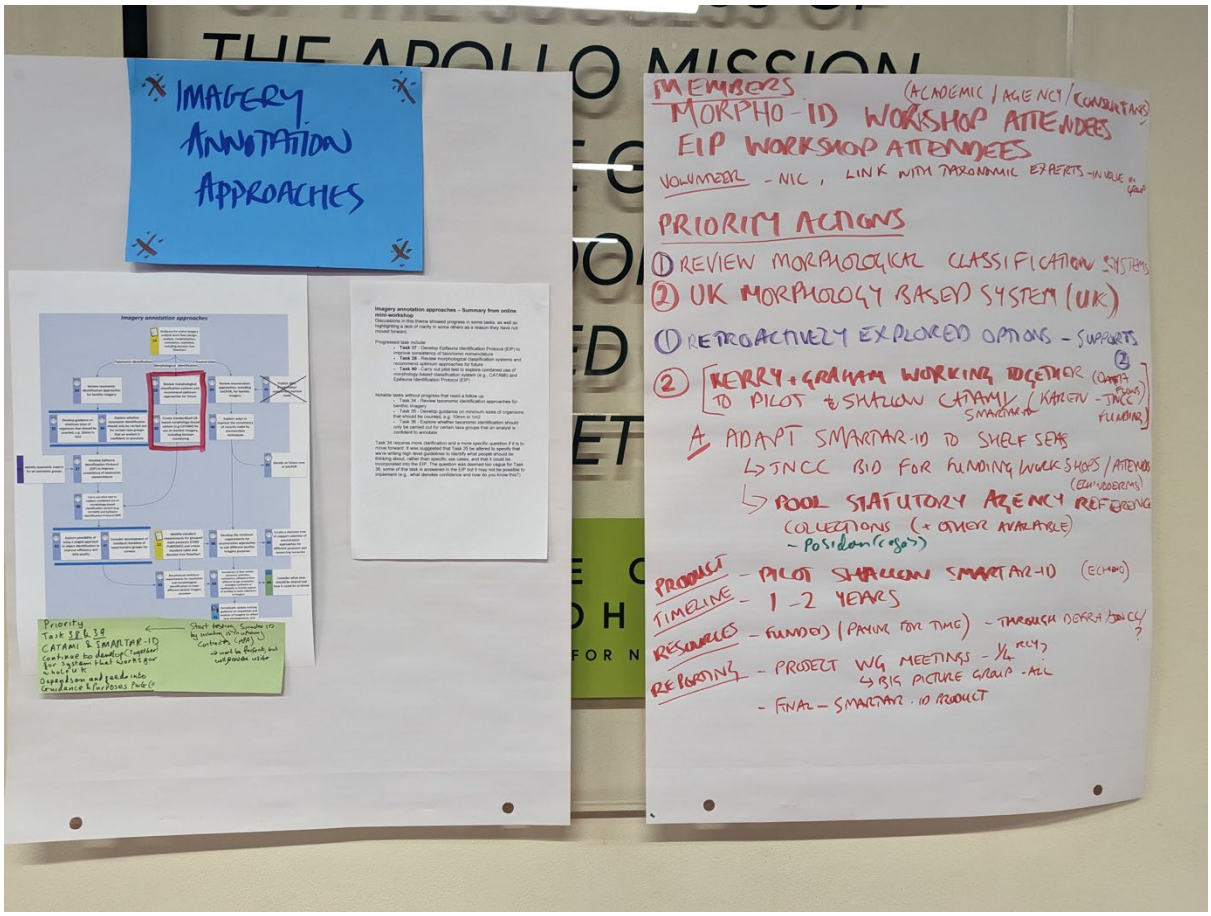

ANNOTATION
SOFTWARE
+
MACHINE
LEARNING
Need to get Questionnaire to feed into training materials & wider workshop
Priority Task 52
Action to undertake survey of Big Pic Group and their use of Annotation Software
Link with other PWGs - what tools/features are important to them
Priority task 14
Guidance can help us move toward standardisation!
& support task 58
Image annotation software and machine learning
Define features that software platforms must have for annotation and machine learning
Guidance for entire imagery analysis work flow (design, analysis, randomisation, annotation, statistics), including decision tree flowchart
Integrate recommended enumeration and identification approaches with image annotation software
Create a machine learning and annotation user 'group' for the UK
Consider what data should be shared and how it could be archived
Develop online common image library/catalogue to collate and share reference collections across the UK
Create a pathway for annotated imagery to be shared with machine learning community (via common image library?)
Scope out international expertise in machine learning and explore options for how to collaborate
Define targets/tasks for machine learning algorithms to be tested on, such as identifying indicator taxa in benthic imagery
Explore use of google imagery to substitute machine learning needs
Identify taxonomic experts for all taxonomic groups
Develop confidence assessment approaches for machine learning outputs
Evaluate habitat variability giving examples of specific habitats and species to estimate acceptable levels of error
ge annotation software and machine learning –
mmary from online mini-workshop
There are two PWGs within the "image annotation software and machine learning" theme. These are the PWG on imagery annotation software, and the PWG on machine-learning approaches for benthic imagery.
For the imagery annotation software PWG it was noted that not much progress has been made to address tasks since the last workshop. However it is clear that there has been rapid uptake of image annotation software by the group since 2019 (particularly, but not exclusively BIIGLE). Clearer channels of communication should be developed to facilitate collaboration between group members (as discussed at the governance and coordination mini-workshop).
It was suggested that an online survey of user needs for image annotation software would be a useful exercise to address tasks 52 and 56, and help to identify new members interested in this PWG.
For the machine-learning approaches for benthic imagery, progress has been made on four tasks:
Task 55 - Define data format specifications necessary for machine learning algorithms to work, as well as export formats for biologists to use (e.g. csv files)
Task 59 - Scope out international expertise in machine learning and explore options for how to collaborate
Task 61 - Explore potential uses and value of image annotation and machine learning approaches to support Quality Assurance procedures, training, development of reference collections
Task 63 - Develop confidence assessment approaches for machine learning outputs
Potential removal of tasks
Task 56 - Review image annotation software and machine learning approaches for benthic imagery analysis purposes to explore differences in user interface, open-source vs contracted, point vs polygon/boxes, stills vs video
Task 62 - Explore use of google imagery to substitute machine learning needs
There was useful discussion about how some of the tasks that have not been addressed could be further developed, this is captured in the notes section of the BIAP.

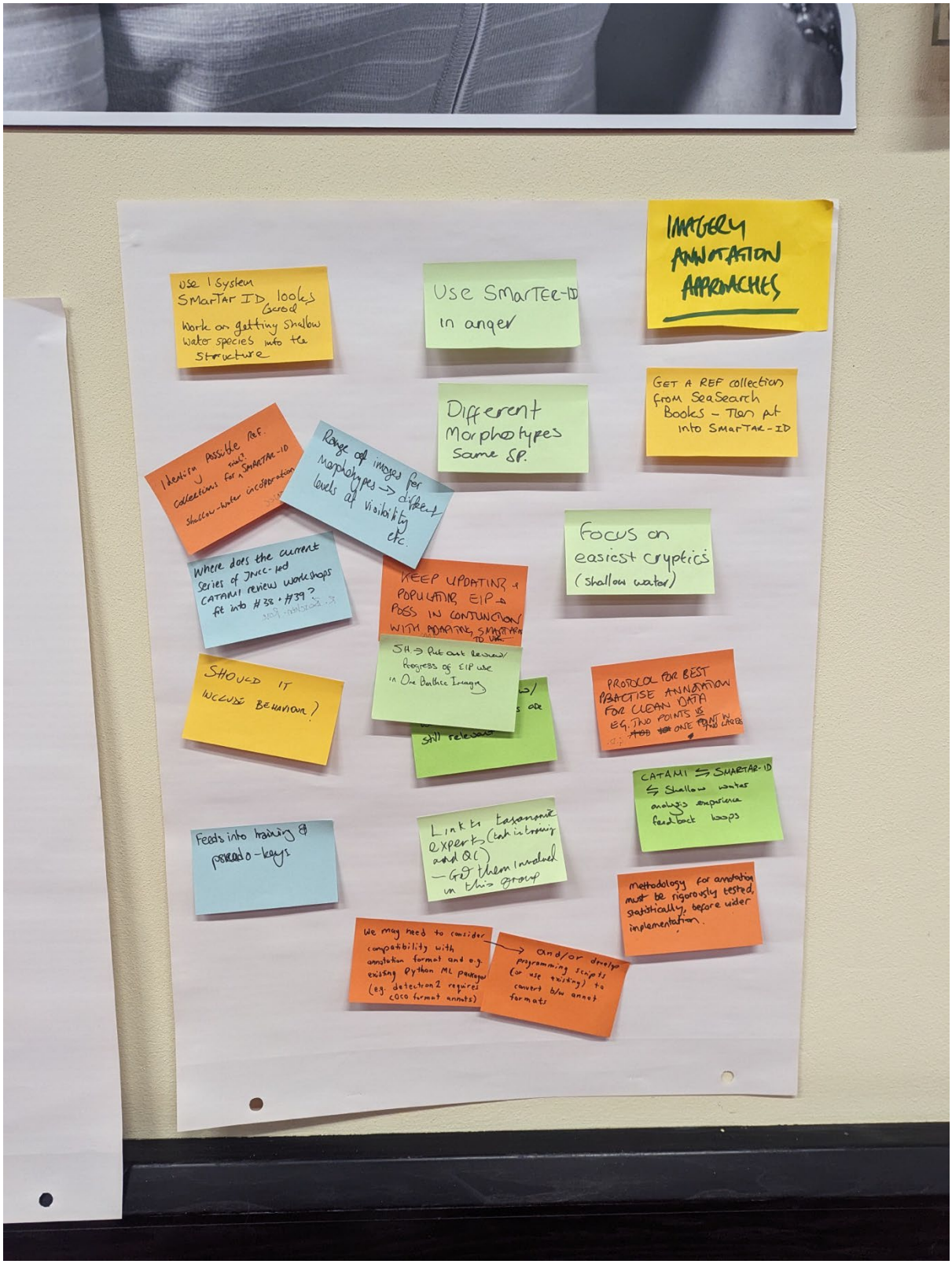
Data flows

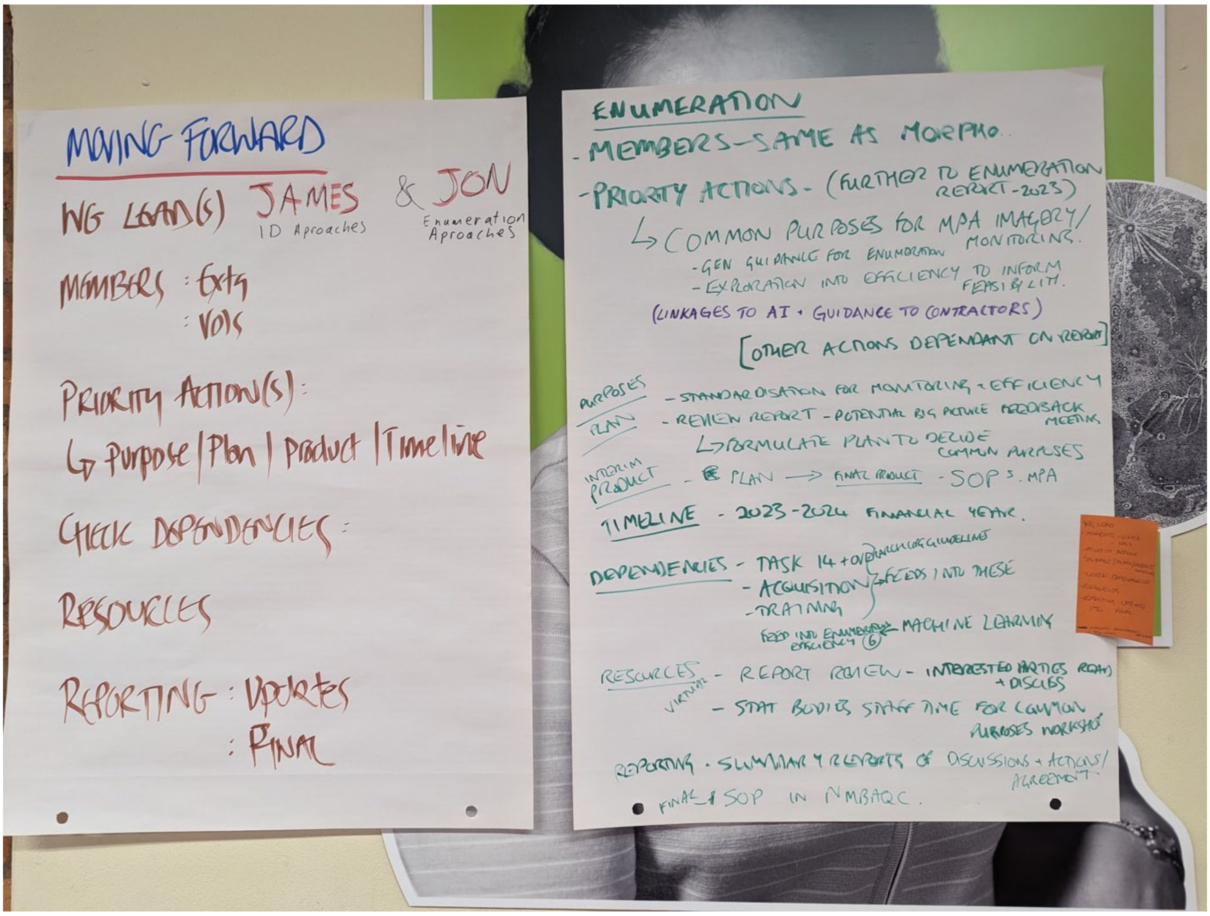

DATA FLOWS
"Closed" system of imagery storage could recruit industry clients to allow data sharing.
Link confidence assessment approach to having a consortium approach to QA/QC /peer-review of annotations #69
LINK TO ANNOTATION APPROACHES
WHAT RESOLUTION VIDEO IS NEEDED FOR PARTICULAR ANALYSES? (THEN SCOPE IT UP)
Develop National Imagery centre at JNCC?
Agree a pilot study is a priority here 67 but this is linked to a standard in reference collections.
Need Data Managers + Developers in a room too
Archive of Raw files or JPGs?
- Develop image metadata standards / format
- 'tag' environ conditions in metadata during survey (turbidity, current, depth)
More info needed to group on DASSH's data imagery archive plans
Develop at joint proposal for pilot study for offline common library/catalogue
- sort out different data sharing specifics (file format, data storage responsibility, where to host data)
Industry can share imagery but no env. metadata unless prior agreement
Links to Community ML models in multi-level data network
67. link to theme on training
Industry conversations need to happen before to ensure client compliance → need prior warning for clients.


DATA FLOWS
DATA FLOWS
Develop national Imagery centre at JNCC?
Need Data Managers + Developers in a room too
PRIORITIES?
DEPENDENCIES?
QUESTIONS?

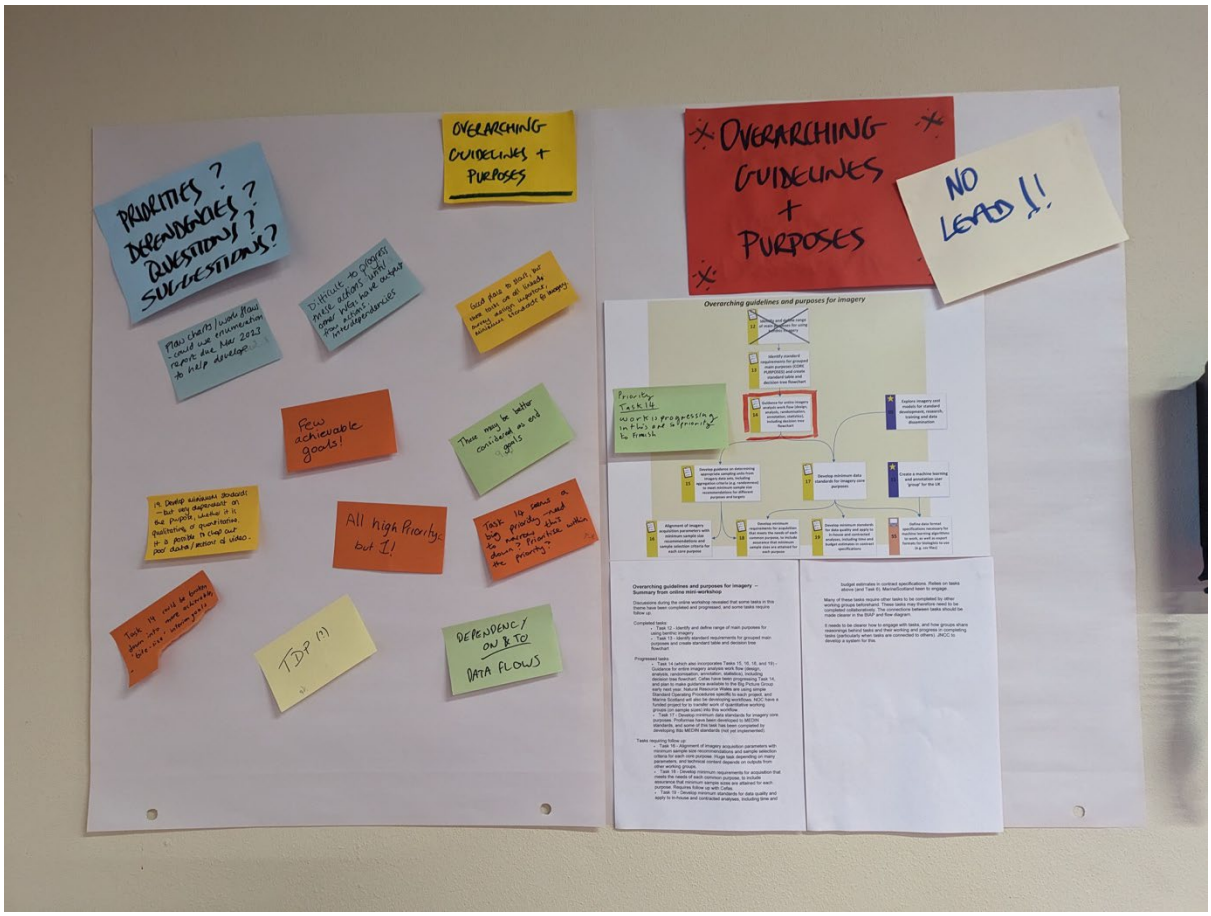
Imagery annotation approaches




IMAGERY ANNOTATION APPROACHES
Use SMarTER-ID in anger
Use 1 System SMarTar ID, looks Good
Work on getting shallow water species into the structure
GET A REF collection from SeaSearch Books – Then at into SMarTar-ID
Different Morphotypes same SP.
Range of images for morphotypes -> different levels of visibility etc.
Focus on easiest cryptics (shallow water)
Where does the current series of JNCC-led CATAMI review workshops fit into #38 + #39?
KEEP UPDATING & POPULATING EIP & POSS IN CONJUNCTION WITH
SH -> Put out Regional Progress of EIP use in Our Baltic Images
SHOULD IT INCLUDE BEHAVIOUR?
PROTOCOL FOR BEST PRACTISE ANNOTATION FOR CLEAN DATA EG. TWO POINTS VS ONE
CATAMI ⇆ SMARTAR-ID ⇆ Shallow waters analysis experience feedback loops
Feeds into training & pseudo-keys
Link to taxonomic EXPERTS (both in training and QC) — Get them involved in this group
Methodology for annotation must be rigorously tested, statistically, before wider implementation.
We may need to consider compatibility with annotation format and e.g. existing Python ML packages (e.g. detectron2 requires COCO format annots)
and/or develop programming scripts (or use existing) to convert b/w annot formats

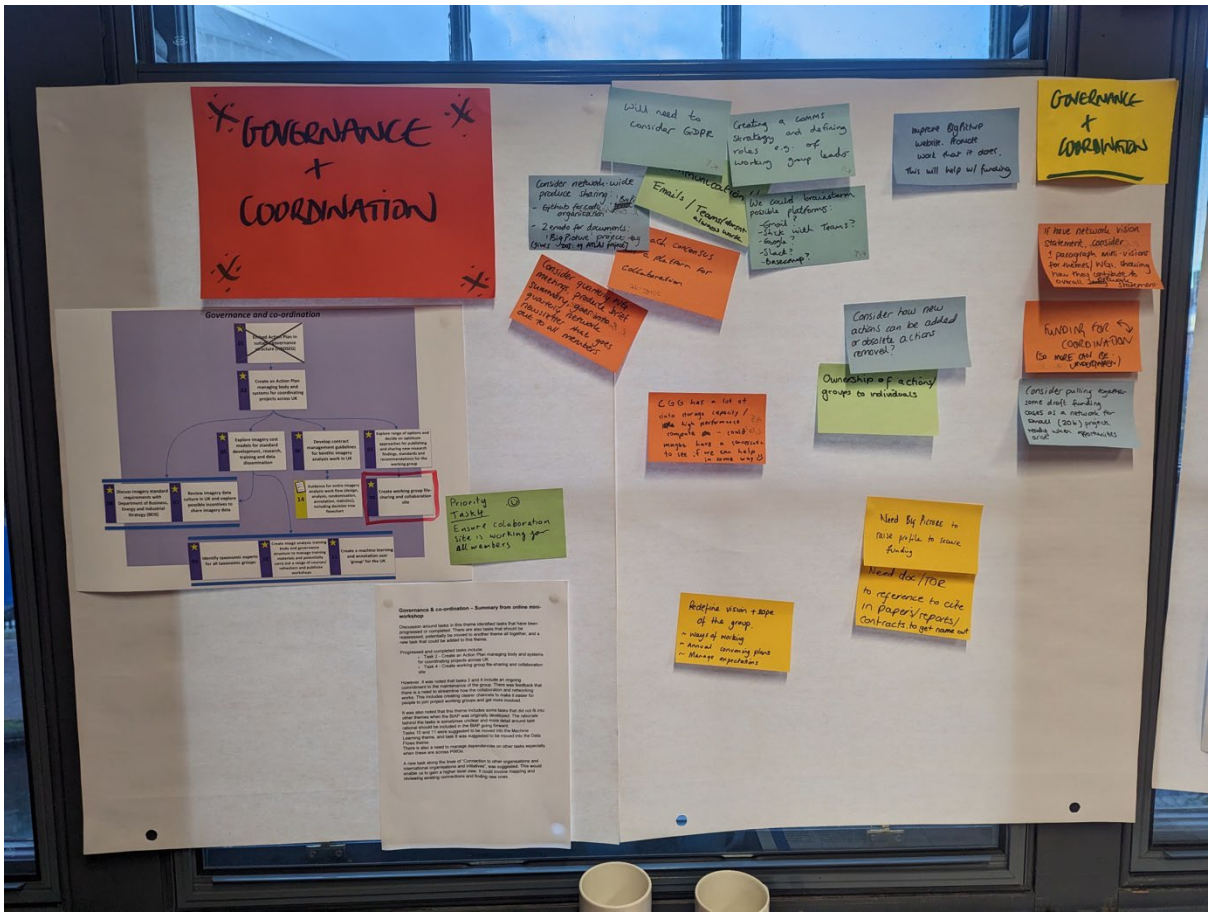

MOVING FORWARD
WG LEAD(S) JAMES & JON
ID Aproaches
Enumeration Aproaches
MEMBERS : Exts
: Vols
PRIORITY ACTION(S):
Purpose / Plan / Product / Timeline
CHECK DEPENDENCIES:
RESOURCES
REPORTING : Updates
: Final
ENUMERATION
- MEMBERS – SAME AS MORPHO.
- PRIORITY ACTIONS - (FURTHER TO ENUMERATION REPORT - 2023)
COMMON PURPOSES FOR MPA IMAGERY / MONITORING.
- GEN GUIDANCE FOR ENUMERATION
- EXPLORATION INTO EFFICIENCY TO INFORM FEASIBILITY.
(LINKAGES TO AI + GUIDANCE TO CONTRACTORS)
[OTHER ACTIONS DEPENDANT ON REPORT]
PURPOSES - STANDARDISATION FOR MONITORING + EFFICIENCY
PLAN - REVIEW REPORT - POTENTIAL BIG PICTURE FEEDBACK MEETING
FORMULATE PLAN TO DECIDE COMMON PURPOSES
INTERIM PRODUCT - PLAN → FINAL PRODUCT - SOPS. MPA
TIMELINE - 2023-2024 FINANCIAL YEAR.
DEPENDENCIES - TASK 14
- ACQUISITION
- TRAINING
FEEDS INTO THESE
MACHINE LEARNING
RESOURCES - REPORT REVIEW - INTERESTED PARTIES READ + DISCUSS
VIRTUAL
- STAT BODIES STAFF TIME FOR COMMON PURPOSES WORKSHOP
REPORTING · SUMMARY REPORTS OF DISCUSSIONS + ACTIONS / AGREEMENT.
FINAL SOP IN NMBAQC.

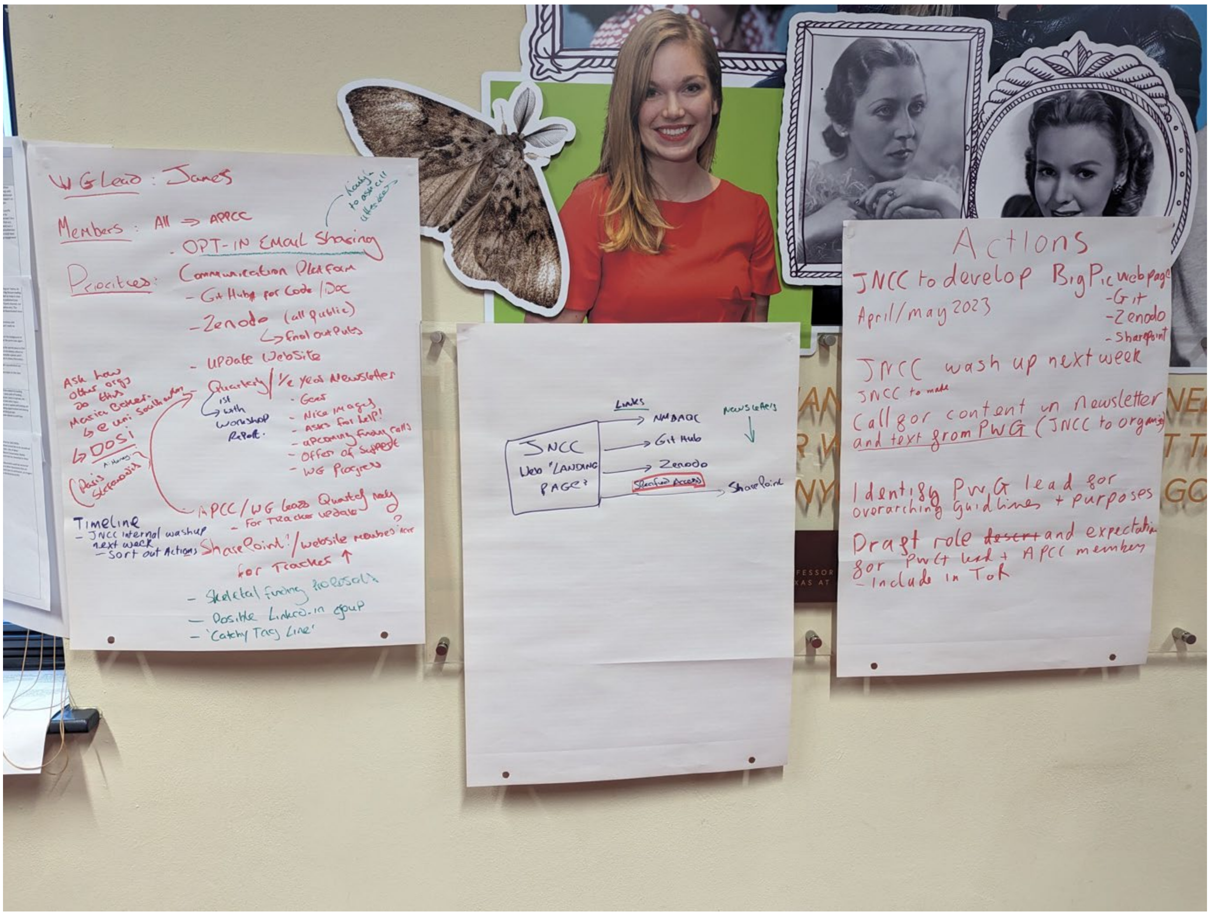
Overarching guidelines and purposes



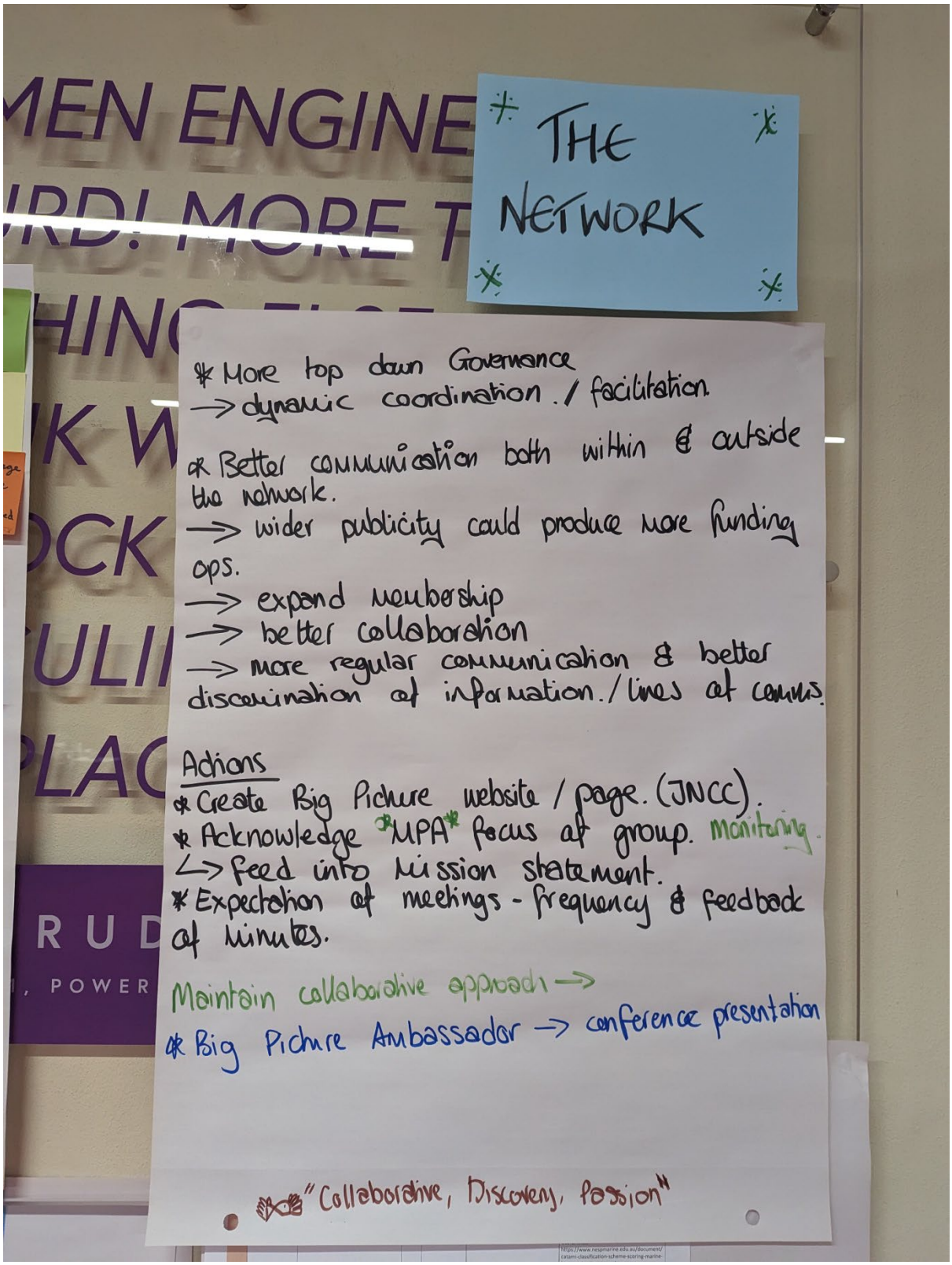
Plenary 2: Flipcharts

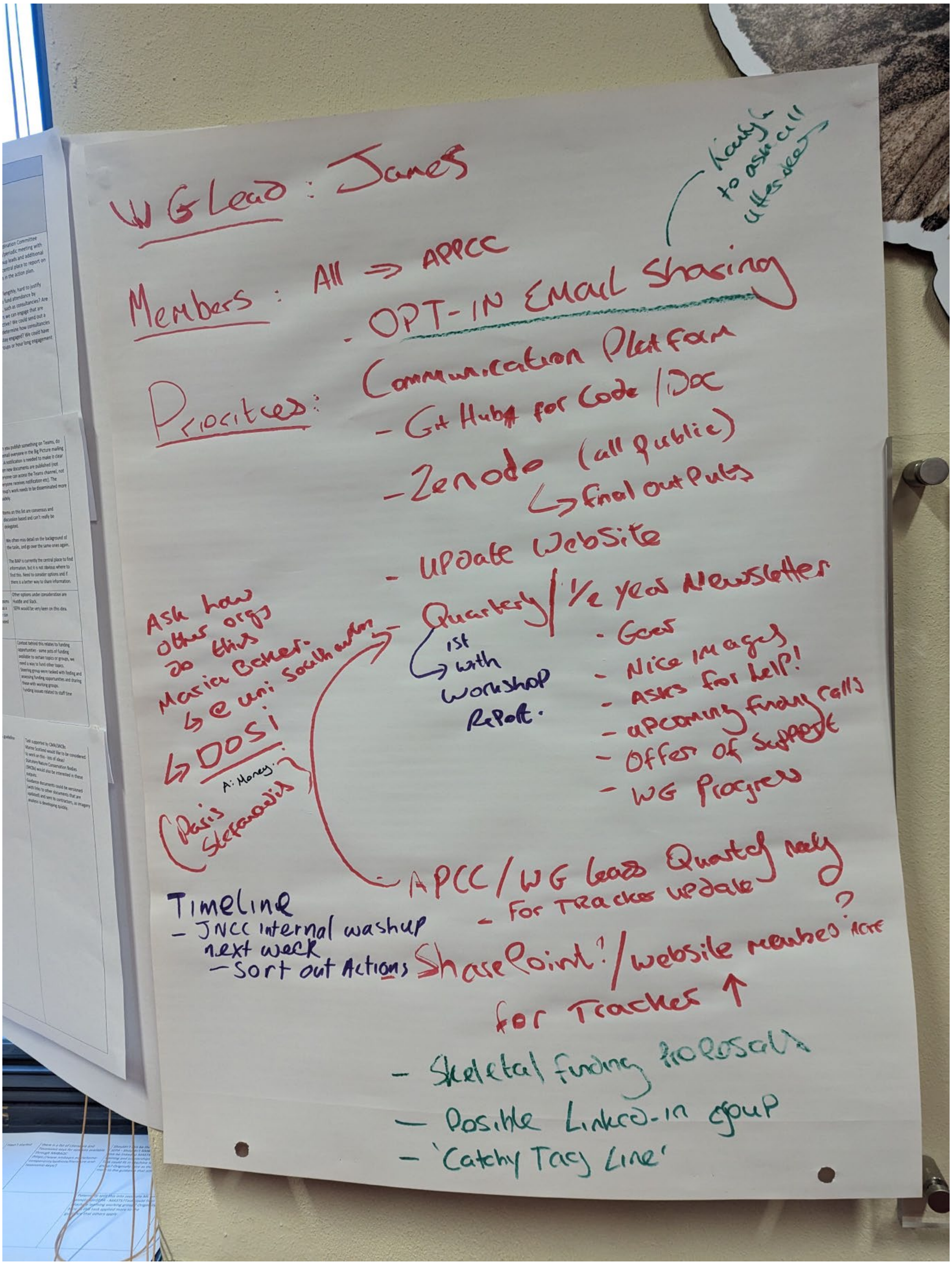
Governance and coordination




WG Lead : James
Members : All ⇒ APCC
- OPT-IN Email Sharing
Priorities: Communication Platform
- Git Hub for Code / Doc
- Zenodo (all public)
↳ final outputs
- Update Website
- Quarterly / ½ year Newsletter
1st with Workshop Report.
- Goals
- Nice images
- Asks for help!
- upcoming funding calls
- Offers of support
- WG Progress
Ask how other orgs do this
Maria Baker - Uni Southampton
↳ DOSI
- APCC / WG leads Quarterly ready
- for Tracker update
SharePoint / website members' area for Tracker ↑
- Skeletal funding proposals
- Possible Linked-in group
- 'Catchy Tag Line'
Timeline
- JNCC internal washup next week
- Sort out Actions
JNCC Web 'LANDING PAGE'
Links
Git Hub
Zenodo
SharePoint
Newsletters
Actions
JNCC to develop BigPic webpage
April/may 2023
- Git
- Zenodo
- Sharepoint
JNCC wash up next week
JNCC to make
Call for content on newsletter and text from PWG (JNCC to organise)
Identify PWG lead for overarching guidlines + purposes
Draft role descr and expectation for PWG lead + APCC members
- Include in ToR

The network


THE NETWORK
* More top down Governance
→ dynamic coordination / facilitation
* Better communication both within & outside the network.
→ wider publicity could produce more funding ops.
→ expand membership
→ better collaboration
→ more regular communication & better discemination of information / lines of comms
Actions
* Create Big Picture website / page. (JNCC).
* Acknowledge "MPA" focus of group. Monitoring.
↳ feed into Mission statement.
* Expectation of meetings - frequency & feedback of Minutes.
Maintain collaborative approach →
* Big Picture Ambassador → conference presentation
"Collaborative, Discovery, Passion"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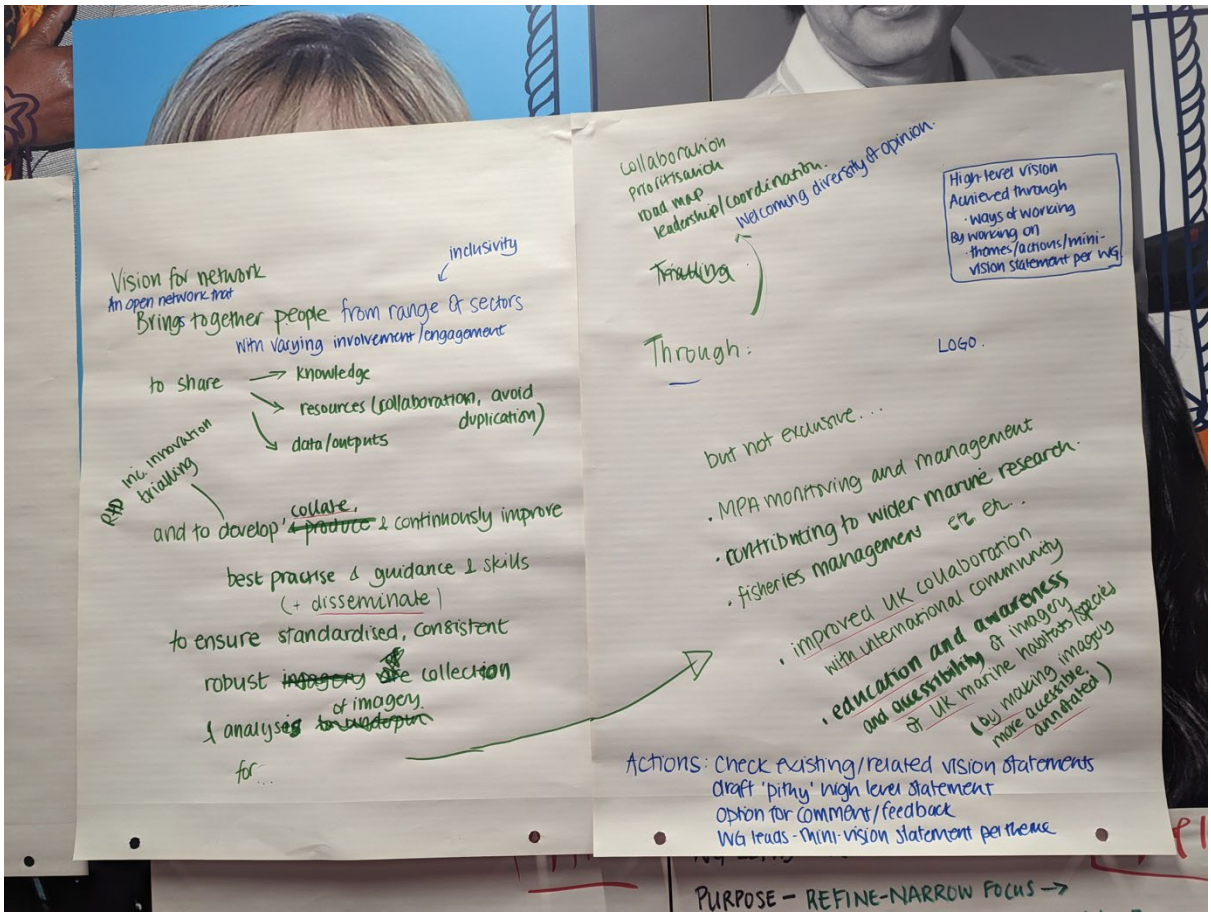
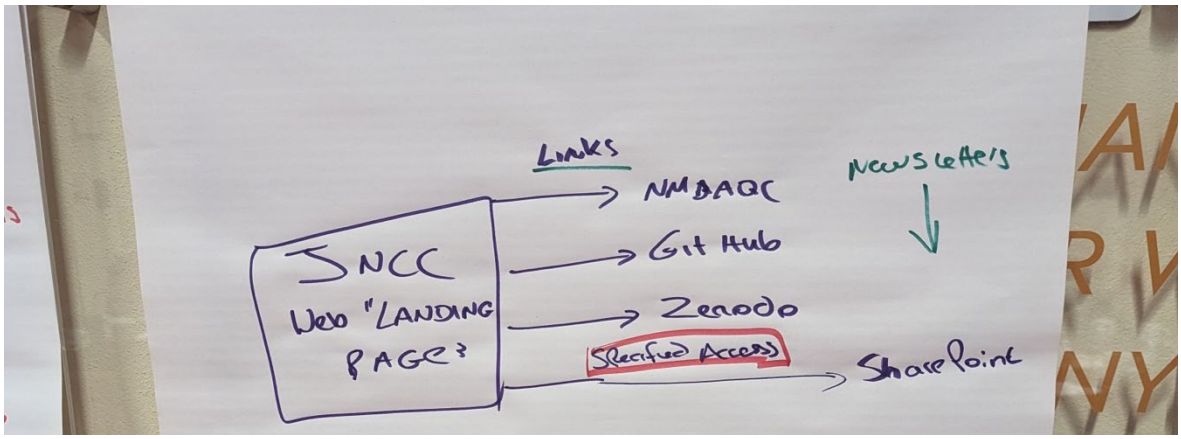
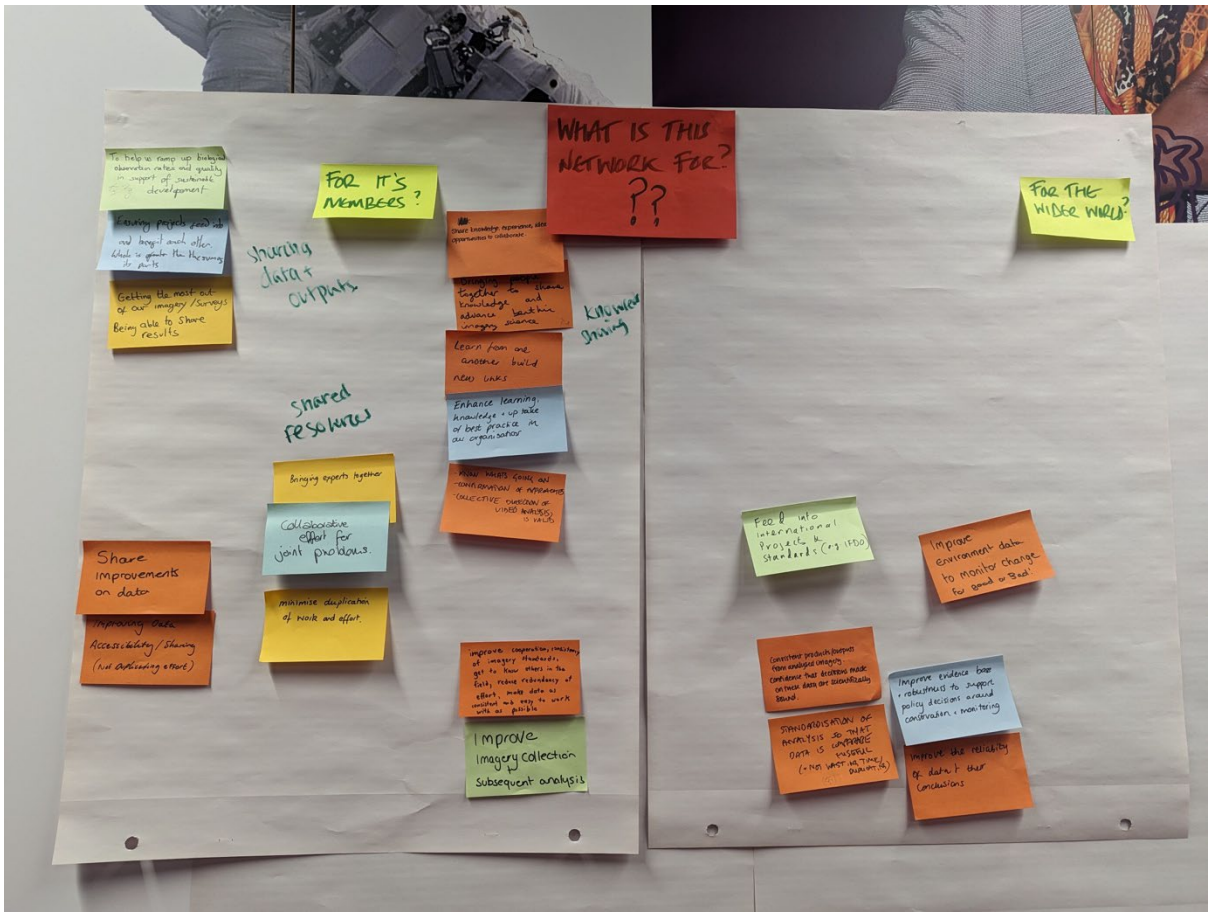
Vision for the network



Webpage ideas



What the network is for



Why the network is great