DMP Implementation Status of IPP

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1st IMAS Data Mapping workshop

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Short report

- Very much appreciate ability to **pip install** imas-python, imas-idstools on my MacBookPro (M1)

- Endless discussions
  - But progress is being made!
- Concretely, still working on getting the UDA mappings to function
  - Now using libtokamap, libtokamap-uda-datasource, libtokamap_demo
    - Have written the program to read AUG shot data
    - Further testing held up
      - Currently requires python >= 3.13
      - But EB/2023b python is 3.11
    - Work around – use a more recent python (lose EB compatibility)

Python proof of principle working …

- python aug_demo/uda_mapper.py
  - Calling LibTokaMap version: 0.2.4
  - With context = {'shot': 33724}
  - magnetics/ids_properties/homogeneous_time: 0
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - magnetics/ip[0]/data: [111.76636 -105.73755 -395.74268 ... -8660.889 -9023.3955 -8805.892]
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - magnetics/ip[0]/time: [-2.0027161e-05 8.0108643e-05 1.7929077e-04 ... 7.9997787e+00 7.9998798e+00 7.9999790e+00]
- ~/src/read_ip | head -3
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - -0.000020 111.766357
  - 0.000080 -105.737549
  - 0.000179 -395.742676
- ~/src/read_ip | tail -3
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - 7.999779 -8660.888672
  - 7.999880 -9023.395508
  - 7.999979 -8805.891602

Python proof of principle working …

- {
- "ids_properties/homogeneous_time": 0,
- "ip[0]/data": {
- "map_type": "DATA_SOURCE",
- "data_source": "AUG",
- "args": {
- "experiment": "AUGD",
- "diagnostic": "FPC",
- "signal": "Ipi",
- "time": false
- }
- },
- "ip[0]/time": {
- "map_type": "DATA_SOURCE",
- "data_source": "AUG",
- "args": {
- "experiment": "AUGD",
- "diagnostic": "FPC",
- "signal": "Ipi",
- "time": true
- }
- }
- }

Some take home messages from the 1st IMAS DMW

- ITER, UKAEA and GA are pursuing AI deeply
  - Using various AI agents to generate code
  - "Coding is cheap"
    - Same message as the ETASC GM2 meeting in Garching in February
    - Do we want to jump on board or be left behind?
- JET mappings seem to have made significant progress
  - But access to the data is blocked because JET data policy cannot be imposed yet
    - Getting that implemented is high priority
    - But until then it would be good if data for a single "test" shot were made available
- ITER were able to run their version of EFIT++ on the AUG data that I supplied last year (or was it the year before?)

Progress on mapping AUG data

- Forked
  - https://github.com/ukaea/libtokamap
  - https://github.com/jholloc/libtokamap_demo
  - https://github.com/stephen-dixon/libtokamap-uda-datasource
- Now under https://github.com/DavidPCoster
- Have committed the changes made during the IMAS DMW
  - Many thanks to Adam, Jonathan and Stephen!
- Have access via a C++ interface to the AUG shot files
- Would like to explore the python option as this should be faster in the development cycle
  - No compilations
    - And I understand it better!

Have started thinking about switching summary to tokamap mappings

- Old format
  - {
  - "ip": {
  - "diag": "FPC",
  - "sig": "IpiFP",
  - "summary": "global_quantities/ip"
  - },
  - …
  - }
- New format (something like)
  - {
  - "ids_properties/homogeneous_time": 1,
  - "global_quantities/ip/data": {
  - "map_type": "DATA_SOURCE",
  - "data_source": "AUG",
  - "args": {
  - "experiment": "AUGD",
  - "diagnostic": "FPC",
  - "signal": "IpiFP",
  - "time": false
  - }
  - },
  - "global_quantities/ip/time": {
  - "map_type": "DATA_SOURCE",
  - "data_source": "AUG",
  - "args": {
  - "experiment": "AUGD",
  - "diagnostic": "FPC",
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  - "time": true
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  - }
  - }

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  - 7.9998798e+00 7.9999790e+00]
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - summary/global_quantities/ip/data: [386.8683 8.28287 -267.7318 ... -3495.3645 -3631.6748
  - -3635.3962]
  - Requesting shot 33724(1) of AUGD:FPC 33724(1)
  - summary/global_quantities/ip/time: [-2.0027161e-05 8.0108643e-05 1.7929077e-04 ...
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  - 7.9998798e+00 7.9999790e+00]

Have started thinking about switching summary to tokamap mappings

- Need to work out how/where the conversion of **data, time** raw summary data to **data, data_error_upper, source** on the homogeneous time base will occur
  - New mapping tool?
  -

Next steps

1. Implement python back-end in addition to the currently implemented C++
2. Find/implement option to fill (and write) an IMAS IDS based on the mappings
3. Couple to a locally running UDA server to grab an IMAS IDS, and then write locally
4. Compare the outputs of (2) and (3)
5. Implement the checking of authorization on the external UDA server
   a. This is currently a docker image from PCSS
6. Have discussions with IPP CODAC and IPP IT about implementing a pass through from the external UDA server to an UDA internal server
7. Work out how we will implement authorization on the internal server