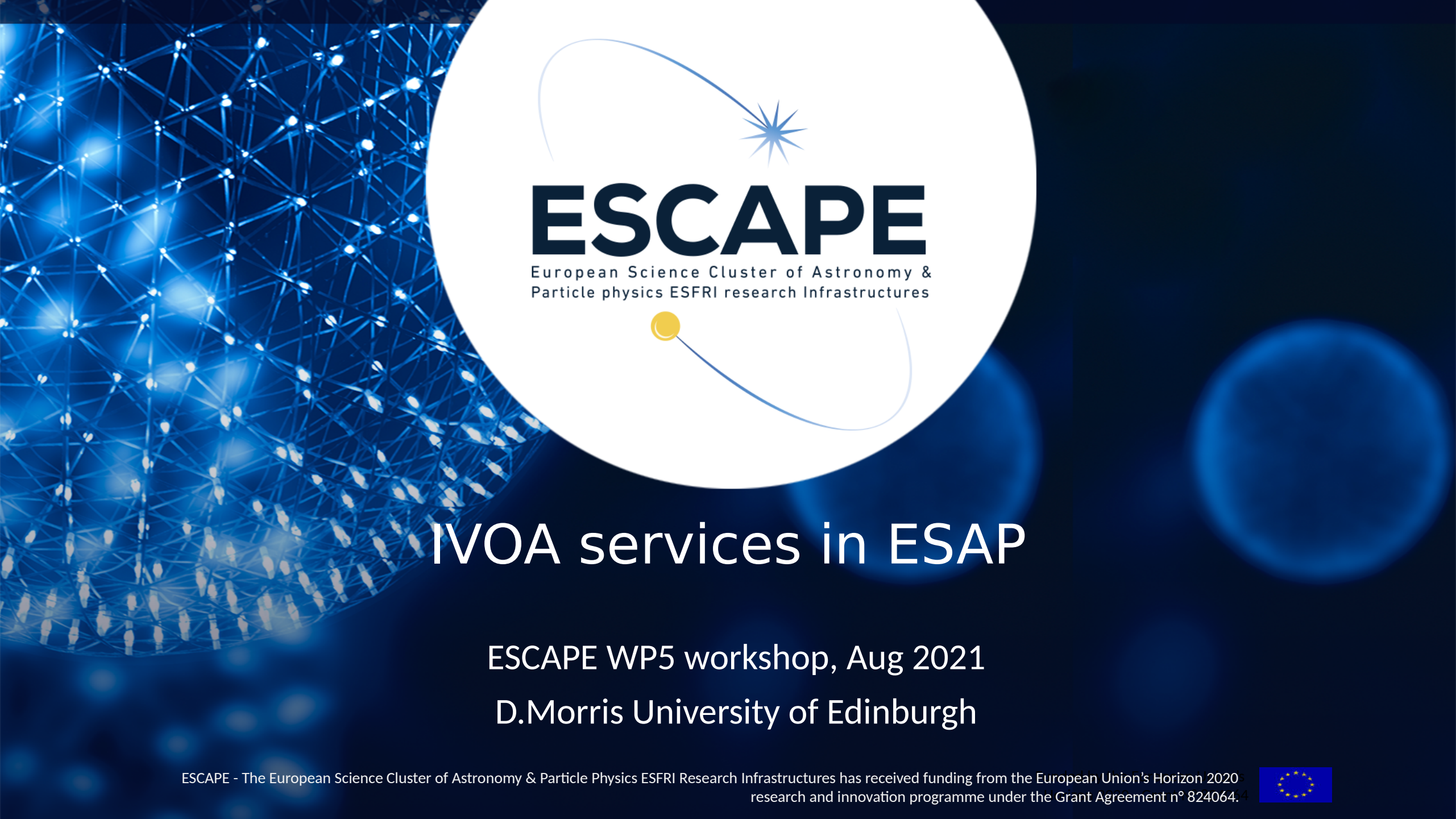

IVOA services in ESAP

ESCAPE WP5 workshop, Aug 2021

D.Morris University of Edinburgh

ESCAPE - The European Science Cluster of Astronomy & Particle Physics ESFRI Research Infrastructures has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement n° 824064.

IVOA services in ESAP

ASTRON VO Data Collection

ESAP GUI

7 Query parameters – including ra, dec and radius

8 Result columns – including ra, dec and radius

Example query

ra = 208
dec = 52
radius = 10

apertif-dr1

~1,000 rows

20 pages of 50 rows each

mixture of cubes and images

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IVOA services in ESAP

ASTRON VO Data Collection

SIAP query via TopCat

Separate services for continuum images, polarization images, spectral cubes

Example queries

ra = 208
dec = 52
radius = 10

Apertif continuum	Apertif polarization	Astron VO
285 rows	805 rows	3,066 rows
42 columns + metadata	46 columns + metadata	37 columns + metadata

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IVOA services in ESAP

Gaia eDR3 @ ESA
Cone Search via TopCat

Example query

ra = 208
dec = 52
radius = 10

eDR3 (1°)
9,588 rows
100 columns
+ metadata

eDR3 (10°)
24,121 rows
100 columns
+ metadata

Scrolling through 190 pages manually selecting rows
- doesn't scale

Holding 25,000 rows as JSON data in the HTTP session object
- doesn't scale

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IVOA services in ESAP

IVOA metadata is the glue that makes everything work

IVOA metadata relies on the XML structure in VOTable

Serializing IVOA metadata in JSON doesn't scale

(*) developer time chasing a moving target

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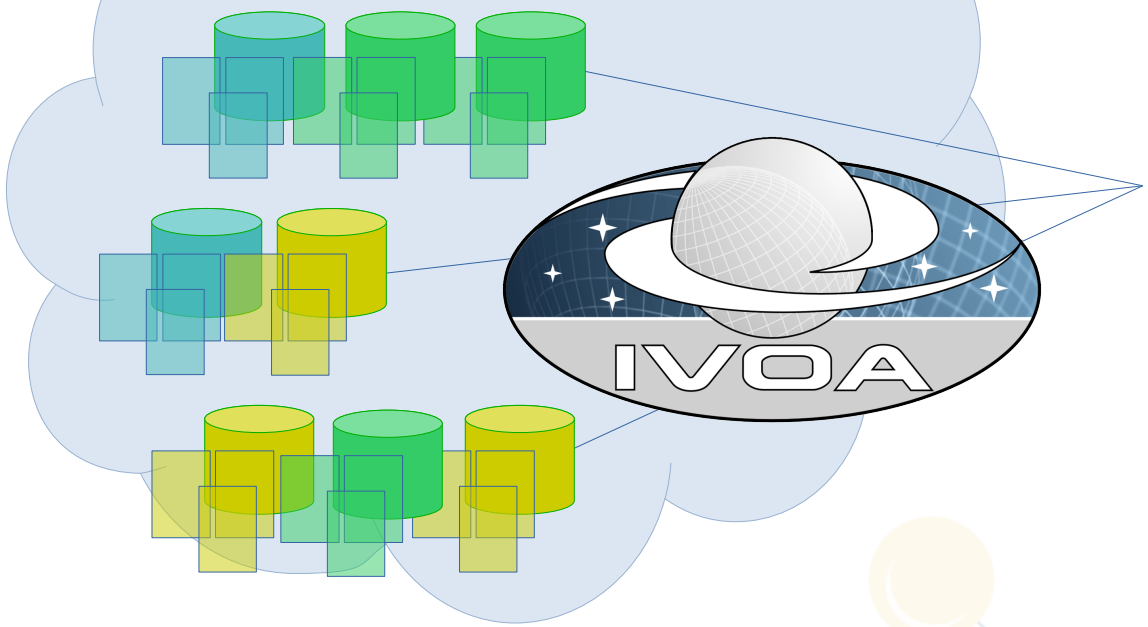
IVOA services in ESAP

10^10 row databases

complex metadata and data models



ESAP

High performance cloud compute

openstack

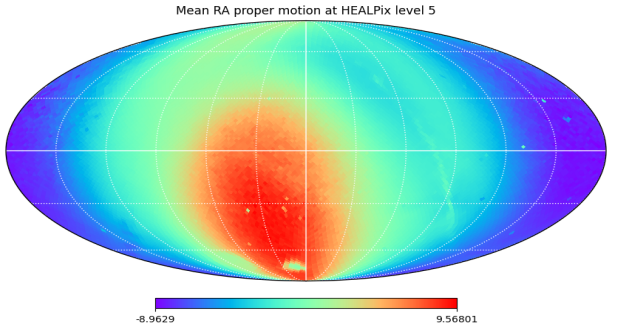
DIRAC
THE INTERWARE

kubernetes

docker

binder

jupyter



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IVOA services in ESAP

Don’t put IVOA data in the ShoppingCart

Put the data on disc

Put a URI in the ShoppingCart

ESAP data store can scale to handle BigData results

ESAP data store can grow to handle IVOA metadata

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IVOA services in ESAP

Simple implementation

All the IVOA services return VOTable

Put the data on disc in /tmp/data-store

File names use UUID to link to HTTP session

Data store directory exposed via HTTP server

Shopping cart contains simple URLs

http://esap-gui/data=store/xxx-yyy-yyy

Notebooks download their data from the URL

Add more disc space and access control later

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IVOA services in ESAP

Clever implementation

All the IVOA services return VOTable

Put the results into ESAP-DB tables

ESAP-DB preserves the VOTable metadata

Publish ESAP-DB as a TAP service

Shopping cart contains TAP table URIs

ivo://esap-gui/tap-service?table=xxx

AstroPy can read ESAP-DB contents from anywhere

- A Jupyter notebook in an ESCAPE service
- A Python program in China
- TopCat on a desktop in Canada

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