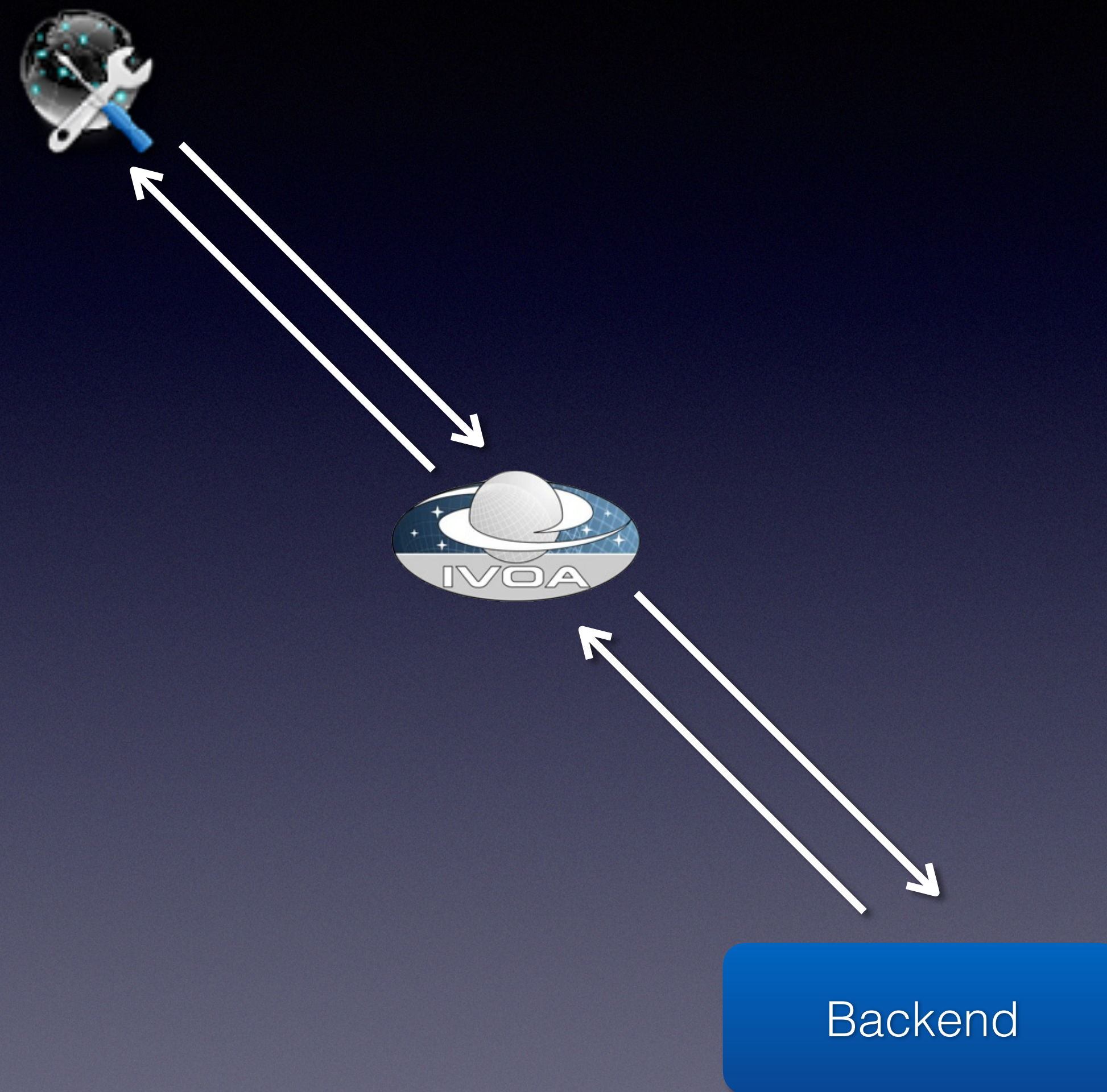


Using VO

How Firefly is using Datalink and Service Descriptors



“Implement an extension & provide feedback”

–Janet Evans (3 hours ago)

Goals

- Detailed version of my ADASS talk
- Describe in detail how we are using
 - Datalink
 - Service Descriptors
- Point out how we are solving problems
- Make suggestions

Challenges

- Search Result Challenges ← *Straight forward*
- Search UI Challenges ← *Complex*

Almost anytime we are using Service Descriptors we are building UIs



Search Result Challenges

UI Directives for results

Using `local_semantics` and `content_qualifier`

still learning



Using local_semantics

content_type	semantics	local_semantics
image/fits	#this	#image-grid-red
image/fits	#this	#image-grid
image/fits	#this	#image-grid-blue
image/fits	#this	#image-grid-green

- #this: they are primary products
- other semantics might make sense

- Show an images in a grid
- Allow a three color option
- set up default bands
- could put 'image' in content_qualifier

Image Result

The screenshot displays a software interface with a table of photometry data on the left and a grid of image cutouts on the right. The table has columns for calibration level, tile ID, solar longitude (s_ra), solar latitude (s_dec), solar phase angle (s_fov), solar region (s_region), and observation publication status (obs_publish). The first row of data is highlighted in yellow. A red arrow points from the text 'Click on 1 row' to the first row of the table. The image cutouts are arranged in a grid. A red box highlights four grayscale images in the top row, labeled 'TILE00001 MER VIS FOV:8.3'', 'TILE00001 NISP-H FOV:8.3'', and 'TILE00001 NISP-J FOV:8.3''. A red arrow points from the text 'See 4 images' to this group. A red box highlights a 3-color image in the bottom row, labeled '3-color FOV:8.3''. A red arrow points from the text 'Plus 3 color' to this image.

calib_level	tile_id	s_ra (deg)	s_dec (deg)	s_fov (deg)	s_region	obs_publish
int	char	double	double	double	char	char
3	TILE00001	180.7898809422635	44.53155200707976	0.25905897165885505	polygon 180.66139737243225 44.623119111 ivo://irsa.ipac.euclid/MER	
3	TILE00002	242.5214121554428	-83.76600369137228	0.06255656830762102	polygon 242.5885173 -83.73558983 242.801 ivo://irsa.ipac.euclid/MER	
3	TILE00003	140.5214121554428	20.76600369137228	0.15255656830762102	polygon 242.5885173 -83.73558983 242.801 ivo://irsa.ipac.euclid/MER	

Click on 1
row

See 4 images

Plus 3 color

Using local Semantics

content_type	semantics	local_semantics
application/x-votable+xml	#this	#spectrum-grid
application/x-votable+xml	#this	#spectrum-grid

- #this: they are primary products

- Show a spectrum in a grid
- Could have a #spectrum_combined
- could put 'spectrum' in content_qualifier

Search Challenges

Meta Data Driven

Service Descriptors means UI creation

Using Datalink and Service Descriptors in search

Choose Data Collection

Facility	Collection	Inst.	Type	Bands	Data	i
erschel	HerM33es	PACS,SPIRE	extragalactic	Infrared,Millimeter	Images	ⓘ
erschel	HeVICS	PACS,SPIRE	extragalactic	Millimeter	Images	ⓘ
erschel	LocalGroup	PACS,SPIRE	extragalactic	Millimeter	Images	ⓘ
erschel	PHDP	PACS	compilation	Infrared,Millimeter	Images	ⓘ
IRAS	EIGA	IRAS	galactic	Infrared,Millimeter	Images	ⓘ
IRAS	IGA	IRAS	galactic	Infrared,Millimeter	Images	ⓘ
IRAS	IRIS	IRAS	all-sky	Infrared,Millimeter	Images	ⓘ
IRAS	ISSA	IRAS	all-sky	Infrared,Millimeter	Images	ⓘ
IRAS	MIGA	IRAS	galactic	Infrared,Millimeter	Images	ⓘ
MSX	MSX	SPIRIT III	galactic	Infrared	Images	ⓘ
Spitzer	Abell1763	IRAC, LFC, MIPS	extragalactic	Infrared, Millimeter,	Images	ⓘ
Spitzer	CLASH	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	Cosmic Dawn S	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	Cygnus-X	IRAC,MIPS	galactic	Infrared	Images	ⓘ
Spitzer	DeepDrill	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	DUSTINGS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	ELFLock	MIPS	extragalactic	Millimeter	Images	ⓘ
Spitzer	FIDEL	MIPS	extragalactic	Infrared,Millimeter	Images	ⓘ
Spitzer	Frontier	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	GLIMPSE	IRAC	galactic	Infrared	Images	ⓘ
Spitzer	SGOODS	IRAC	extragalactic	Infrared,Optical	Images	ⓘ
Spitzer	IUDF	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	LVL	GALEX,IRAC,MIPS	extragalactic	Infrared,Millimeter,Optical	Images	ⓘ
Spitzer	MIPS_LG	MIPS	extragalactic	Millimeter	Images	ⓘ
Spitzer	MIPSGAL	MIPS	galactic	Infrared	Images	ⓘ
Spitzer	S4G	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SAFIRES	MIPS	compilation	Infrared	Images	ⓘ
Spitzer	SAGE-SMC	IRAC,MIPS	extragalactic	Infrared,Millimeter	Images	ⓘ
Spitzer	S-CANDELS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SDWFS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SEIP	IRAC, MIPS	compilation	Infrared	Images	ⓘ
Spitzer	SEP	MIPS	extragalactic	Infrared	Images	ⓘ
Spitzer	SERVS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SHELA	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SIMPLE	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SMUVS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SpIES	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SpUDS	IRAC,MIPS	extragalactic	Infrared	Images	ⓘ
Spitzer	SRELICS	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SSDF	IRAC	extragalactic	Infrared	Images	ⓘ
Spitzer	SWIRE	IRAC, MIPS, WISE	extragalactic	Infrared,Millimeter,Optical	Images	ⓘ
Spitzer	TAURUS	IRAC, MIPS	galactic	Infrared,Millimeter	Images	ⓘ
WISE	z0MGS	GALEX,WISE	extragalactic	Infrared,UV	Images	ⓘ

Spitzer IRAC Equatorial Survey (SpIES) Images Search

Click to choose a search center, or use the Selection Tools () to choose a search center and radius.

HiPS HIPS/Aitoff Galactic HIPS / MOC

AllWISE color Red (W4), Green (W2), Bl... FOV:156°

Multiple datasets
Each searched differently

Each could launch 1-5 different searches
Possibly different UI elements

EQ-J2000: [] Lock by click

Cone Polygon

Coords or Obj Name: [] Try NED then Simbad

Examples: 331.7310427 0.0642813

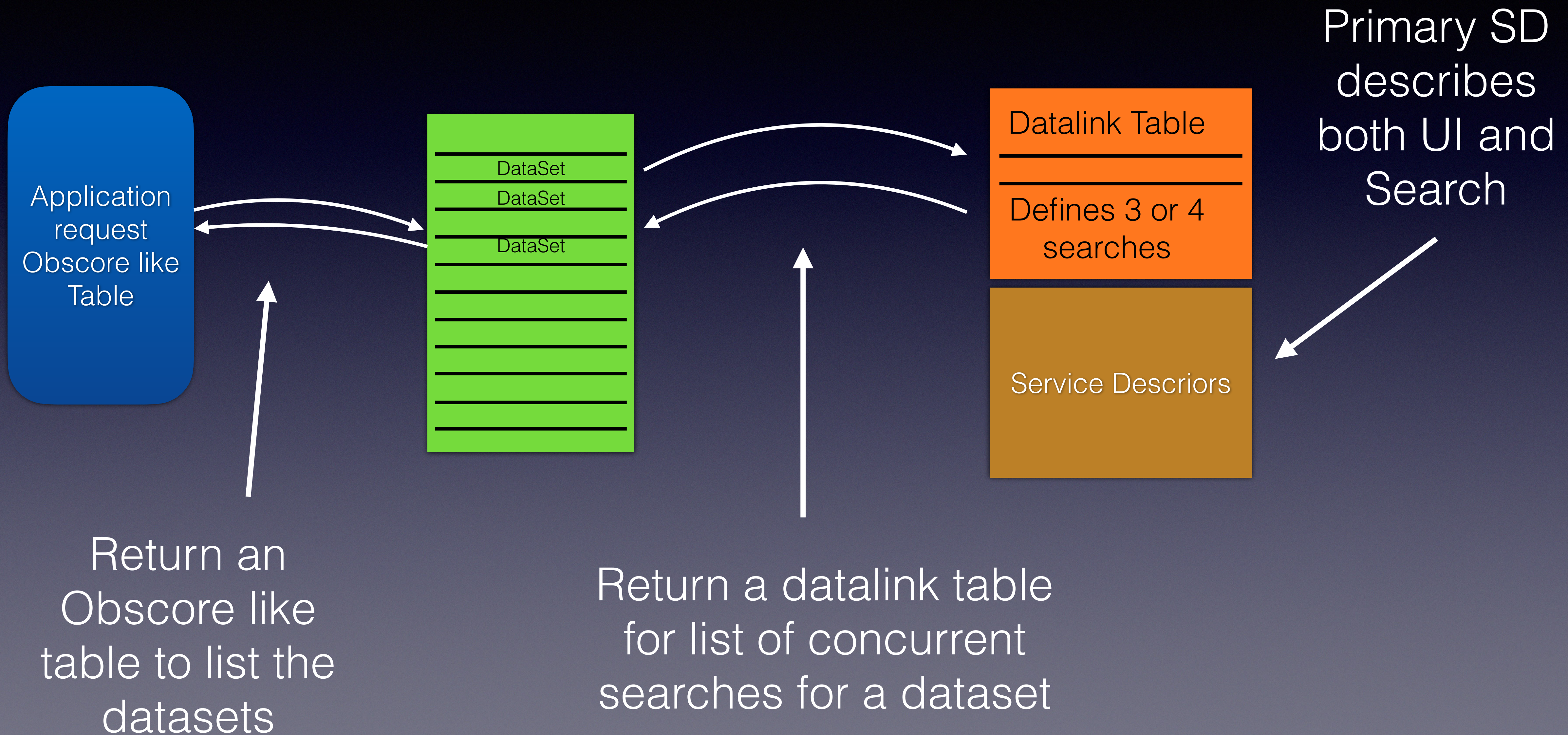
Search Radius: 360 [] arcseconds

Valid range between: 1" and 3600"

Search Cancel [Documentation: SpIES Overview Page](#)

Click on data collection to search; filter or sort table to find a data collection.

How DCE Works



UI Search Challenges

- Problem 1: Datalink needs to tell us how the searches relate
- Problem 2: Services descriptors must give us UI information about the searches
- Problem 3: TAP and upload searches ← *No solution yet*

Problem1: How Searches relate

- Solution: `local_semantics`
 - mark primary: `#primary-query` (example - SIA2, SSA)
 - mark others: `#concurrent-query` (example - SIA2, TAP)
- All searches fired at the same time
- Example: doing an image search and a spectrum search

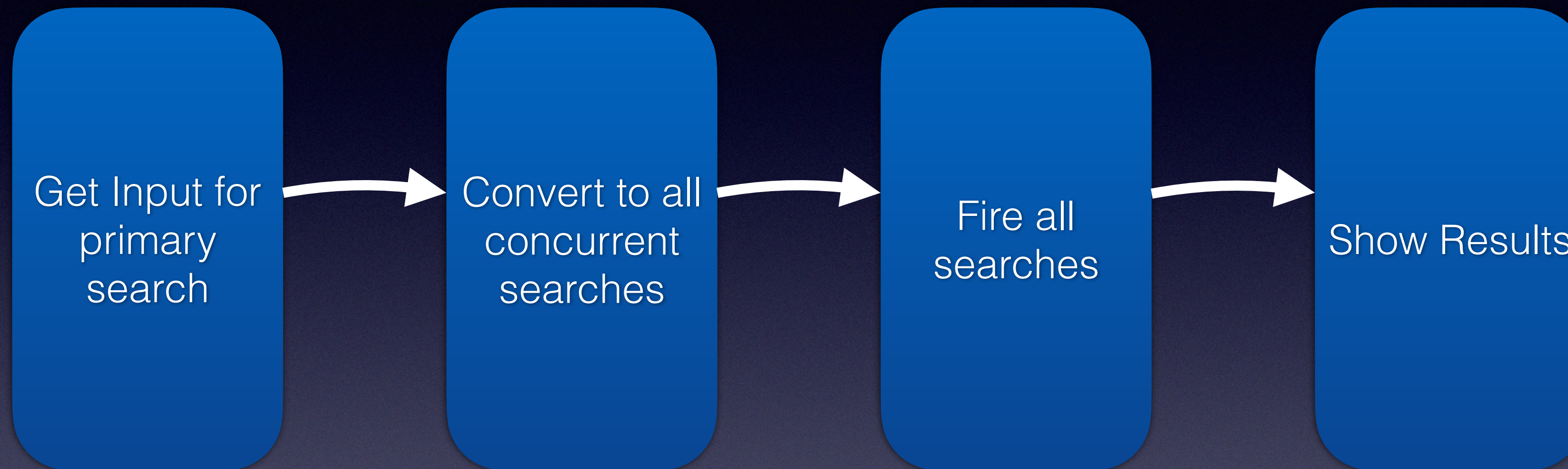
Solution 1: relate the queries

access_url	service_def	semantics	local_semantics
	sd_1	#this	#primary-query
	sd_2	#this	#concurrent-query
	sd_3	#this	#concurrent-query
https://abc		#documentation	

Relation of queries



Search flow



- Translate input between service descriptors
 - *example*: SIA -> SSA
 - *example*: SIA -> TAP

Problem 2: Search User Interface

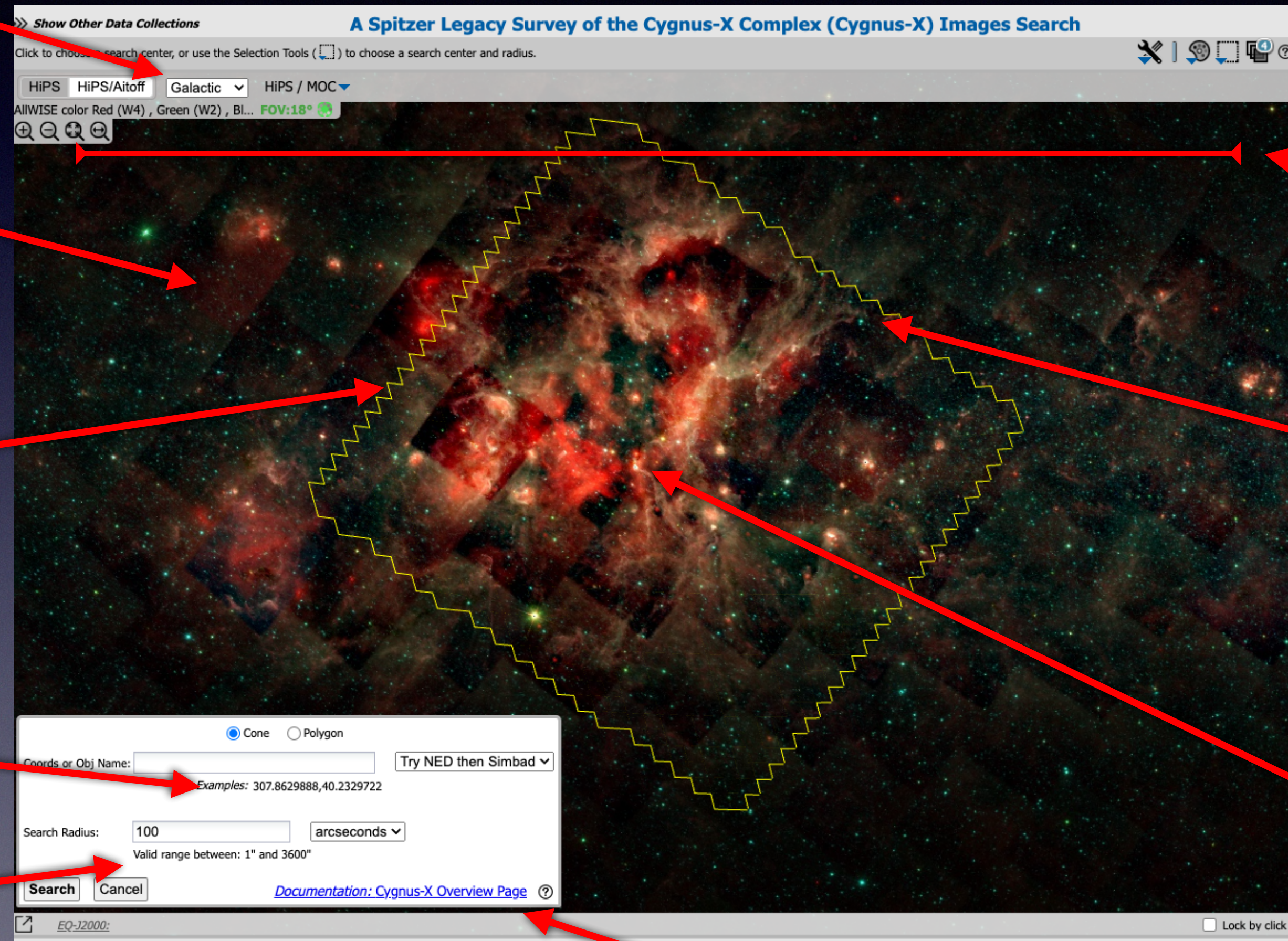
Frame

Background
HiPS

MOC to
describe coverage

Examples

Min/Max for radius



Field of View

MOC Color

Center

Dataset Help link

Solution 2: Enhancing A Service Descriptor

```
<RESOURCE type="meta" utype="CISX:adhoc:service" ID="sia_spitzer_elflock_primary_pos">  
  <DESCRIPTION>ELFlock Images</DESCRIPTION>  
  <PARAM name="standardID" datatype="char" arraysize="*" value="ivo://ivoa.net/std/SIA"/>  
  <PARAM name="accessURL" datatype="char" arraysize="*" value="https://stuff"/>
```

New Group Here

```
<GROUP name="inputParams">
```

```
  <DESCRIPTION>Single object Search</DESCRIPTION>
```

```
  <PARAM name="POS" datatype="double" arraysize="*" unit="deg" value=".1" xtype="circle" >
```

```
    <VALUES>
```

```
      <MIN value="0" />
```

```
      <MAX value="0.3" />
```

```
    </VALUES>
```

```
  </PARAM>
```

```
  <PARAM name="POS" datatype="char" arraysize="*" value="" xtype="polygon" />
```

```
  <PARAM name="POS" datatype="char" arraysize="*" value="" xtype="range" />
```

```
  <PARAM name="COLLECTION" datatype="char" arraysize="*" value="spitzer_elflock" />
```

```
  <PARAM name="RESPONSEFORMAT" datatype="char" arraysize="*" value="VOTABLE" />
```

```
</GROUP>
```

```
</RESOURCE>
```

Add a new Group!!!!

Enhanced Group

```
<GROUP name="CISX:ui">
```

```
  <PARAM name="HiPS" datatype="char" arraysize="*" value="ivo://CDS/P/allWISE/color">
```

```
    <DESCRIPTION>HiPS Maps</DESCRIPTION>
```

```
  </PARAM>
```

```
  <PARAM name="hips_initial_fov" datatype="double" unit="deg" ucd="phys.angSize;instr.fov" value="99" >
```

```
  <PARAM name="hips_initial_ra" datatype="double" unit="deg" ucd="pos.eq.ra" value="161.5135">
```

```
  <PARAM name="hips_initial_dec" datatype="double" unit="deg" ucd="pos.eq.dec" value="58.0785">
```

```
  <PARAM name="moc_color" datatype="char" arraysize="*" value="yellow"/>
```

```
  <PARAM name="moc" datatype="char" arraysize="*" value="https://irsadev.ipac.caltech.edu/data/spitzer_elflock.moc.fits">
```

```
    <DESCRIPTION>irsa_spitzer_elflock_moc</DESCRIPTION>
```

```
  </PARAM>
```

```
  <PARAM name="data_covers_allsky" datatype="boolean" value="false"/>
```

```
  <PARAM name="hips_frame" datatype="char" arraysize="*" value="equatorial"/>
```

```
  <PARAM name="examples" datatype="char" arraysize="*" value="161.5743909 57.9121705 eq"/>
```

```
  <PARAM name="polygon_examples" datatype="char" arraysize="*" value="162.041744 57.661311, 161.107038 57.661311, 161.100488 58.161291, 162.048294 58.161291"/>
```

```
</GROUP>
```

Problem 3: 2024 Service Descriptor Problems

- TAP Service Descriptors
- Upload Service Descriptors

Must be solved in 2024

```
<PARAM name="standardID" datatype="char" arraysize="*"
  value="ivo://ivoa.net/std/TAP#async#tokenSub#sharedInputParams" />
<PARAM name="accessURL" datatype="char" arraysize="*"
  value="https://irsadev.ipac.caltech.edu/TAP/" />
```

Token substitute

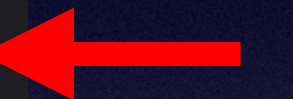
```
<GROUP name="inputParams">
  <DESCRIPTION>Single object Search</DESCRIPTION>
  <PARAM name="QUERY"
value="SELECT+*+FROM+ivoa.obscore+WHERE+(...)+and+INTERSECTS(poly,CIRCLE(${ra},${dec},${size}))=1" />
</GROUP>
```

```
<GROUP name="CISX:tokenSub">
  <DESCRIPTION>Single object Search</DESCRIPTION>
  <PARAM name="ra" datatype="double" ucd="pos.eq.ra" unit="deg" value="" />
  <PARAM name="dec" datatype="double" ucd="pos.eq.dec" unit="deg" value="" />
  <PARAM name="size" datatype="double" unit="deg" ucd="phys.size.radius" value="5">
    <DESCRIPTION>Search range</DESCRIPTION>
    <VALUES>
      <MIN value=".05" />
      <MAX value="12.5" />
    </VALUES>
  </PARAM>
</GROUP>
```

Our Ideas: TAP SD
templates

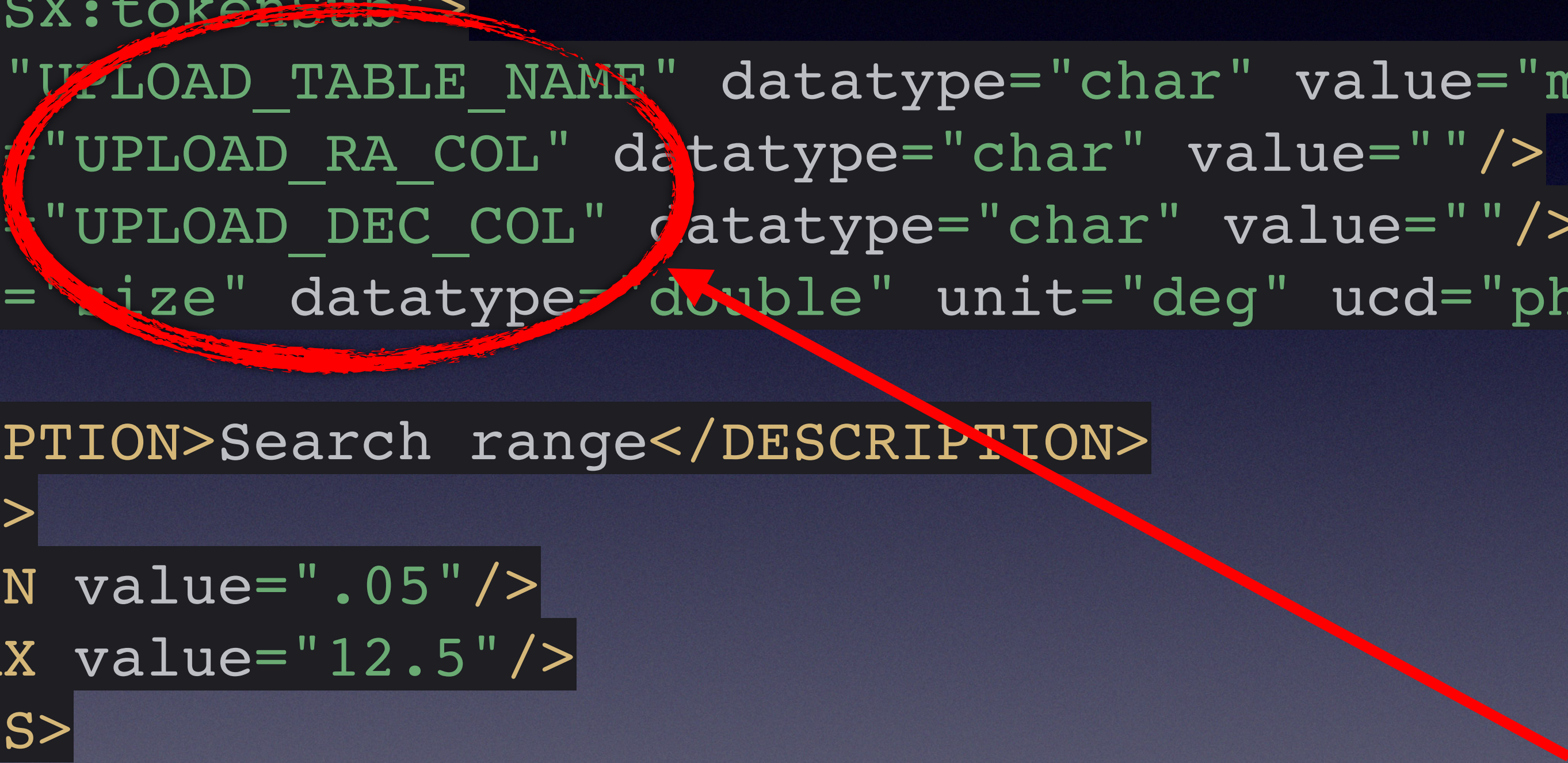
Upload TAP: Service Descriptors are messy

```
<PARAM name="QUERY" datatype="char" arraysize="*" value="SELECT  
cat_table.ra, cat_table.dec FROM TAP_UPLOAD.${UPLOAD_TABLE_NAME}  
AS t, CIRCLE('J2000',t.${UPLOAD_RA_COL}, t.${UPLOAD_DEC_COL},  
${size})) =1" />
```



Upload TAP: Even more messy

```
<GROUP name="CISX:tokenSub">
  <PARAM name="UPLOAD_TABLE_NAME" datatype="char" value="myTable" />
  <PARAM name="UPLOAD_RA_COL" datatype="char" value="" />
  <PARAM name="UPLOAD_DEC_COL" datatype="char" value="" />
  <PARAM name="size" datatype="double" unit="deg" ucd="phys.size.radius"
value="5">
  <DESCRIPTION>Search range</DESCRIPTION>
  <VALUES>
    <MIN value=".05" />
    <MAX value="12.5" />
  </VALUES>
</PARAM>
</GROUP>
```



These Parameters need Special handling

We need some good ideas for upload

Service Descriptor Rabbit Trail

- We are also looking at adding one or two service descriptors to TAP to reference a help page
- TAP_SCHEMA.tables: For help on the whole table
- TAP_SCHEMA.columns: For help on table columns

Overall Successes

- Datalink is working and getting better with 1.1
- Datalink one-to-many relationship is solves a 15 year problem
- Service descriptors are huge break through for searching
- Service descriptors separate the UI from the search

Overall Suggestions

- Standard way to extend service descriptors
 - Named extensions could be recognized
 - *For example-* Rubin and IRSA might use same extension
- Templating service descriptors
- Cross link HTML documentation