i-explosion

JVO構築を通じて学んだこと

国立天文台・天文データセンター

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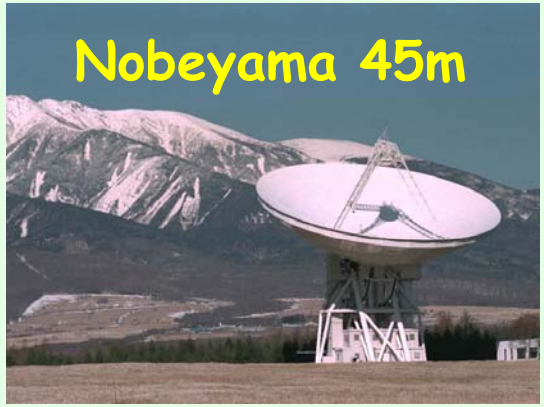
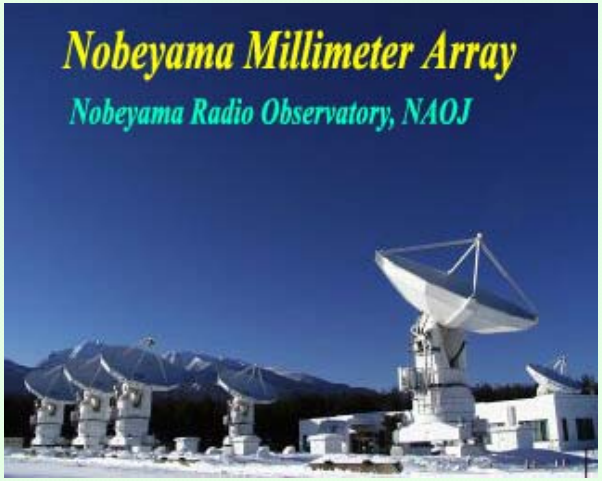
Data Resources in NAOJ

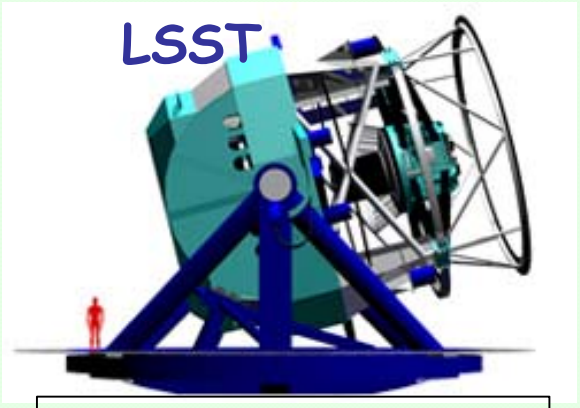
- Subaru 8.2m Optical-Infrared Telescope
- Nobeyama 45m Radio Telescope
- Nobeyama Millimeter Array
- Nobeyama Radioheliograph
- VERA
- Hinode, Kaguya, ,,,



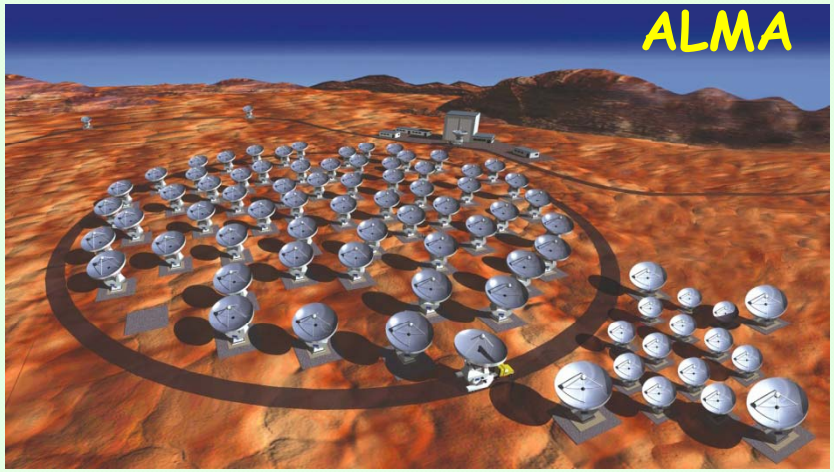


Planned Data Resources

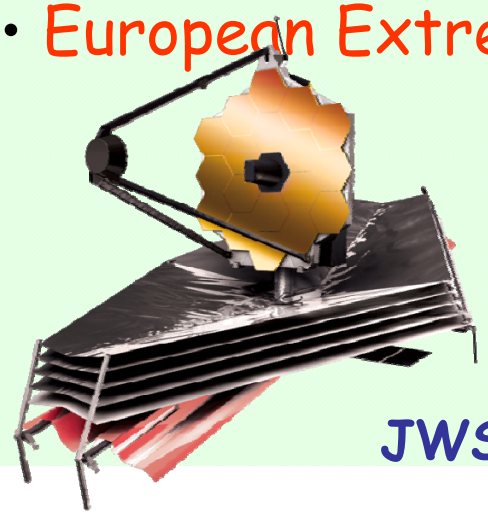
- ALMA
- JWST
- LSST
- LOFAR
- SKA
- Thirty MetreTelescope
- Giant Magellan Telescope
- European Extremely Large Telescope



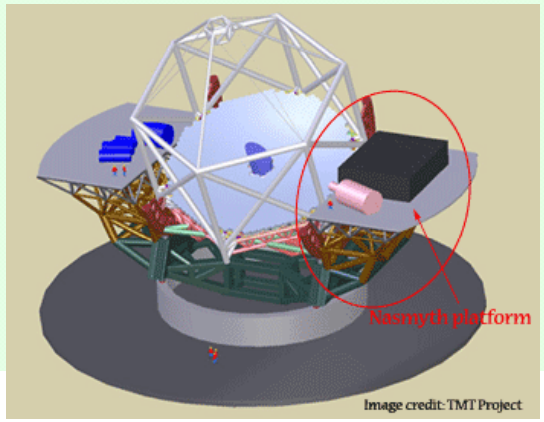
30 PB/yr x 6 yr ~ 200 PB



~ a few PB/yr



JWST



TMT


大量のデータをどう処理したらよいか悩む天文学者。猫の手も借りたい状況。
データ生成率
Looking Ahead
Universe on Your Desktop
教育の教材としても利用できる。
バーチャル天文台
いつでもどこでも天文データにアクセスできる。

VO– New Research Infrastructure in the 21st Century

A collection of integrated astronomical data archives and software tools that utilize computer networks to create an environment in which research can be conducted.

http://www.encyclopedia.com/html/v1/virtobserv.asp

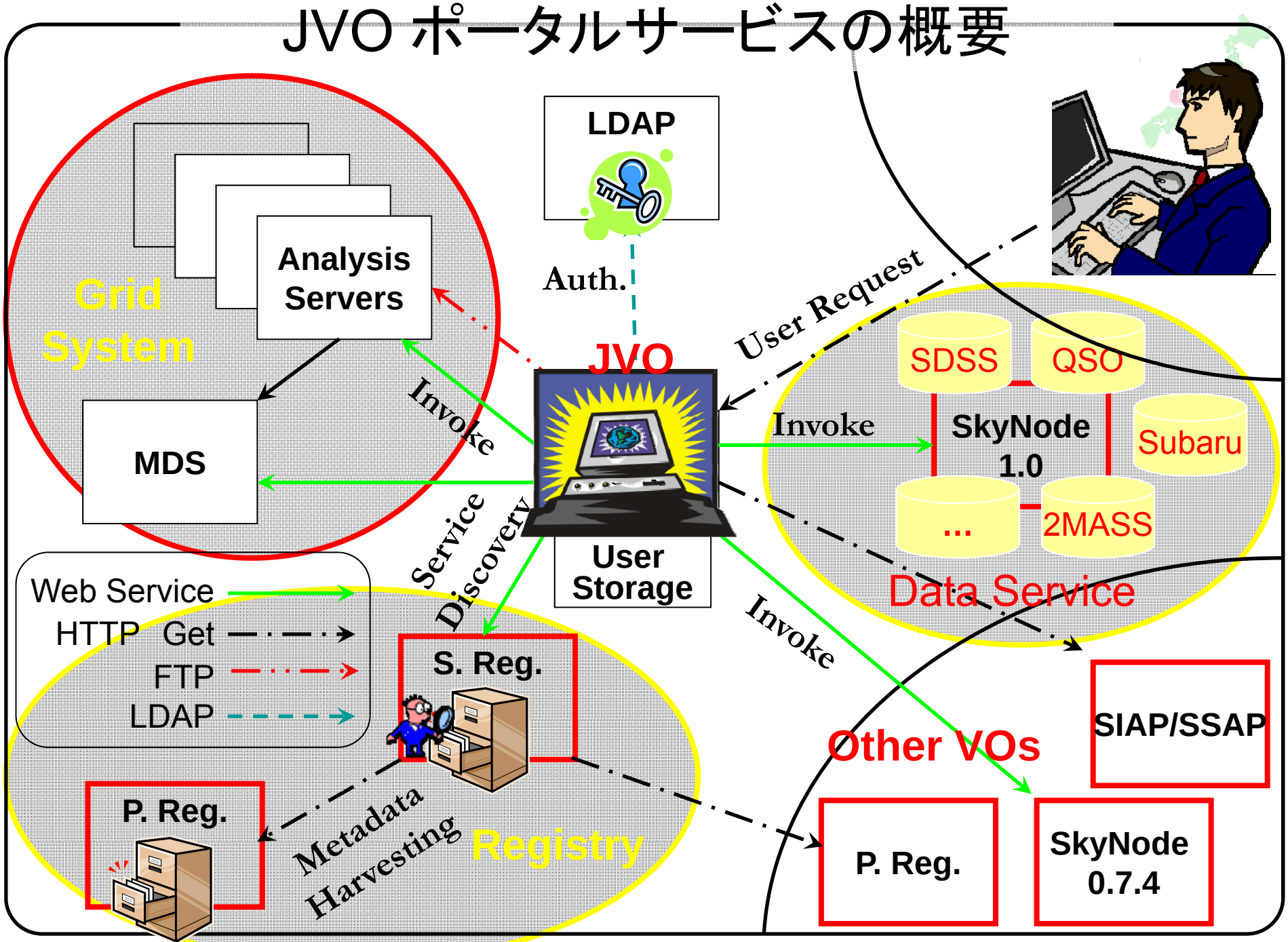
i-explosion

観測的研究の流れ

- 課題設定・計画立案
- 望遠鏡による観測
- データ処理
  - 較正，選択，結合，，，
- データ解析
  - 物理量の導出
  - 考える
  - 現象の理解
- 論文出版

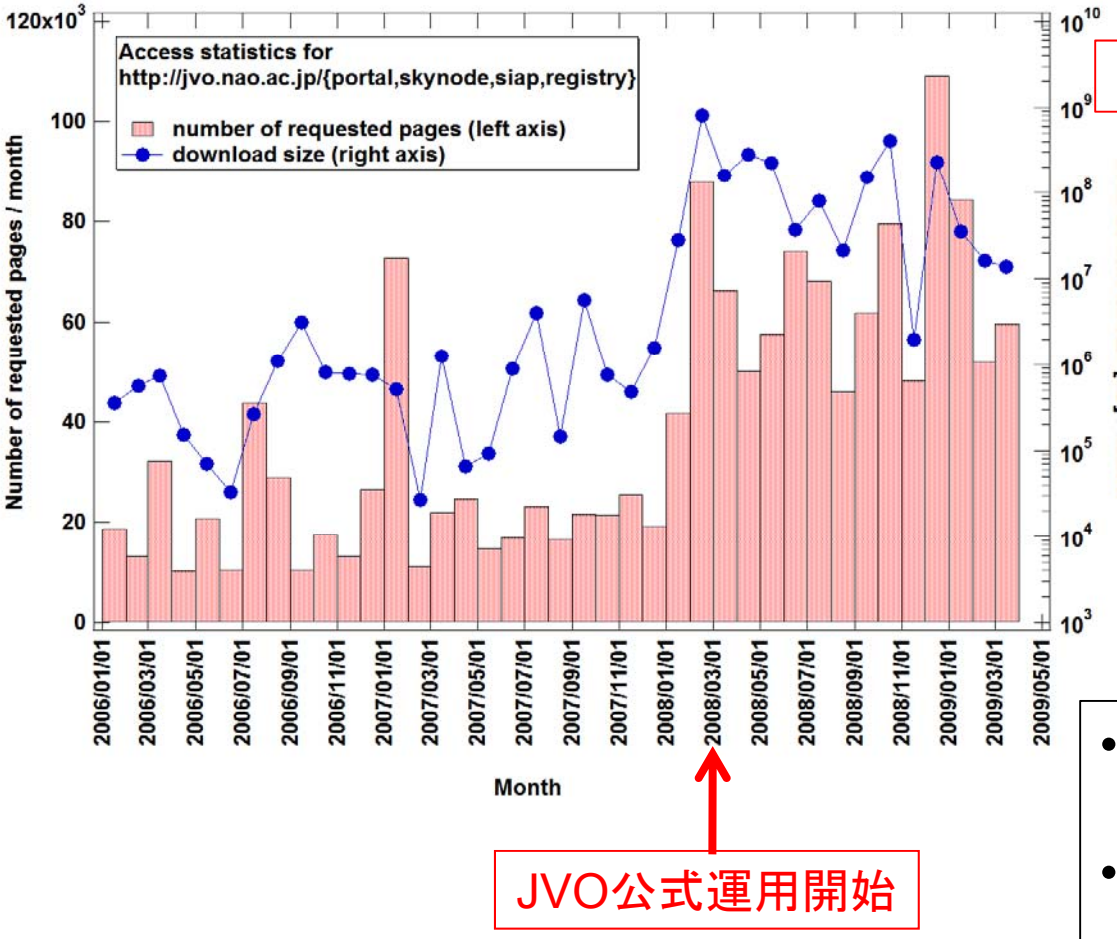
データ
↓
情　報
↓
知　見
↓
理　解
↓
（学問の）進歩

JVO ポータルサービスの概要

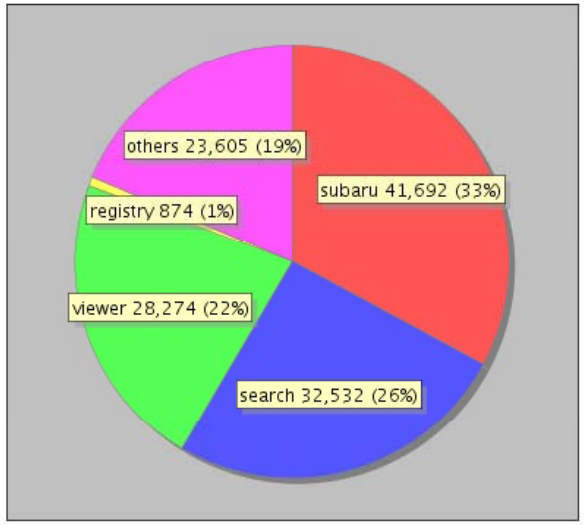


http://jvo.nao.ac.jp/portal/

JVOアクセス統計 (2009 March)



1TB



JVO公式運用開始

- 最大1TB/月の国内外からのデータ要求
- SupCAMデータへのアクセスが多い

VO Projects in the world

- 16 countries and a region (EU)
- International Virtual Observatory Alliance (IVOA)
  Standards to interoperate VOs

- Meta data,
  data models,
  data accesses,
  output format,
  etc.

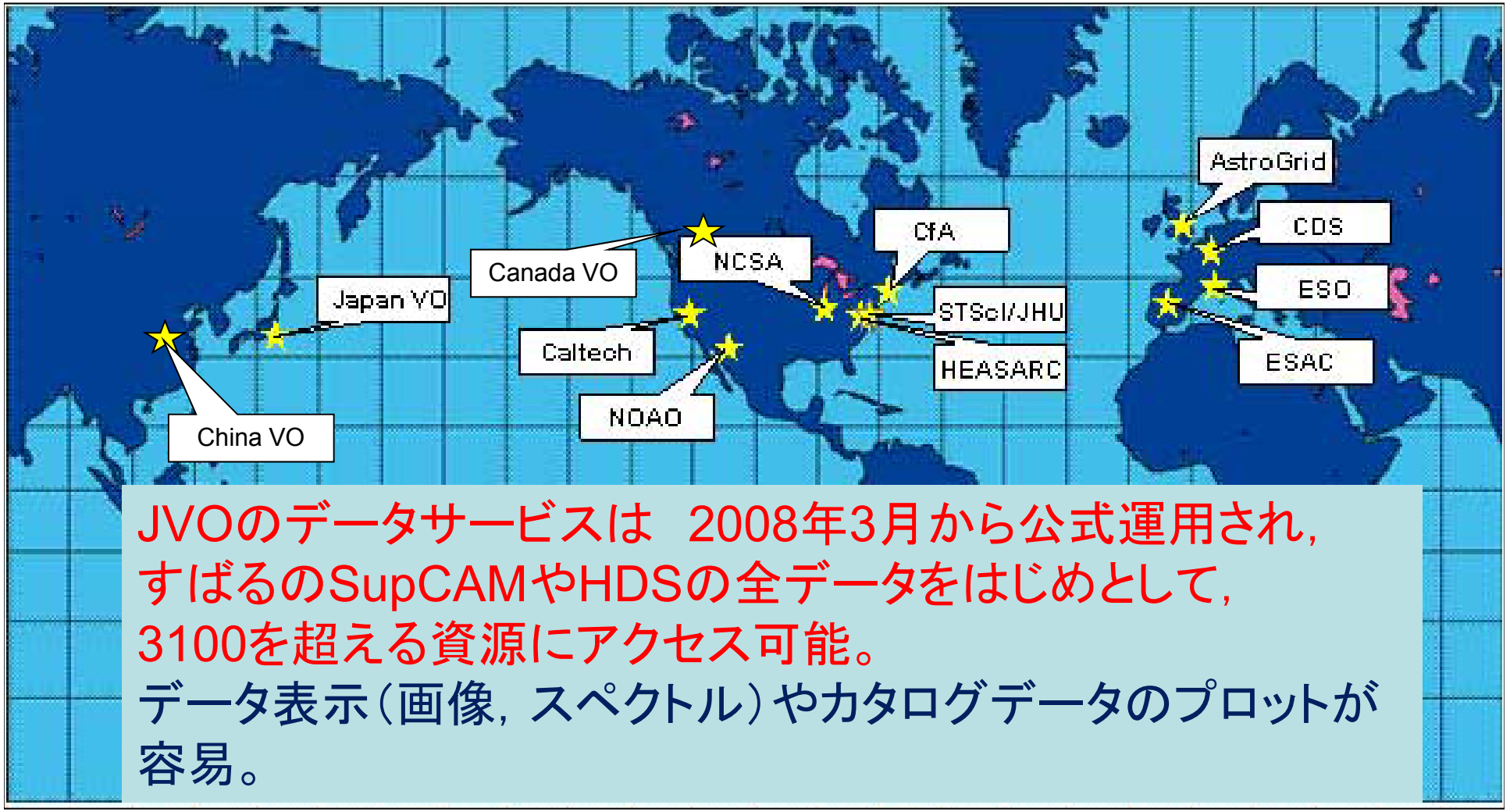
IVOA Interoperability meeting in Kyoto, May 2005

i-xplosion

Standardization in IVOA

- Meta-data
  - Contents & access protocol
- Access Images, Spectra, Catalogues
  - TAP, SIAP, SSAP, STC, etc.
- Query Language to Federated DBs (ADQL)
- Unified Attribute Names
  - UCD (Unified Contents Descriptions)
- Output format：VOTable (in XML)
  - FITSを包含

Astronomical Virtual Observatories
~ Dataグリッド環境 ~



JVOのデータサービスは　2008年3月から公式運用され，
すばるのSupCAMやHDSの全データをはじめとして，
3100を超える資源にアクセス可能。
データ表示（画像，スペクトル）やカタログデータのプロットが容易。

標　準　策　定

- 標準があれば極めて有効
  - プロトコル，データフォーマット，など
  - 相互運用性の確保→広い展開・応用
  - 国際天文学連合によるendorsement

- 標準策定は苦難の連続
  - 哲学，理念，意図，目論み，意見，，，
  - 妥協，我慢
  - 人間関係の構築：相互理解
  - 物事は休憩時間，夜にほぼ決まる

Users View Point

- Easiness to use
  - self-explanatory
  - Basic functionalities are sufficient
  - Others could be done by a local machine
- Market research
  - use cases
  - tutorials
- Novice vs Expert
  - GUI vs CUI
  - Almost no astronomers know SQL

Science-Driven

- Demonstrate scientific merit
  - Publish “product papers” by yourselves
- Select most commonly used functionalities
- Quality Index
  - Toward quality assurance
- Young researchers
  - Researchers are VERY conservative !
  - Young researchers tend to show interest to new ones

Technology

- Not too early, not too late
- Stability, robustness
  - "doable or not" is the issue
- Sustainability, support
- Popularlity
  - help desk around you
- Platform dependency
  - for easy dissemination

Tutorials

- A must toward more dissemination and more publications
  - pure users
  - feedback
  - potential tutors

SAO/NASA Astrophysics Data System (ADS)

Query Results from the Astronomy Database

Selected and retrieved 172 abstracts.

#	Bibcode Authors	Score Title	Date	List of Links Access Control Help
1	2009MNRAS.tmp.1016M Mollá, M.; García-Vargas, M. L.; Bressan, A.	1.000 PopStar I: evolutionary synthesis model description	07/2009	A E F X R U
2	2009MNRAS.396..223D D'Abrusco, R.; Longo, G.; Walton, N. A.	1.000 Quasar candidates selection in the Virtual Observatory era	06/2009	A E F X R C U
3	2009AJ....137.5012C Caballero, J. A.; López-Santiago, J.; de Castro, E.; Comide, M.	1.000 X-Ray Variability of σ Orionis Young Stars as Observed with ROSAT	06/2009	A E F X R S U
4	2009GeoJI.177..463B Beggan, C. D.; Whaler, K. A.; MacMillan, S.	1.000 Biased residuals of core flow models from satellite-derived `virtual observatories'	05/2009	A E F R U

Refereed Papers that have "Virtual Observatory" in its abstract

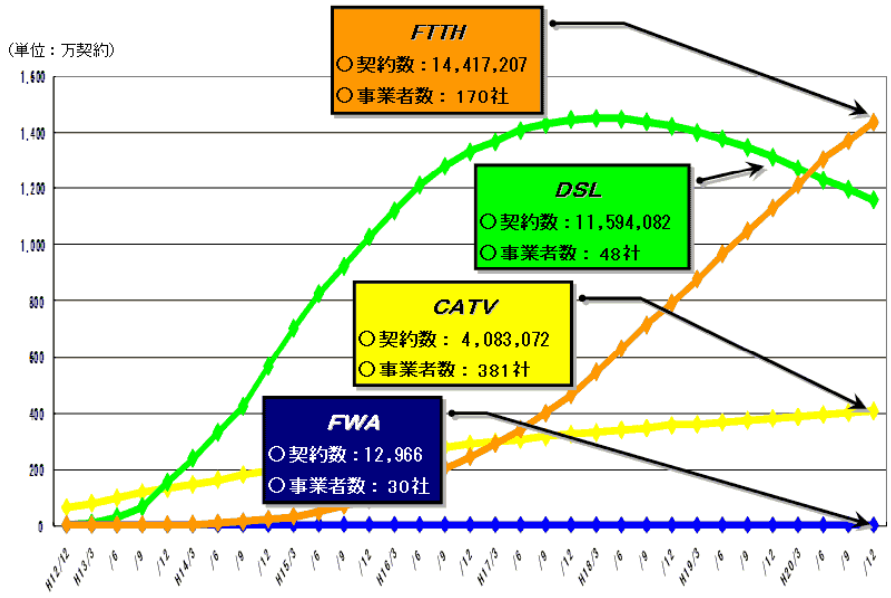
More than 1300 papers mentioning "Virtual Observatory"

For Data providers

- Give credit to them
  - Hard and invisible to prepare science-ready data
- Easy implementation
  - tool kit
- Validation tool prior to publication of data
  - Ensure reliability of the data product

For Tax-Payers

- Effective tool for outreach activity
- Educational use
  - Dedicated user interface, w/ teachers
- More access by non-astronomers
- Funding agencies



http://www.soumu.go.jp/menu_news/s-news/090318_1.html

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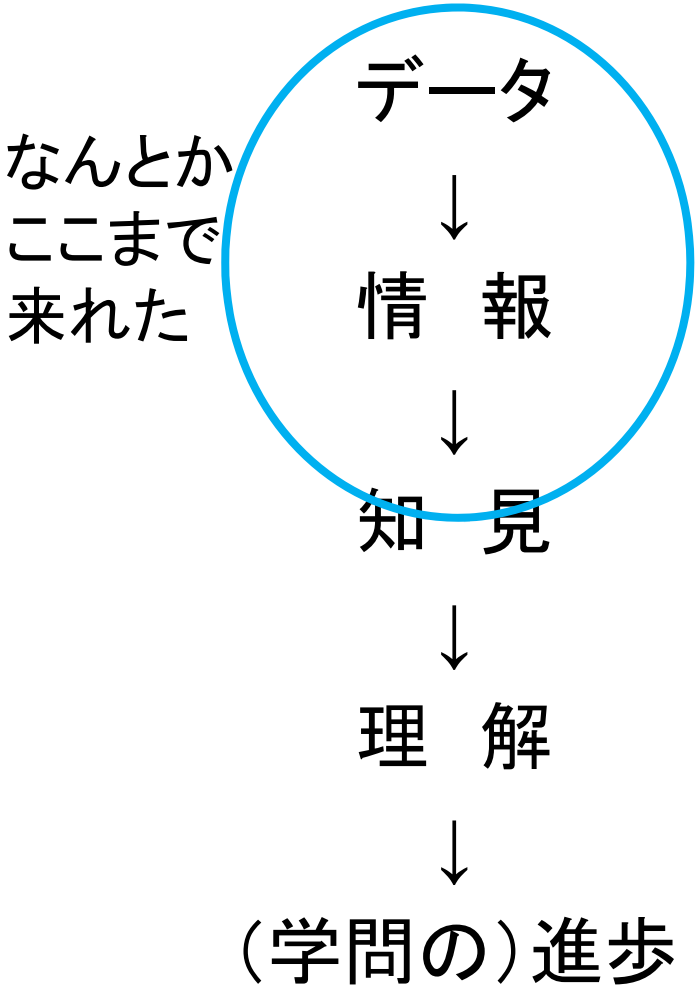

Supported by

- JSPS
  “Core to Core Program” (2004~2008)

- MEXT Grant-in-Aid
  “Information Explosion” (2001~)

- National Institute for Informatics
  “CSI Program” (2006~)

- NAOJ