Experiences with GNSS Data Dissemination using GSAC and its potential usage in EPOS and EPN

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Outline

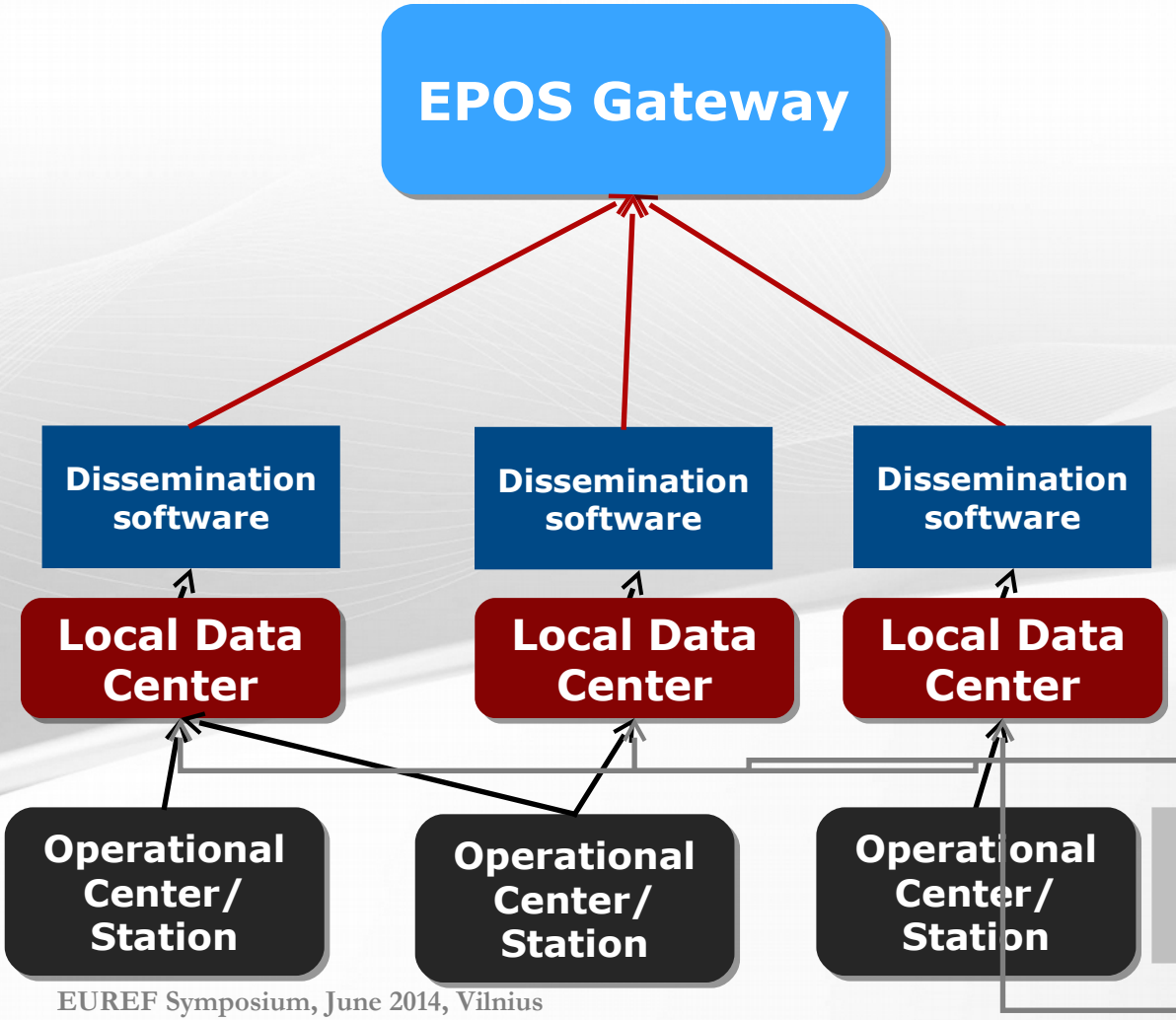
- **Why GSAC@ROB ?**
- How GSAC works
- Stand-alone GSAC
- Federated GSAC
- GSAC for EPN and local/national data center

EPOS Working Group 4

The European Plate Observing System (EPOS) is "*the integrated solid Earth Sciences research infrastructure approved by the European Strategy Forum on Research Infrastructures (ESFRI) and included in the ESFRI Roadmap in December 2008.*"

- The Working Group 4 represents the GNSS data and other geodetic data provider for the EPOS Preparatory Phase

EPOS GNSS data dissemination



GNSS DATA DISSEMINATION & PRESERVATION

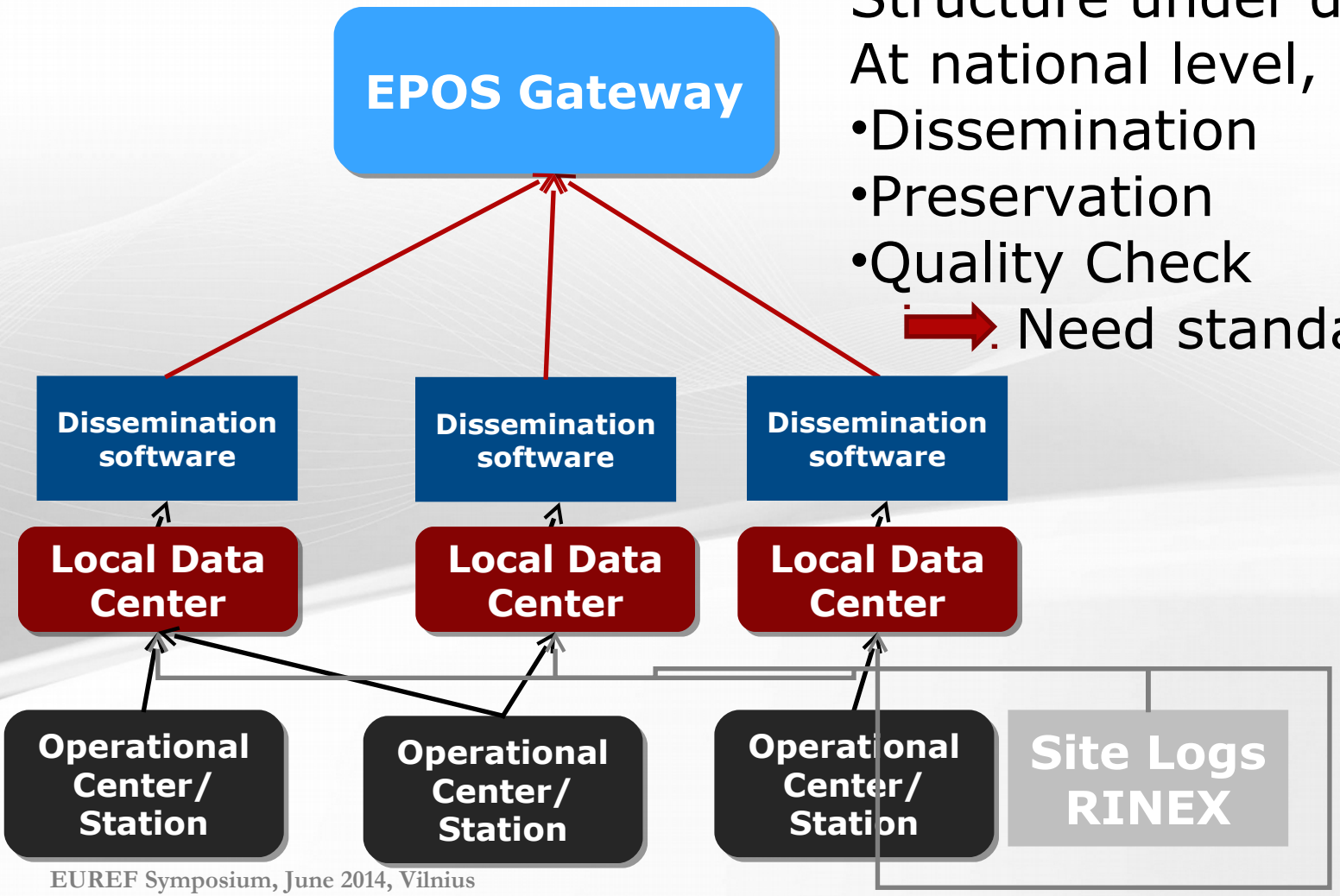
LEVEL 0
GNSS Observation and Meta-data from Permanent (and Campaign) Stations

Structure: Distributed (GSAC-like)
1 EPOS Data Gateway
National and Regional nodes.

Products:
- **Observation data (streams and files).**
- **Meta-data (site logs, access conditions, QC, etc..) for all archived data.**

Services:
- **Seamless and redundant access to Level 0 data through GSAC derived web-services.**
- **mless upload of Level 0**
- **ersion from RAW into national standard format (RINEX x.x).**
- **Checking of essential meta-data.**

EPOS GNSS data dissemination



Structure under discussion
At national level, responsible for
- Dissemination
- Preservation
- Quality Check

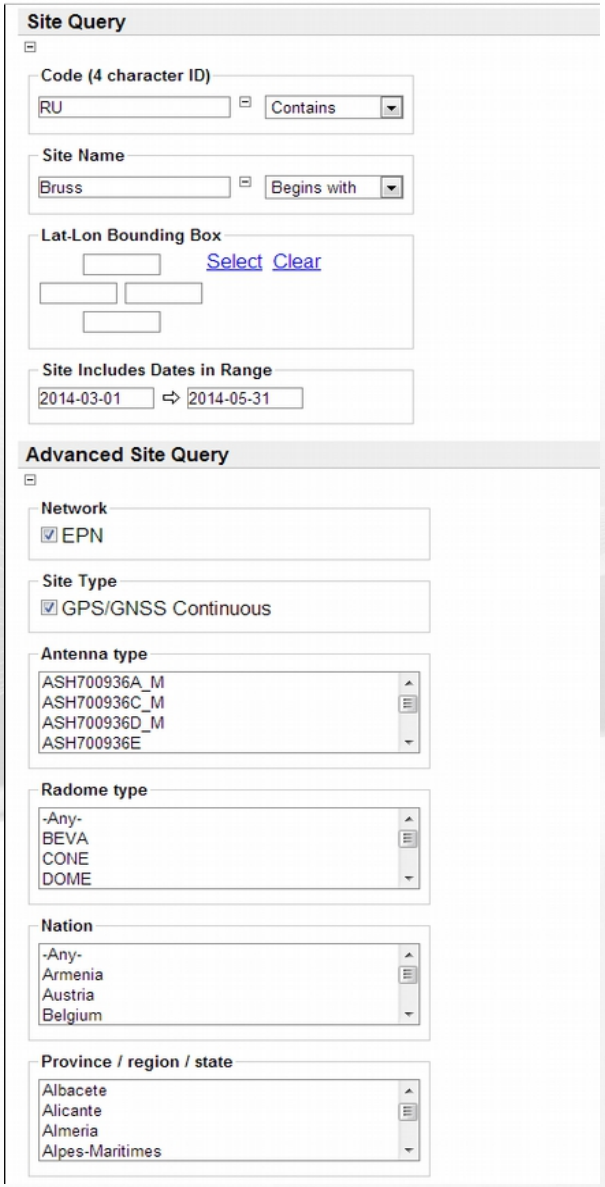
⇒ Need standard tools

EPOS Standard tool for data dissemination

- Geodesy Seamless Archive Centers (GSAC) software package is a software for geodetic data dissemination
  - Chosen as standard tool in EPOS WG4
  - For discovery, share and access to geodetic data
  - Web oriented, written in JAVA
  - Stand alone (1 repository) or federation (several repositories)

EPOS Standard tool for data dissemination

Search site



EPOS Standard tool for data dissemination

Search Site

Search Sites | Search Files | Browse | Information | Help

Search Results

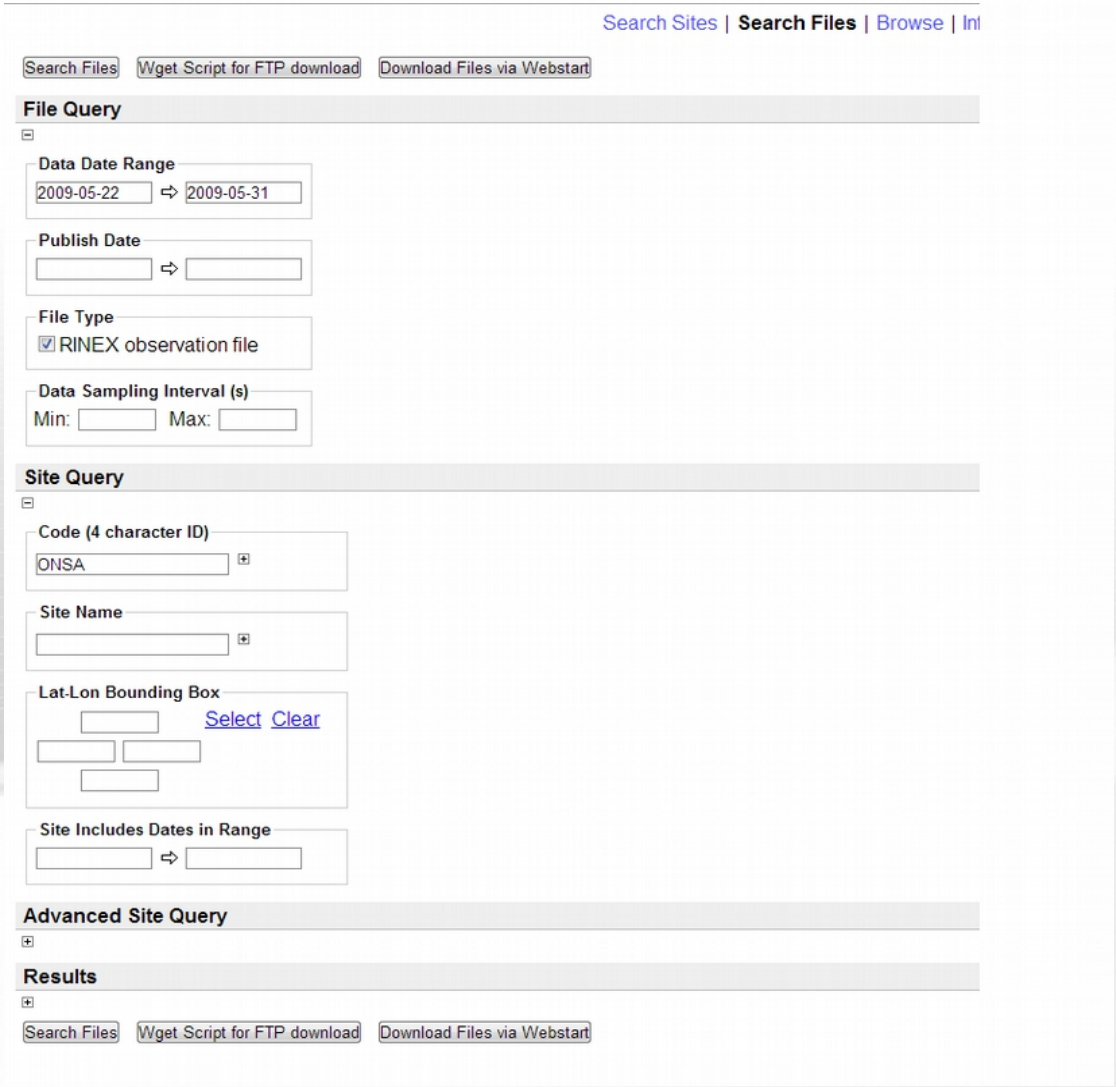
Sites | Map | Search Form

View Selected Sites

	Site Code	Name	Type	Location (latitude, longitude, ellips. hgt.)	Date Range	Networks
☐	BRUX	Brussels	gnss.site.continuous	50.7981 4.3586 158.3	2006-07-07 - 2014-05-22	EPN

Site: BRUX
Name: Brussels
Type: gnss.site.continuous
Location: latitude 50.7981 longitude 4.3586 elevation(ellip. hgt) 158.3
Date Range: 2006-07-07 - 2014-05-22
Network: EPN
Nation: Sweden
Province/State: Brabant
Place/city: Brussels
Agency: Royal Observatory of Belgium
Images ⊞
X: 4027881.6287
Y: 306998.5366
Z: 4919498.9839
IERS DOMES: 13101M010
monument: STEEL MAST
Equipment: ⊞

EPOS Standard tool for data dissemination
Search File



EPOS Standard tool for data dissemination
Search File

Search Sites | Search Files | Browse | Information | Help

Search Information

Wget Script for FTP download | Download Files via Webstart

File for download	File type	Time range of data	Δt	MD5 check sum	File size
ONSA1420.09D.Z	RINEX observation file	2009-05-22 00:00:00 - 2009-05-22 23:59:30	30.0	1076b2e0a8ff60095901a9e5c93b5f5f	620.30 KB
ONSA1430.09D.Z	RINEX observation file	2009-05-23 00:00:00 - 2009-05-23 23:59:30	30.0	691c3e0e1ed84681ab82ac87d8be9e4b	618.52 KB
ONSA1440.09D.Z	RINEX observation file	2009-05-24 00:00:00 - 2009-05-24 23:59:30	30.0	c7d82e4d91f163271441b7e3a14dfdf5	618.67 KB
ONSA1450.09D.Z	RINEX observation file	2009-05-25 00:00:00 - 2009-05-25 23:59:30	30.0	e2584d239c390c22d8798bdc38b09d41	626.18 KB
ONSA1460.09D.Z	RINEX observation file	2009-05-26 00:00:00 - 2009-05-26 23:59:30	30.0	61cb27a726dcead29fc3495ce3335841	610.56 KB
ONSA1470.09D.Z	RINEX observation file	2009-05-27 00:00:00 - 2009-05-27 23:59:30	30.0	17c176be75d2bf9ba49229f2a560f9c1	606.07 KB
ONSA1480.09D.Z	RINEX observation file	2009-05-28 00:00:00 - 2009-05-28 23:59:30	30.0	0ff9d2b8d7ccd2c04c2b60291622df71	600.84 KB
ONSA1490.09D.Z	RINEX observation file	2009-05-29 00:00:00 - 2009-05-29 23:59:30	30.0	39bd5a2f142ab4c263a8887ed5cdd162	602.85 KB
ONSA1500.09D.Z	RINEX observation file	2009-05-30 00:00:00 - 2009-05-30 23:59:30	30.0	e761d2f4f97bae4c1ad6c33577cf9c0d	610.20 KB
ONSA1510.09D.Z	RINEX observation file	2009-05-31 00:00:00 - 2009-05-31 23:59:30	30.0	e3d85c36b8349150814328587937 2a46	606.94 KB
10 files					6.12 MB

Outline

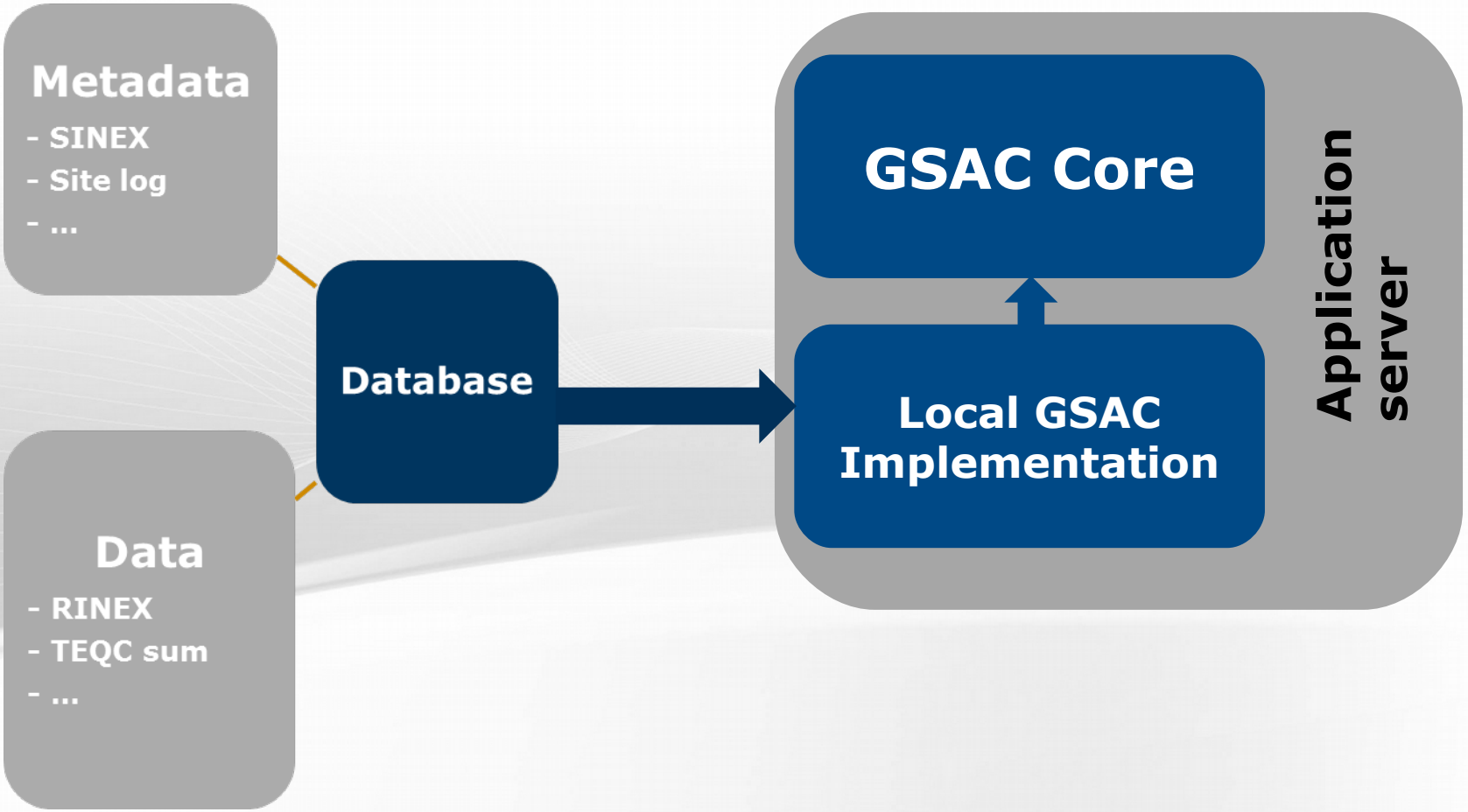
- Why GSAC@ROB ?
- **How GSAC works**
- Stand-alone GSAC
- Federated GSAC
- GSAC for EPN and local/national data center

How GSAC works

- GSAC returns results from a database
  - Database contains meta-data and information on data repository
  - Database need to be filled before
  - Can be based on existing database

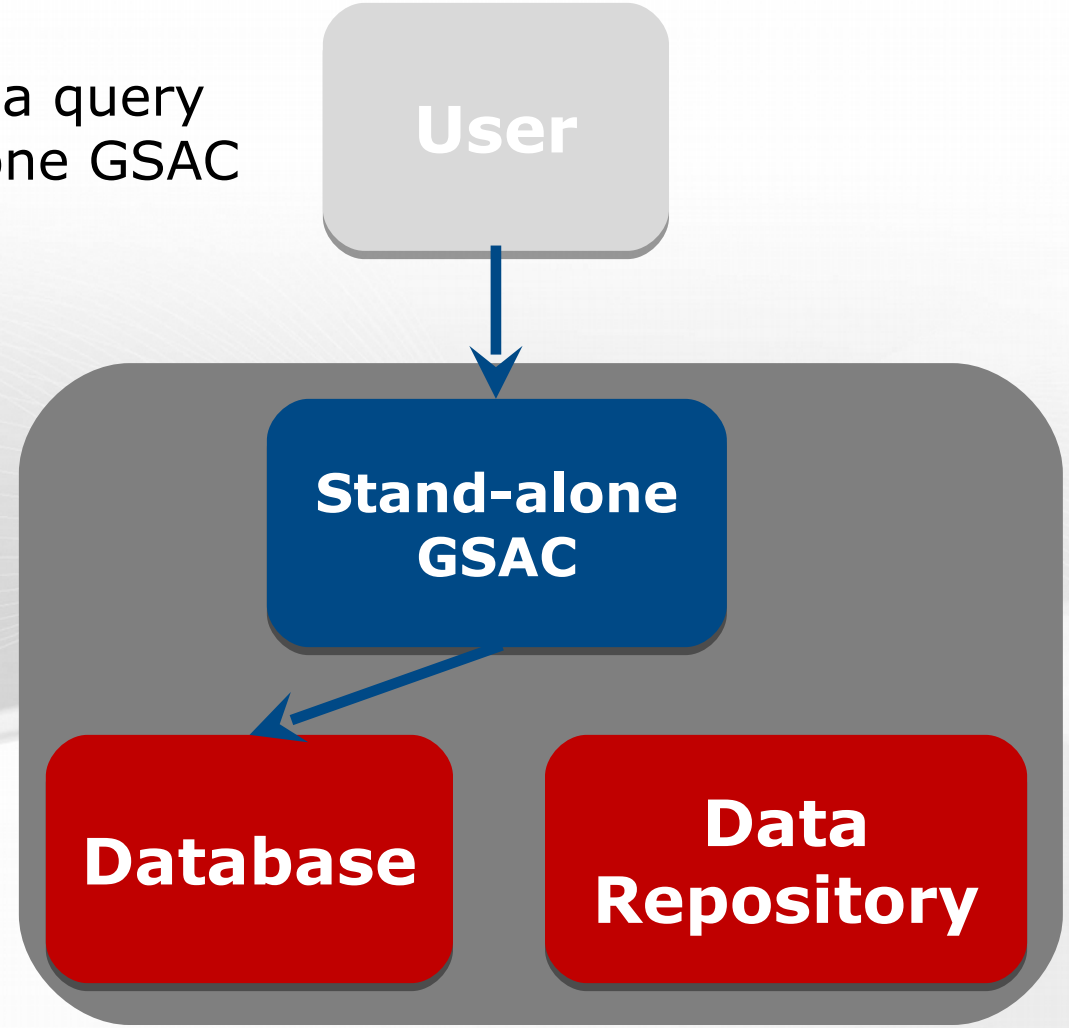
- GSAC package:
  - GSAC Core (JAVA)
  - Prototype local implementation (JAVA)
  - Prototype database (SQL)
  - Python scripts for populating the database
    - From SINEX
    - From IGS Site logs

GSAC Principle



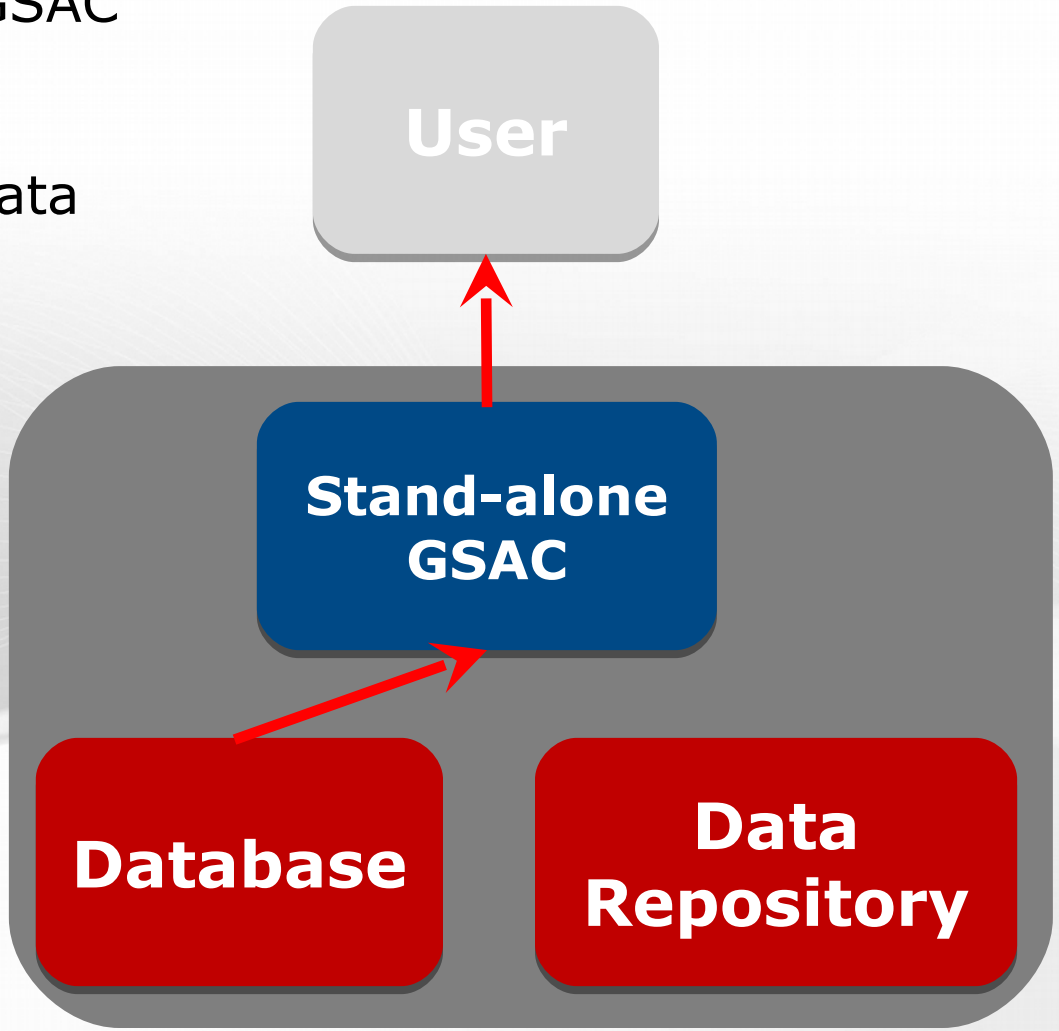
GSAC Principle

User makes a query
on stand-alone GSAC



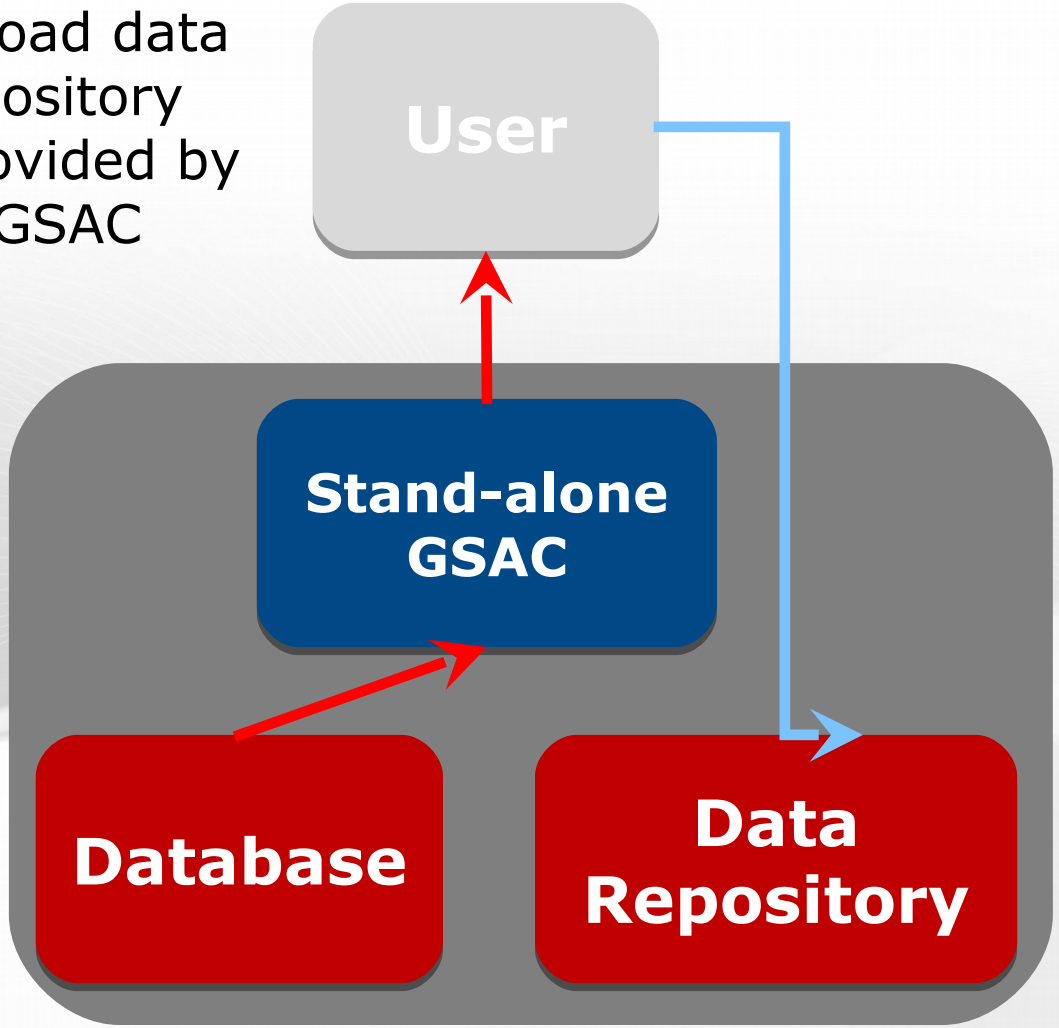
GSAC Principle

Stand-alone GSAC returns
- meta-data
- links to the data repository



GSAC Principle

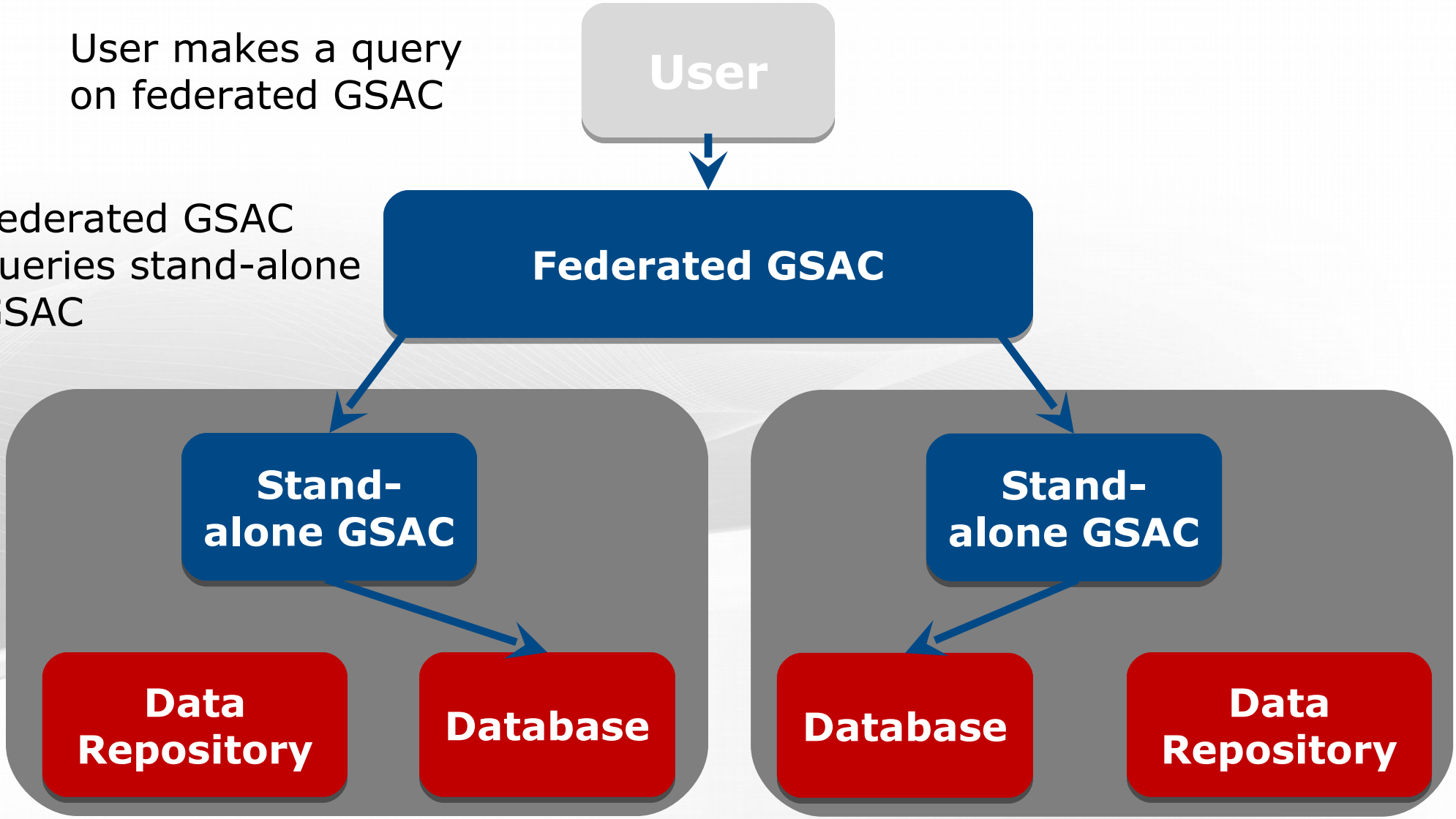
User can download data from data repository with the link provided by stand-alone GSAC



Federated GSAC Principle

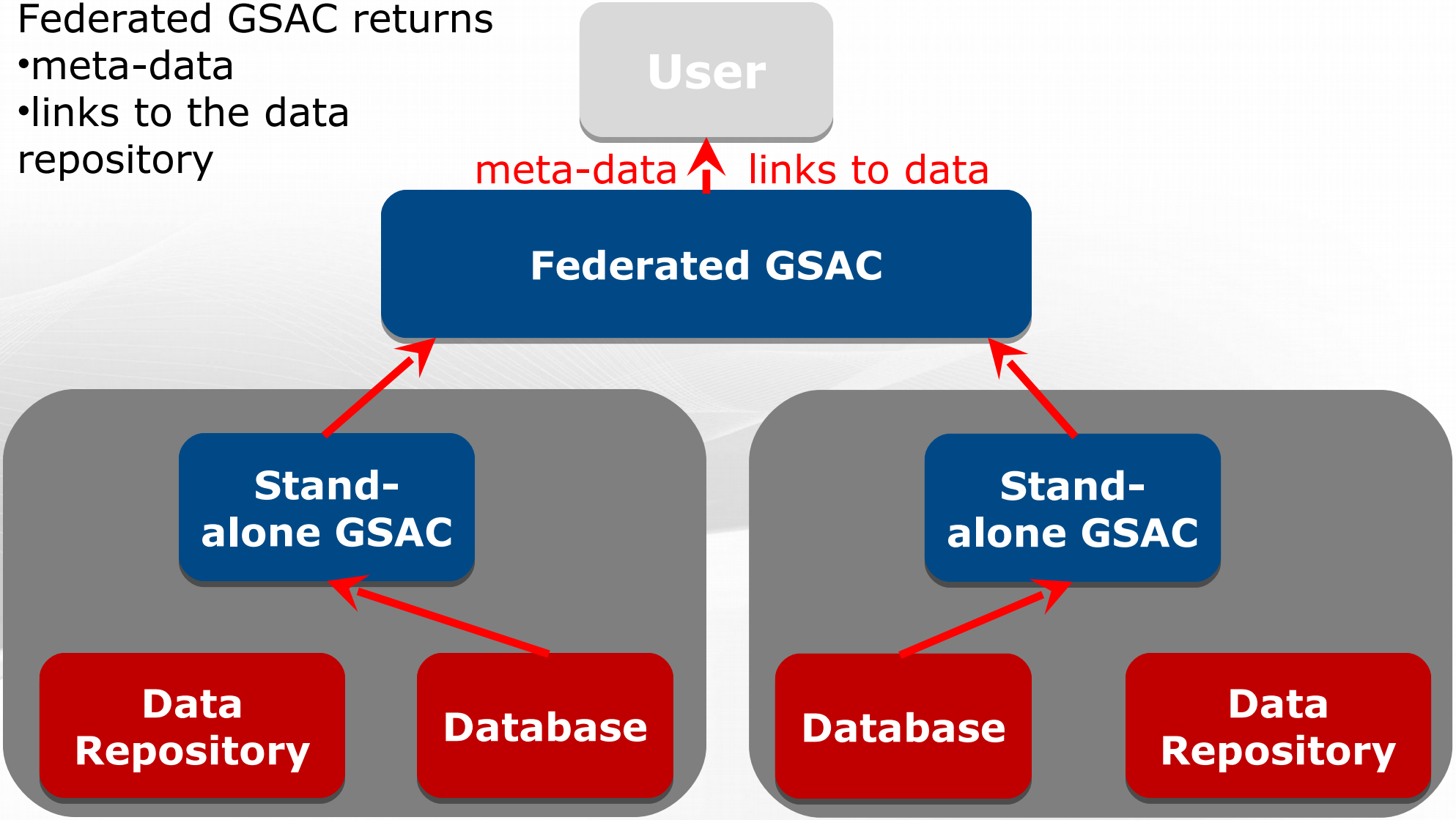
User makes a query on federated GSAC

Federated GSAC queries stand-alone GSAC

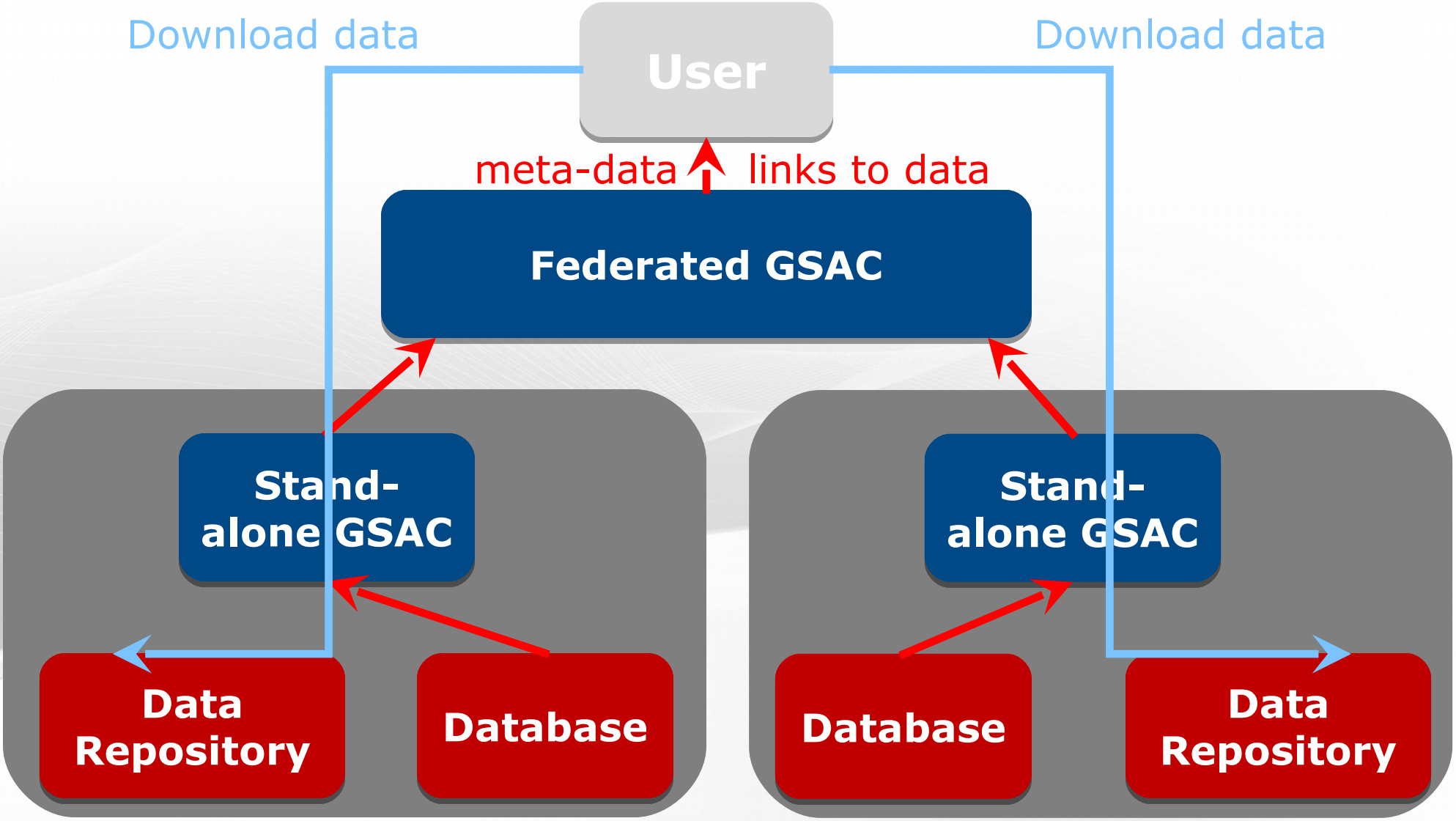


Federated GSAC Principle

Federated GSAC returns
- meta-data
- links to the data repository



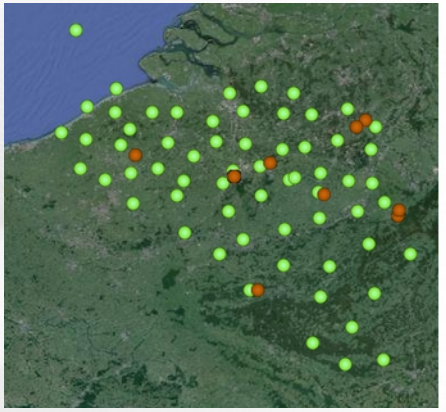
Federated GSAC Principle



GSAC@ROB

- For test purposes: not public
- Install a GSAC Repository for the EPN CB
  - Based on the database maintained for the EPN CB activities

- Install a GSAC Repository for the Belgian network
  - Based on the Belgian GNSS network site logs



- Federate the two stand-alone GSAC repositories

Outline

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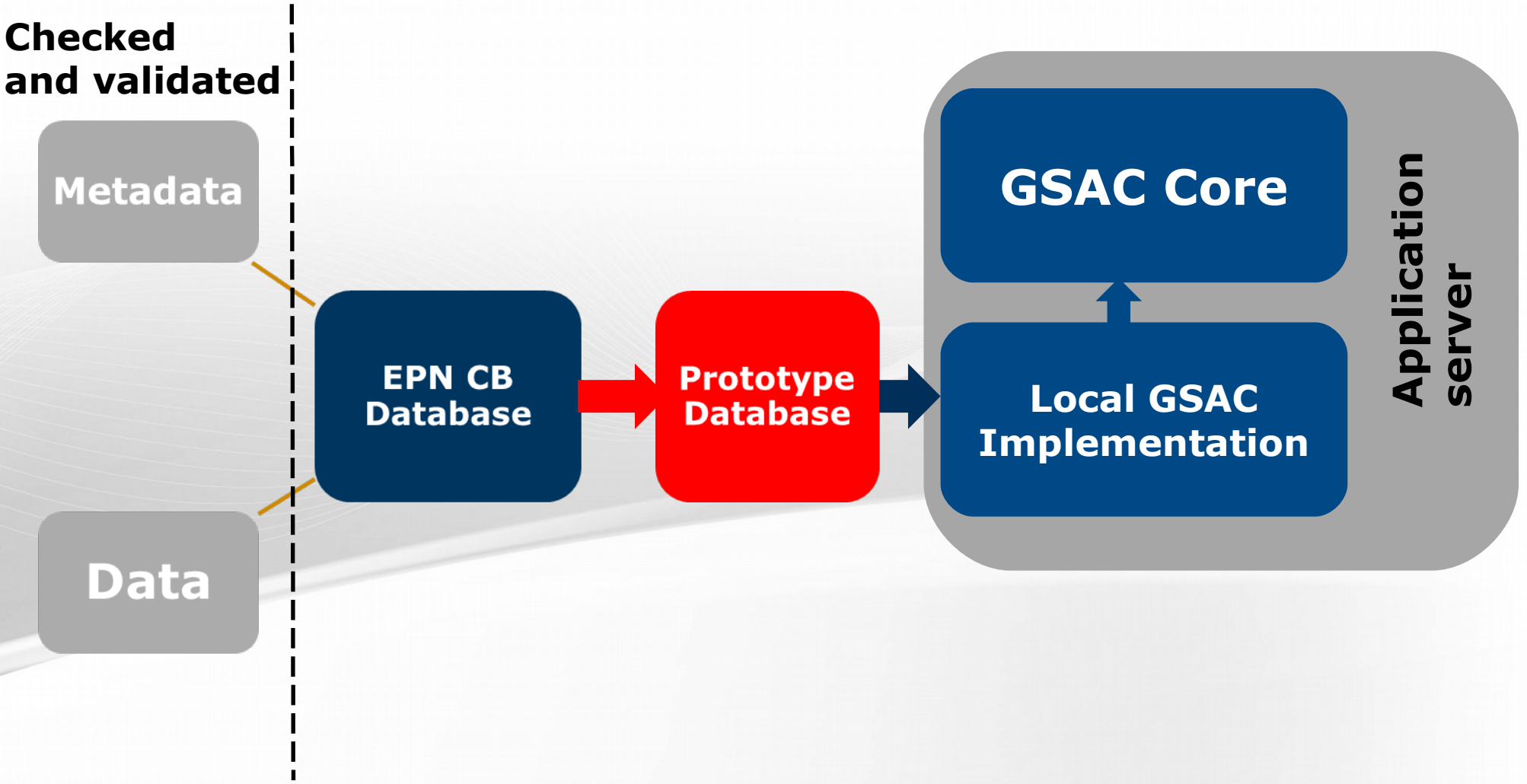
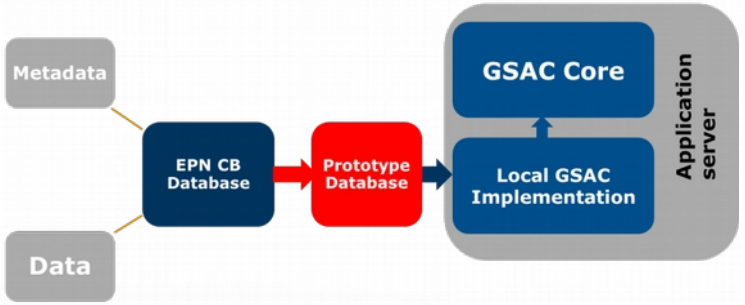
- **Stand-alone GSAC**
- Federated GSAC
- GSAC for EPN and local/national data center

Installation of stand-alone GSAC
For EPN CB



Installation of stand-alone GSAC

For EPN CB



Transfer the EPN CB database information to the prototype GSAC database

Pros	Cons
No JAVA knowledge required	Need MySQL knowledge
Standard GSAC installation with mandatory features	Need to sync the updates of EPN CB DB with GSAC DB
Validation of EPN CB Database not lost by the transfer	

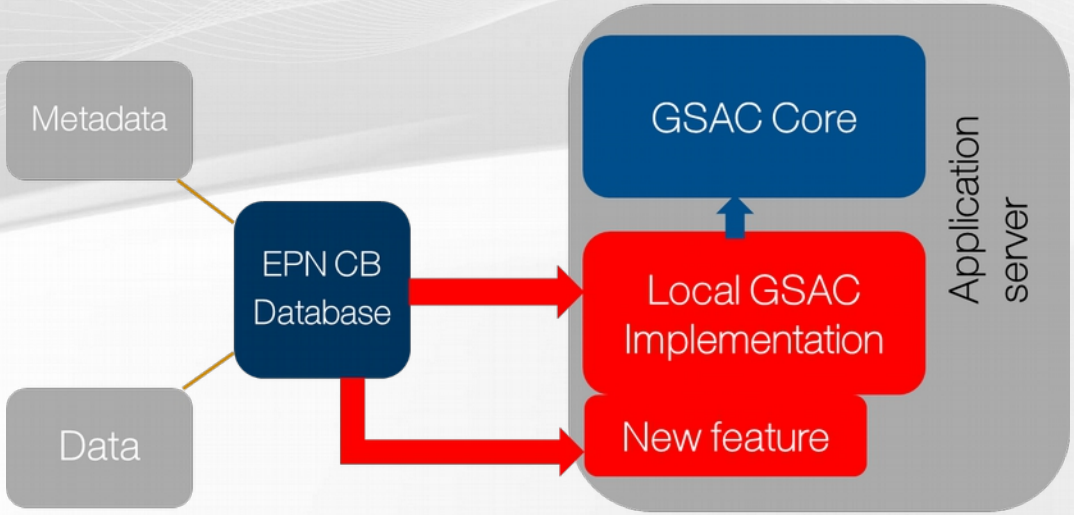
MySQL known (and scripting to make the transfer)

Extend Metadata

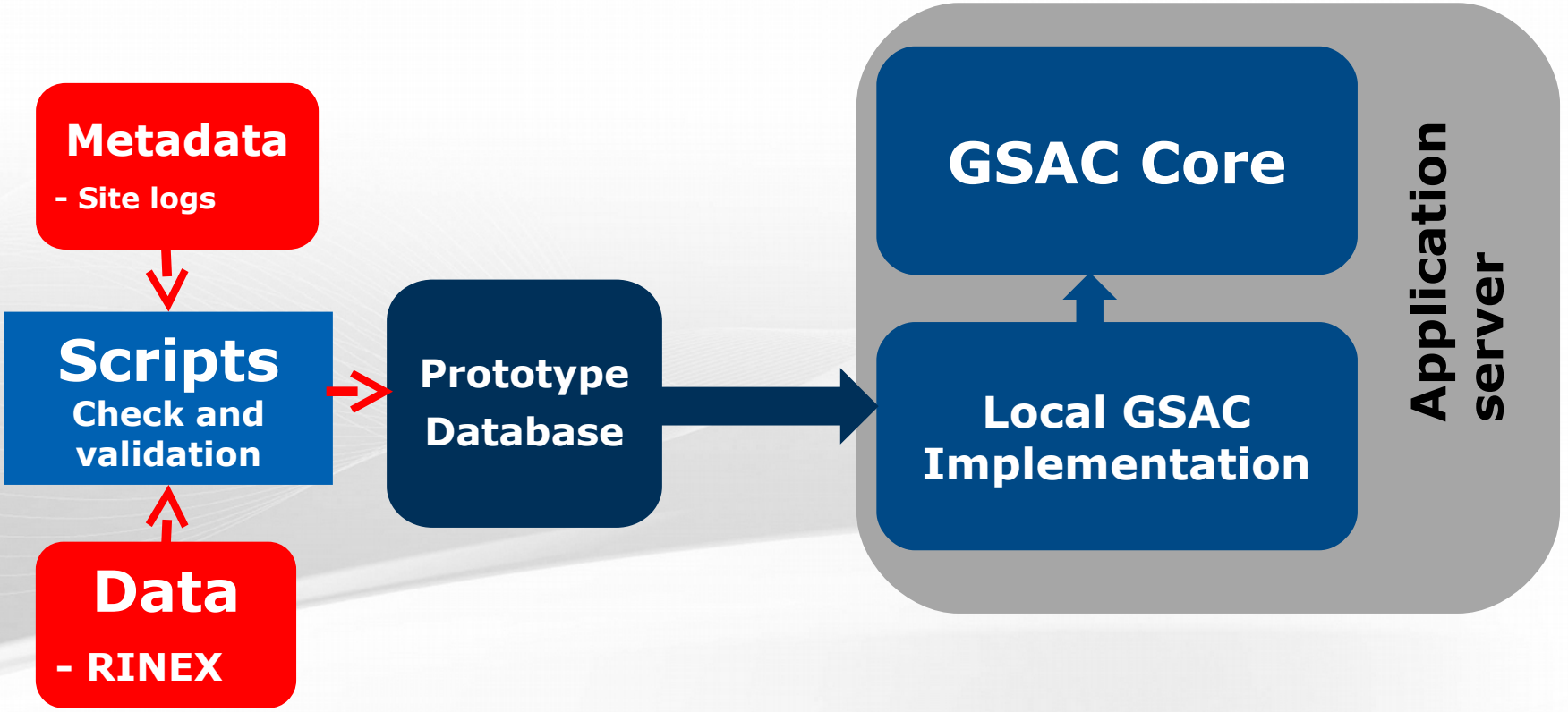
For the "non-prototype" features

- database needs to contain the information
- stand-alone GSAC needs to be extended

E.g.: Search station based on the % of complete observations

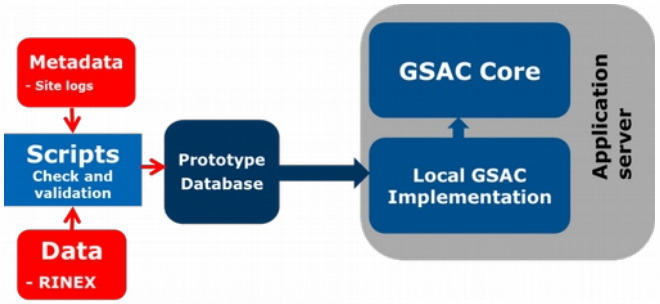


Installation of stand-alone GSAC
For local repository



Installation of stand-alone GSAC

Local repository



Use site logs to populate the GSAC prototype database

Pros	Cons
No JAVA knowledge required	Need to read and store the site log information
Standard GSAC installation with mandatory features	Need to sync when site log changes
	Use of non-checked metadata. Validation must be done before

Outline

- Why GSAC@ROB ?
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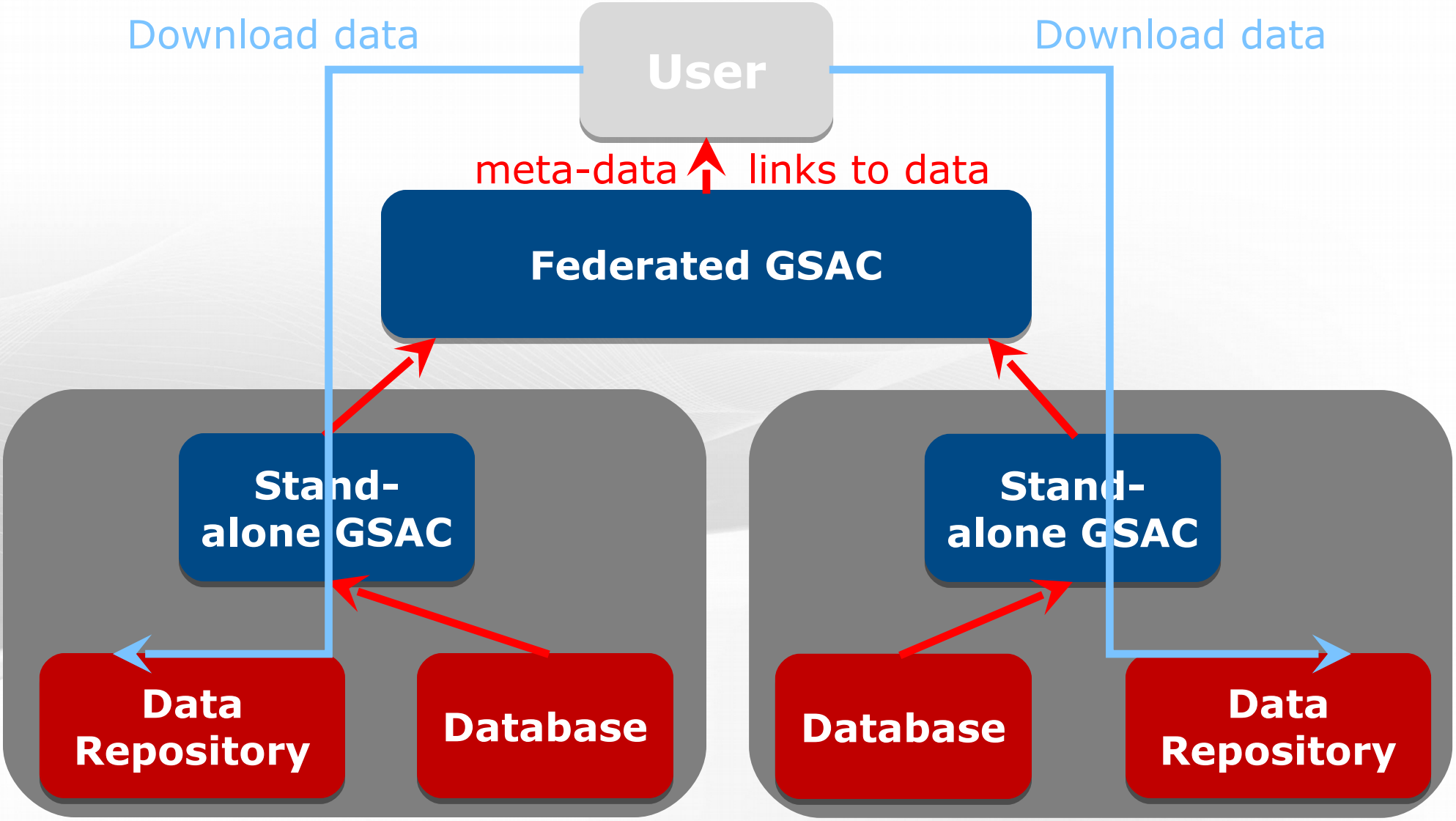
- **Federated GSAC**
- GSAC for EPN and local data center

Federated GSAC

- Easy installation
  - No JAVA knowledge required
  - No MySQL knowledge required

- Up to now, anyone can federate public GSAC
  - Tested on the two stand alone local GSAC repositories

Federated GSAC Principle



Federated GSAC

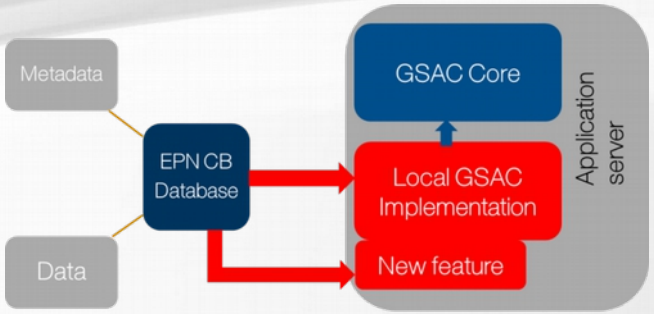
All data and metadata come from stand alone GSAC installations

- Multiple local GSAC sources for same data will be returned twice; user has to choose which one to use

  → Problematic in case of conflicting information at 2 local GSAC

- Content at federated level is solely defined by local GSAC implementation

BUT, "Special features" developed not available if not developed in each local GSAC



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Distribution of GNSS data in EPOS

- EPOS GNSS station provides data AND meta-data
- EPOS local/national data centers
  - Disseminate and preserve data and (validated) meta-data
  - Quality check on the data
- GSAC considered by EPOS as THE standard
  - Extension of GSAC required

Extension of GSAC database

For EPOS, GSAC prototype features are not enough:

- Complete site log information
- QC metrics (not necessarily based on teqc, e.g. ANUBIS, BNC - interface?)
- Data latency (e.g. for near real-time applications)
- Data access information for restricted data

Working Group created to set all the mandatory meta-data to identify GNSS stations and data

→Develop database

→Develop GSAC features to get new info from database

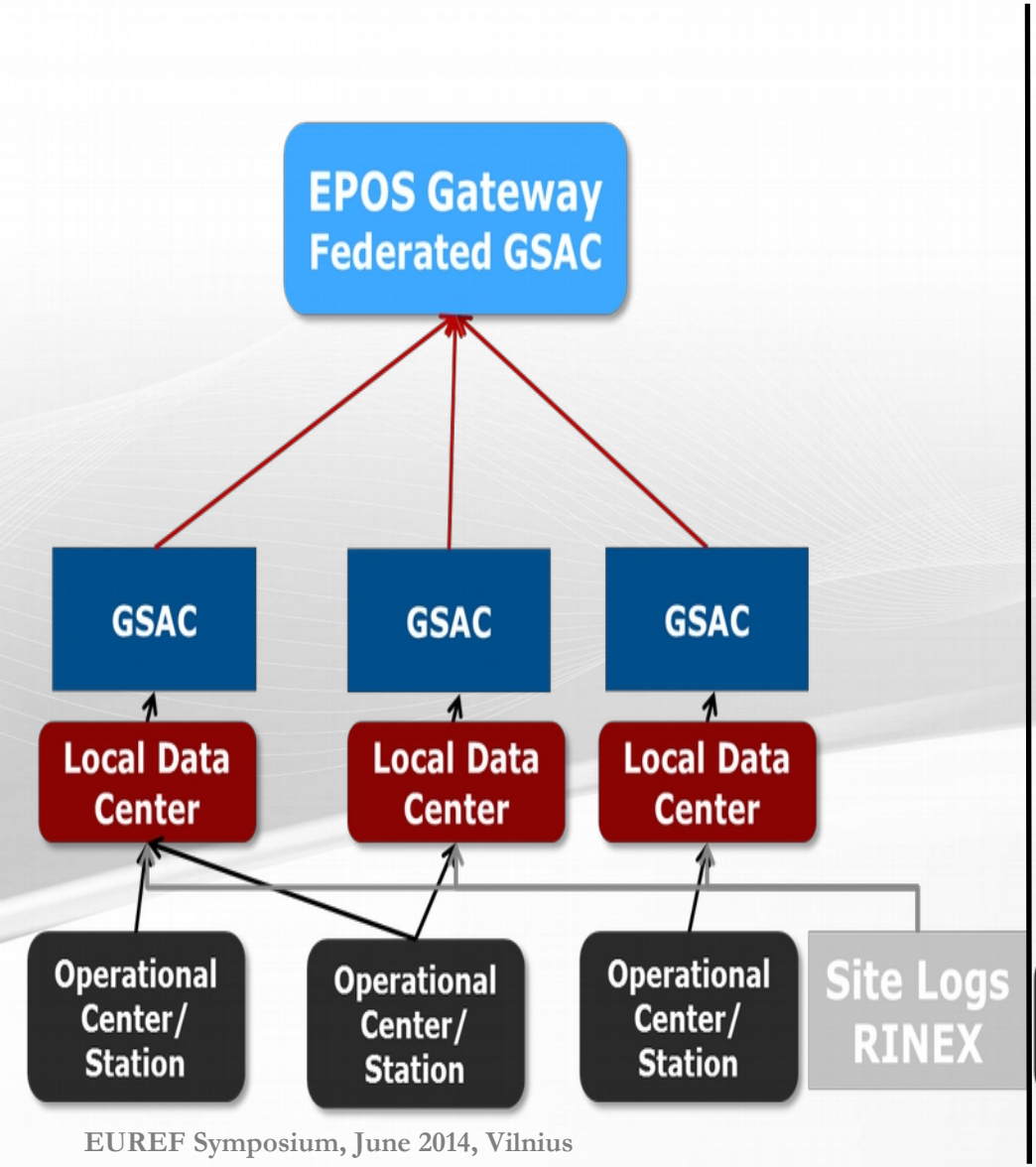
Develoment of additional standard tools

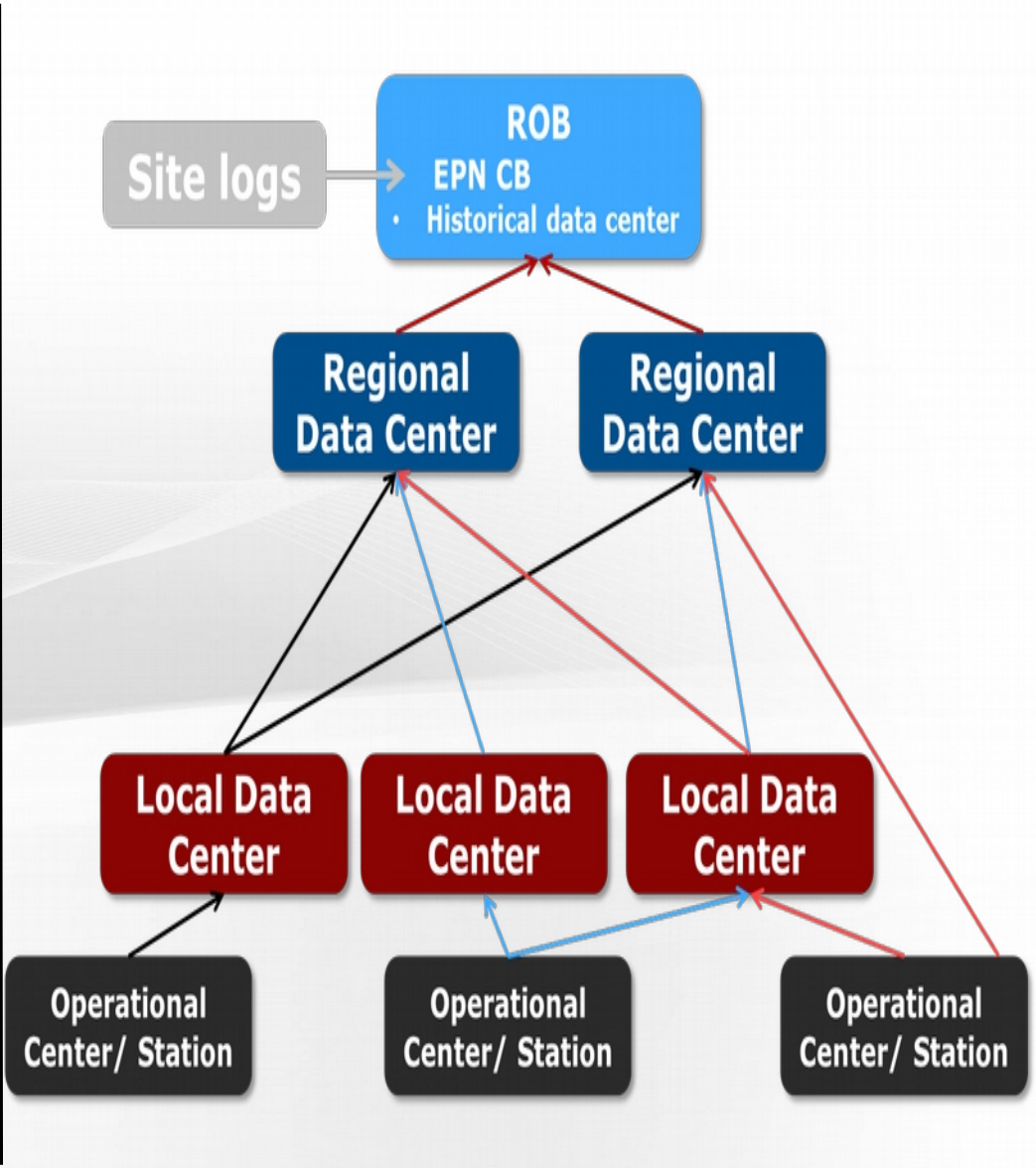
Need for additional standard tools for GSAC data centers

- Check and validate meta-data
- Quality check on data
- Populate GSAC database

EPOS WG4 has a pillar for the development of standard tools

EPOS and EPN data dissemination





Distribution of EPN data to EPOS

EPN local data centers:

-If only EPN data → No need to install GSAC

2 regional EPN data centers *(considered as local data center in EPOS)* will use GSAC to flow EPN data in EPOS

- If EPN data + non-EPN EPOS stations → GSAC + standard tools

Other national/local EPOS data centers:

-GSAC + standard tools (still under development within EPOS !)