

Using the Data Exchange Layer of the Finnish National Architecture for Digital Services for Transporting WFS and WMS Queries

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Introduction

- In 2014 , the Finnish Ministry of Finance has initiated the building of the Finnish National Architecture for Digital Services
 - Aims for creating an infrastructure of interoperable services that makes the data transfer easy between different organizations and services
- It consists of following components:
 - National Data Exchange Layer
 - Service views (Citizen, Company, Public Authority)
 - National e-identification model
 - Role administration and user authorization
- The project studied methods how existing WFS and WMS services can be brought available via the NDEL
- The National Data Exchange Layer uses SOAP in communication, whereas established geospatial standards (such as WFS and WMS) do not

National Data Exchange Layer

- Based on the Estonian X-Road platform
 - Introduced in 2001
 - More than 2000 connected services currently in Estonia
 - Used by over 900 organizations
- Central component: Security Server
 - Established to well-defined server environment
 - Services and information systems are added to the NDEL via Security Servers
 - All messages that are transported in the NDEL go directly between Security Servers
 - Security Server takes also care for encryption, certificate handshaking, message logging, managing user rights, etc

Pilot Implementation

- In the pilot scenario, a family is looking for summer cottages in eastern Finland.
- We created an Application for the iOS platform where summer cottages can be viewed on a map interface together with different map layers
- In addition, a precise positioning ($< 1\text{m}$) that uses a DGNSS-service provided by National Land Survey of Finland was added to the application via an external bluetooth GNSS-receiver



Services used in the pilot

- **WMS Services**

- Lake Water Quality (Finnish Environmental Institute)
- Visible Infrared Imaging Radiometer Suite (VIIRS) satellite images (Finnish Meteorological Institute)
- Topographic Basemap (NLS-FI)
- Forest Berry Crop (National Resources Institute Finland)

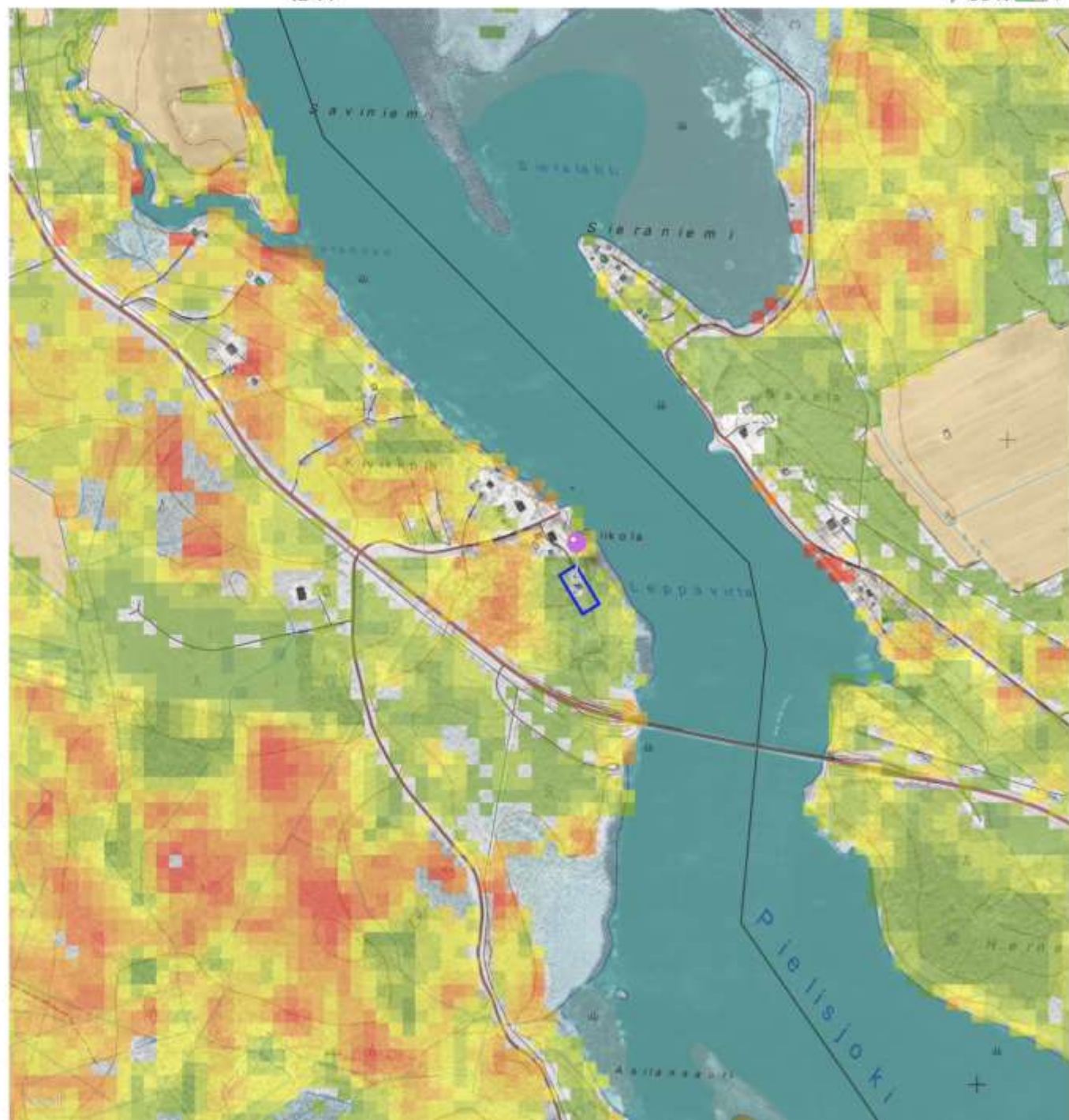
- **WFS Services**

- Average temperatures (Finnish Meteorological Institute)
- Land property information (NLS-FI)
- Soil information (Geological Survey of Finland)

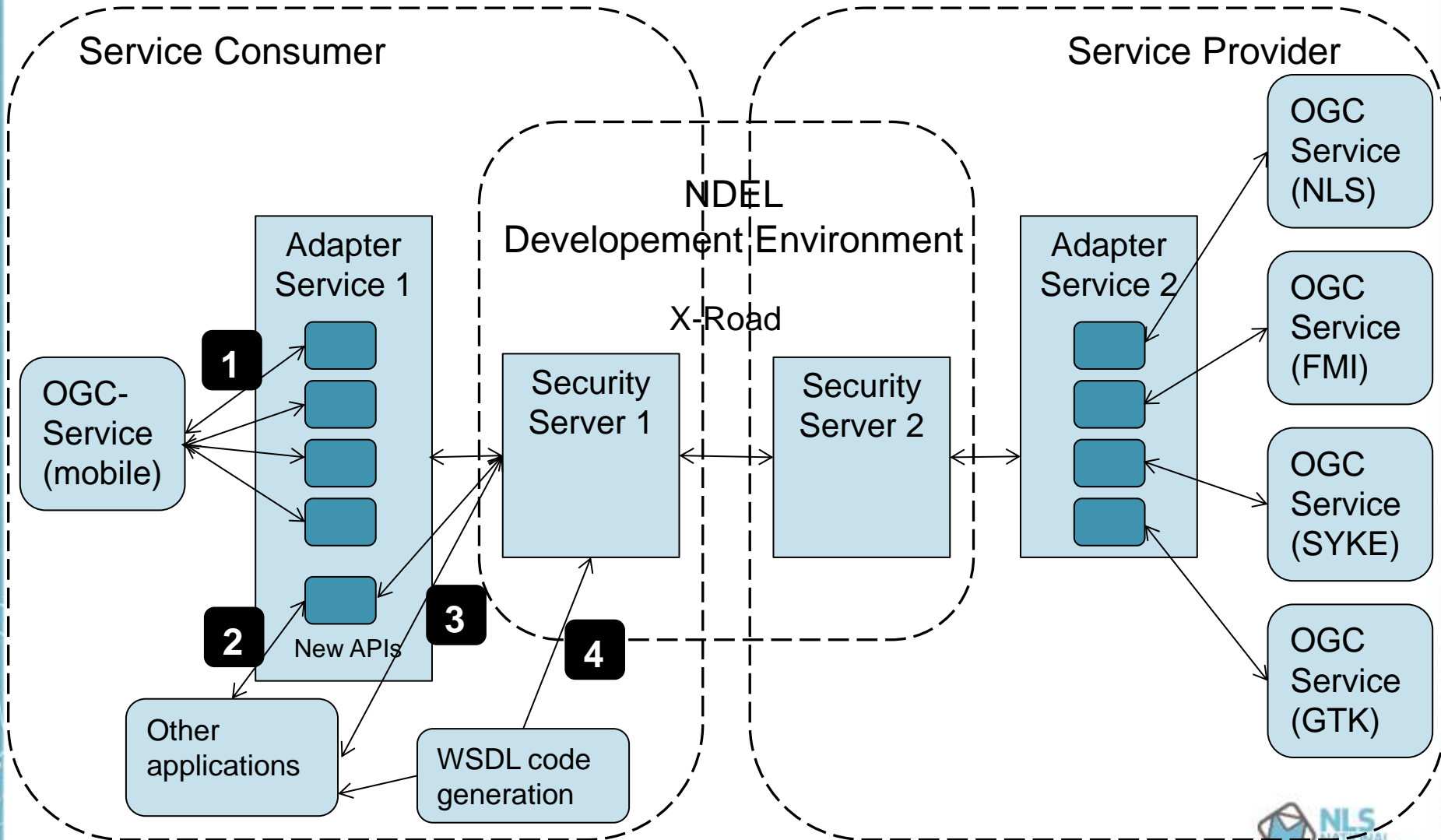
- Pohjakartta
- Sää
- Ilmasto
- Maaperä
- Veden laatu
- Marjasato
- Rajapyykit

Väylä Info

- 28 m2, 4 makuupaikkaa, sauna
- 30 m2, 2 makuupaikkaa
- 45 m2, 3 makuupaikkaa
- 20 m2, 2 makuupaikkaa, sauna
- 89 m2, 6 makuupaikkaa, sauna, vene
- 29 m2, 4 makuupaikkaa
- 64 m2, 5 makuupaikkaa



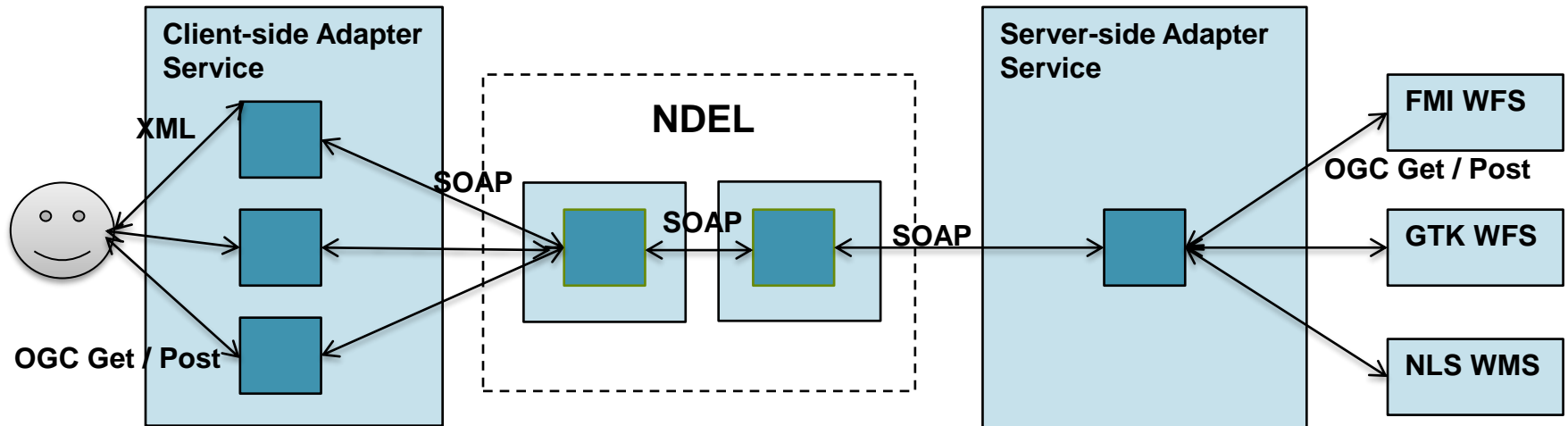
Architecture of the pilot



Adapter Services

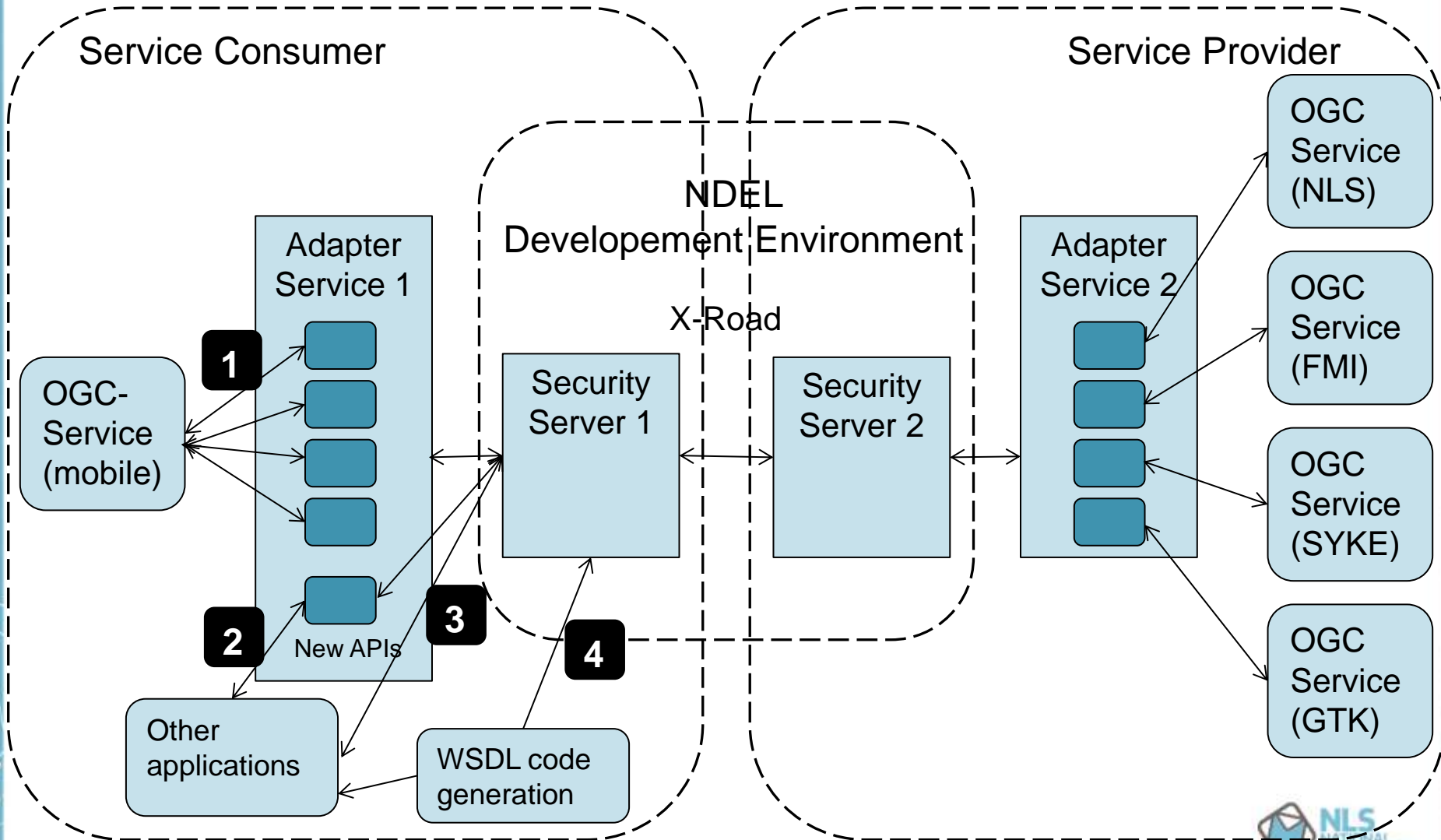
- The adapter services provide a means for connecting the existing OGC services to the NDEL without a need for changing them
- Adapter services must be able to send and receive SOAP-messages that are used in the X-Road platform
 - They must transform the messages in two directions:
 - From the OGC services' native forms to SOAP
 - From SOAP to OGC services' native forms
- The Services that are published via the X-Road must also have WSDL service descriptions
- In order to bring the WFS and WMS services available via the X-Road platform, we created two Adapter Services, one to the service consumer side and the other to the service provider side that transform the messages between the OGC forms and SOAP
- The adapter services are based on the open-source Java-based xrd4j library
 - <https://github.com/petkivim/xrd4j>
 - <https://github.com/petkivim/x-road-adapter-example>

OGC Queries in the NDEL



1. User sends OGC GET / POST queries to that client-side adapter service where they are transformed into SOAP form
2. The SOAP queries are send to the security server
3. Based on the SOAP message header information, the NDEL routes the queries to the other security server that contains the requested service
4. The SOAP queries are sent to the server-side adapter service where they are transformed back to OGC forms
5. The OGC queries are sent to the background services . Their responses are transformed into SOAP and sent back to the client-side adapter service
6. In the client-side adapter service, the SOAP framing is removed and the results are returned to the user

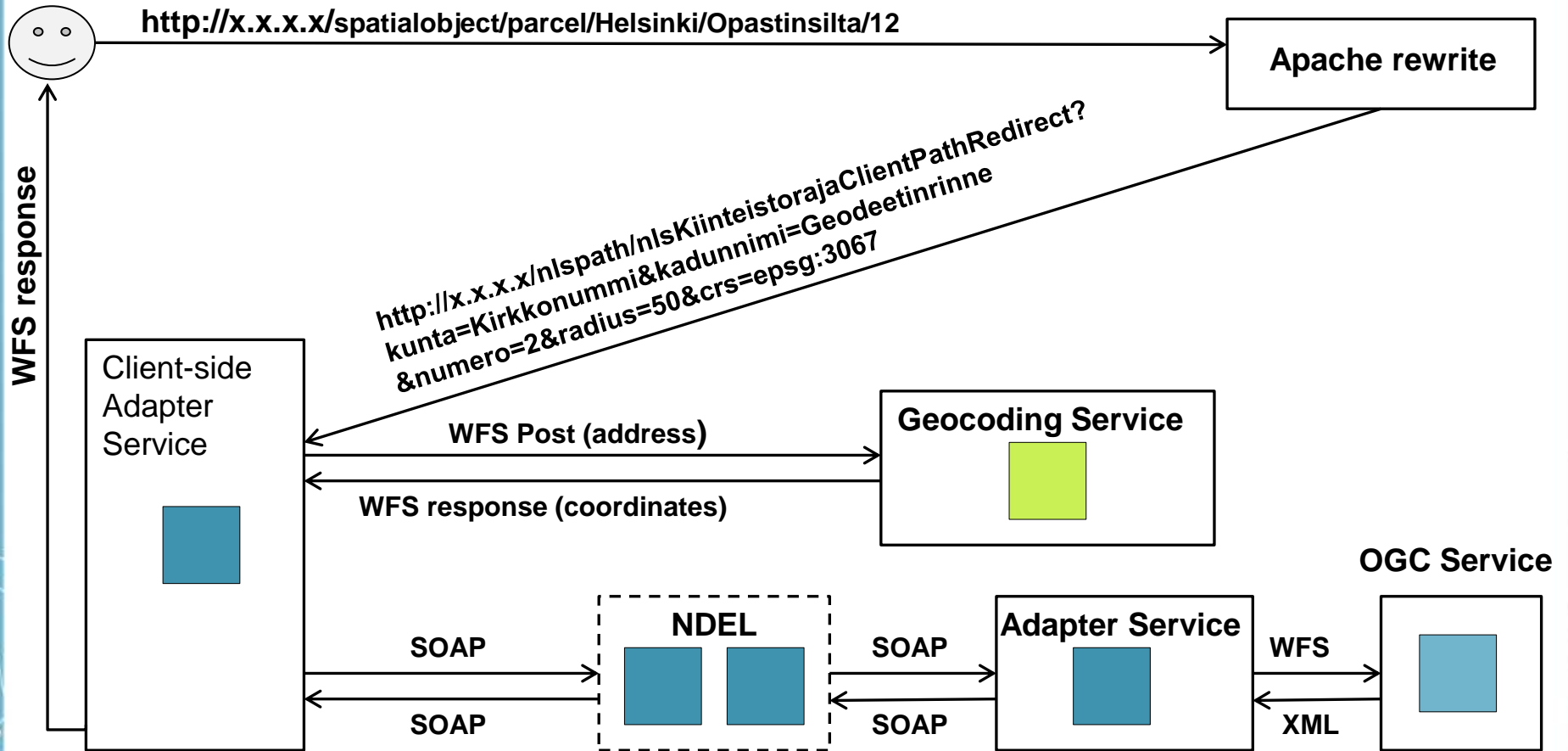
Architecture of the pilot



New APIs

- When client-side adapter services are built, they don't necessarily have to provide an API to the users in the OGC form
- We created new APIs for WFS and WMS services that are defined as URI paths
 - Simplifies WMS and WFS queries
 - Brings built-in geocoding to the queries
- Example
 - WFS
 - [http://\[domain\]/spatialobject/parcel/Helsinki/Opastinsilta/12](http://[domain]/spatialobject/parcel/Helsinki/Opastinsilta/12)
 - WMS
 - [http://\[domain\]/map/basemap/Helsinki/Opastinsilta/12](http://[domain]/map/basemap/Helsinki/Opastinsilta/12)

New APIs



Conclusions

- WMS and WFS services can be brought to the Finnish NDEL through the use of adapter services without making any changes to the OGC services
- The NDEL provides a secure way to change information over the internet together with comprehensive message logging capabilities
- The use of adapter services degrades the service performance in comparison to using directly the OGC services
 - ~ 1.3 x slower for WFS
 - ~ 1.6 x slower for WMS
- The connecting of WMS services to the NDEL is justifiable only on some occasions
- WFS services are more suitable to be connected to the NDEL

Thank you!

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