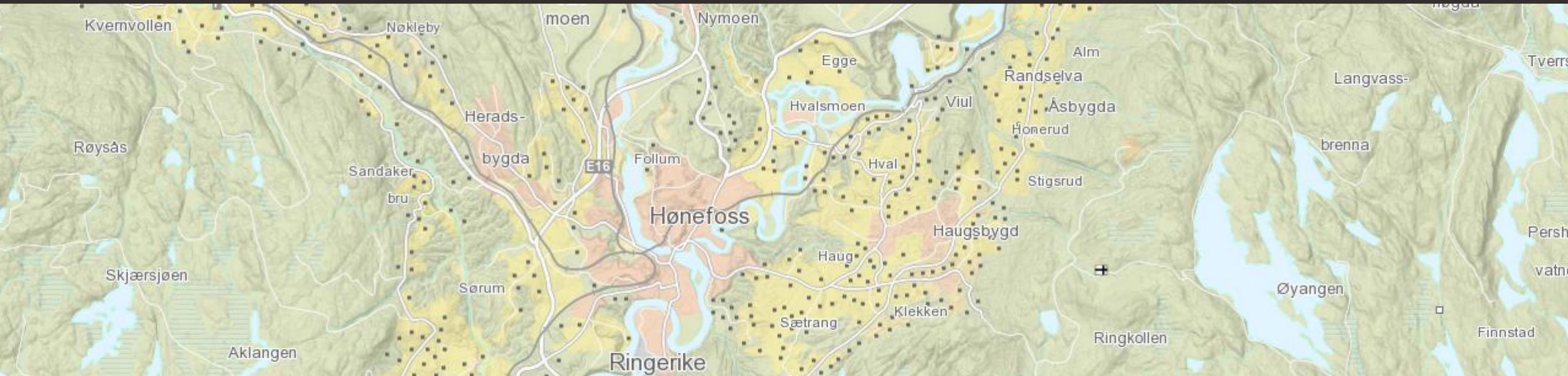
KARTVERKET

GEODATA SERVICE INFRASTRUCTURE

Tom Ellett von Brasch



CONTENTS

1. SERVICE PHILOSOPHY
2. TECHNOLOGY
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4. MANAGEMENT
5. TO INFINITY AND BEYOND

SERVICES
@
KARTVERKET

SERVICE PHILOSOPHY

AUTHORITATIVE

FRESH DATA

STABLE

FAST

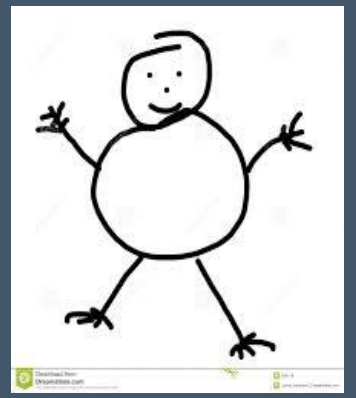
SERVICE PHILOSOPHY

‘ Kartverket’s most critical priority is to ensure its authoritative data is being used as widely as possible, across domains and throughout all technological levels ’

SERVICE PHILOSOPHY

GIS PROFESSIONAL

WEB DEVELOPER



THE PUBLIC USER

OUR USERS

SERVICE PHILOSOPHY

OPEN STANDARDS FROM OGC

WMS	WFS	WMTS
CSW	WCS	WPS…

OPEN SOURCE SOFTWARE

MapServer open source web mapping

Apache

deegree

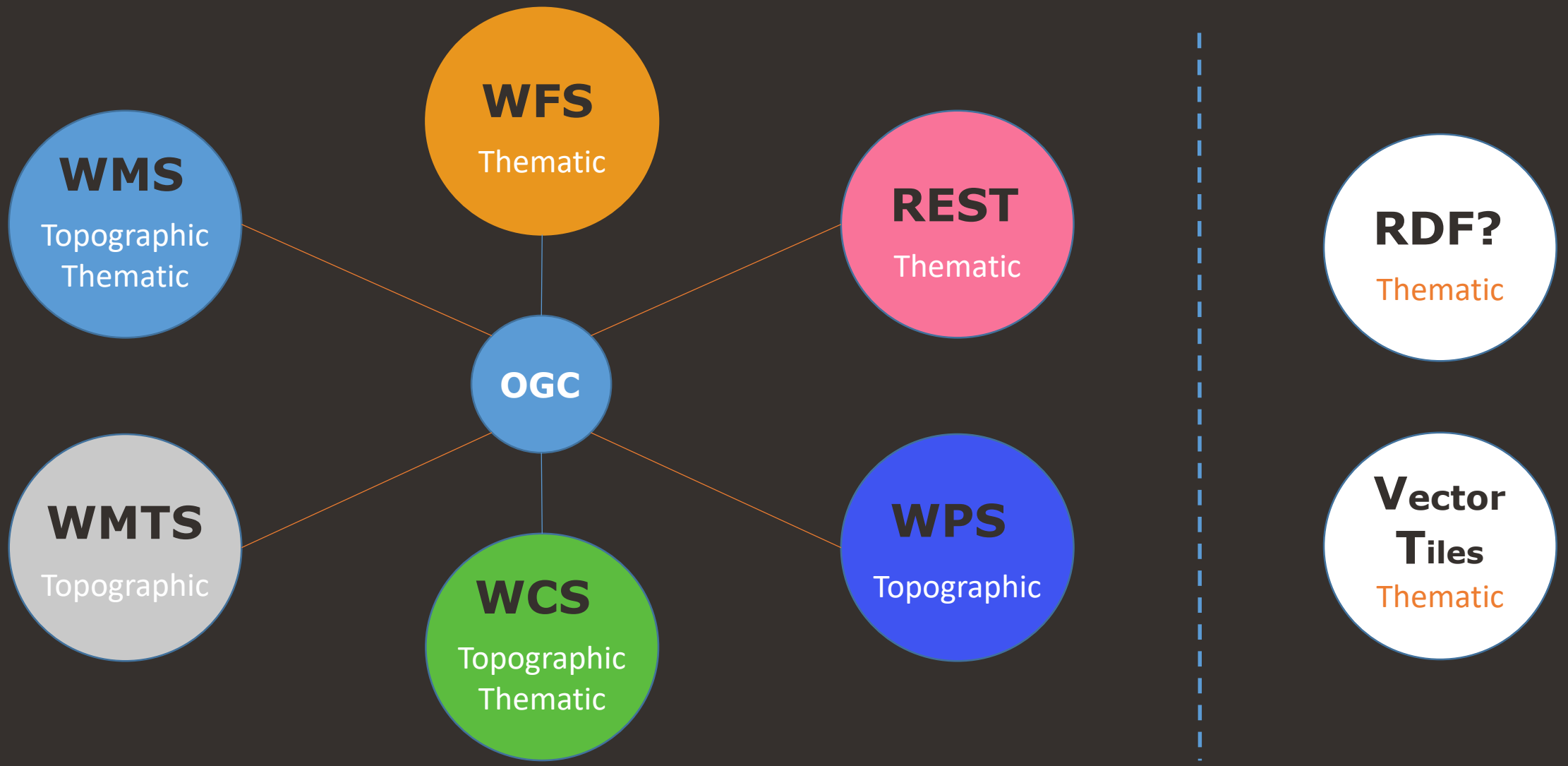
Linux

PostGIS Spatial PostgreSQL

GeoServer

LOOSELY COUPLED SERVICE ORIENTATED ARCHITECTURE

WHAT DO WE ACTUALLY PROVIDE?



STATISTICS

NO. OF SERVICES		DAILY TRAFFIC
WMS services	55	450,000
WMTS services	21	20,000,000
WFS services	20	45,000
WCS services	1	4,000
WPS services	1	1,000
Web services	12	25,000

RANDOM

INTERNATIONAL PROJECTS - 3

HIGHEST TRAFFIC – 27,000/sec

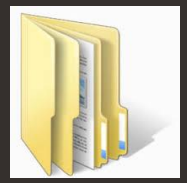
NUMBER OF TILES AT ZOOM LEVEL 18 – 105, 000, 000

NUMBER OF SERVICES END OF 2017 - > 250

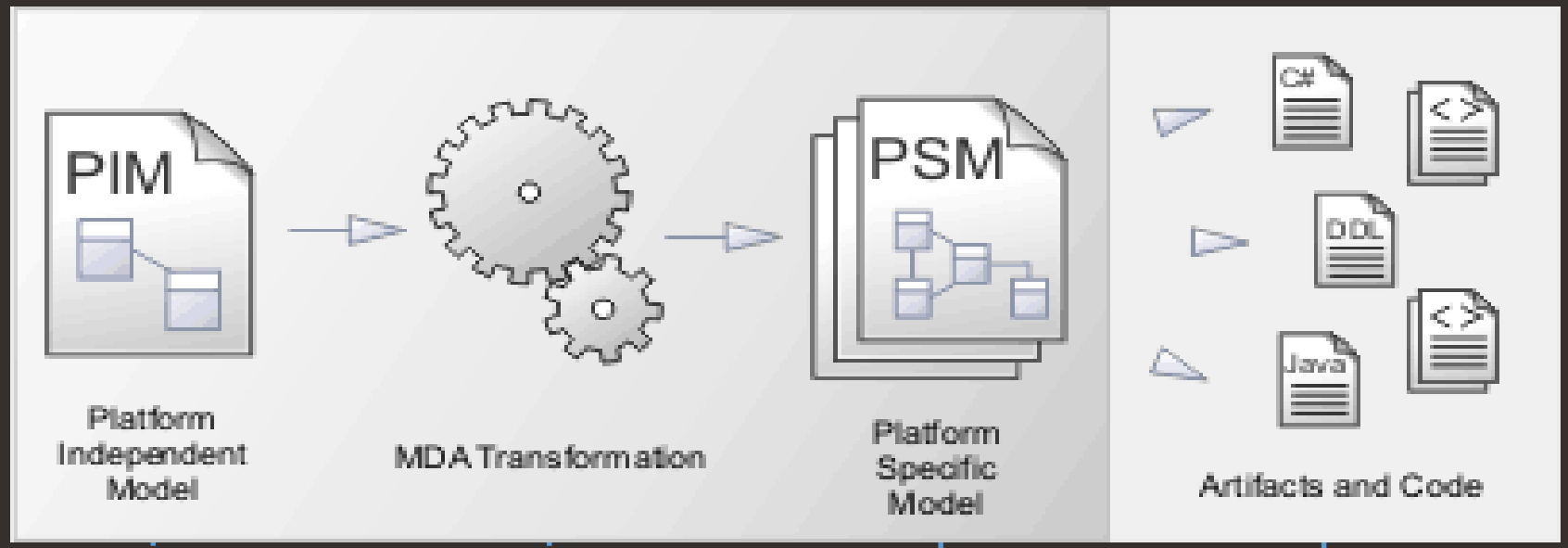
INFRASTRUCTURE AND TECHNOLOGY

INFRASTRUCTURE OVERVIEW

SOURCE → ExtractTransformLoad → DISTRIBUTION → SERVICE → APPLICATION



MODEL DRIVEN ARCHITECTURE



UNIFIED MODELING LANGUAGE

arkitektum

GISTOOLS

PostGIS
Spatial PostgreSQL

WFS

<GML>

INFRASTRUCTURE DETAIL

SOURCE → ExtractTransformLoad

SOURCE

MDA

GISTOOLS → PostGIS Spatial PostgreSQL ← FME

DISTRIBUTION

GDAL → PostGIS Spatial PostgreSQL

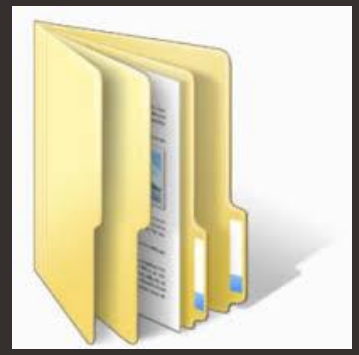
INSPIRE

GDAL → PostGIS Spatial Postgr...

ETL

INFRASTRUCTURE DETAIL

DISTRIBUTION



Get pic of pgadmin with mat views – nrl?

VECTOR **RASTER** **CACHE**

INFRASTRUCTURE DETAIL

SERVICE

WMTS

1.3

WMS & WCS

6.6

WFS

3.2

WPS

3.1

INFRASTRUCTURE DETAIL

APPLICATION

flexible comprehensive
heavyish complex

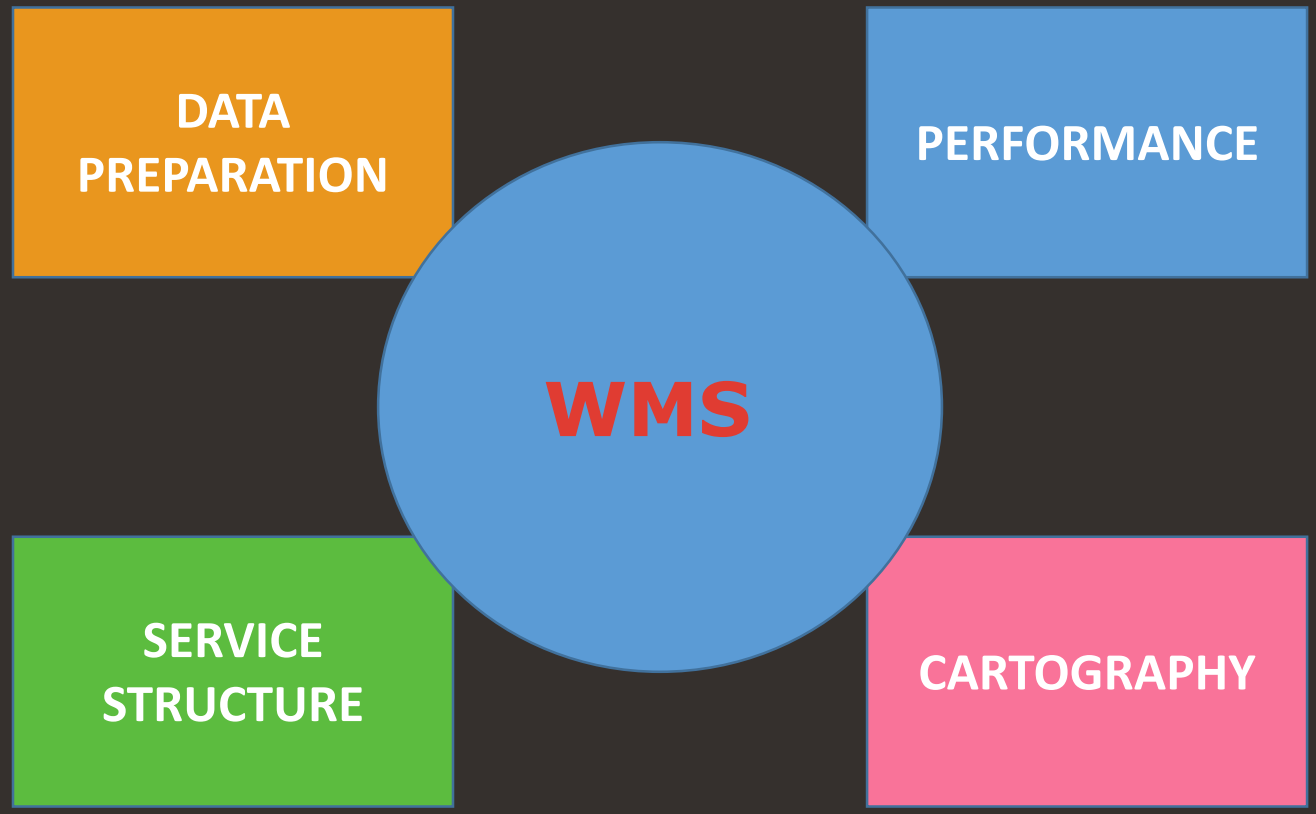
COMPLEX

simple lightweight
3857 only No 3D

SIMPLE

SERVICE CREATION

SERVICE CREATION



SERVICE CREATION

FLATTEN DATA MODEL

OVERVIEWS
&
TILEINDEX's

ALTER ATTRIBUTES

DATA
PREPARATION

INDEX's

SERVICE CREATION

ID	Name	Title	Abstract
0	Tur- og friluftsruter WMS	Tur- og friluftsruter WMS	Tjenesten viser tur- og friluftsruter.
1	Ruter	Ruter	
2	Ruteinfopunkt	Ruteinfopunkt	Viser Rute informasjon punkt i Norge
4	AnnenRute	AnnenRute	Viser andre ruter i Norge
6	Sykkelrute	Sykkelrute	Viser sykkelruter i Norge
8	Skiloype	Skiløype	Viser skiløyper i Norge
10	Fotrute	Fotrute	Viser fotruter i Norge
12	Fotrutetype	Fotrutetype	
27	Gradering	Gradering	
28	Fotrute_gradering	Fotrute Gradering	
41	Skiloype_gradering	Skiløype Gradering	
42	Skiloype_gradering_ikke_angitt	Skiløype gradering ikke angitt	Skiløype gradering ikke angitt
44	Skiloype_ingen_gradering	Skiløype ingen gradering	Skiløype gradering ikke bestemt
46	Enkel_skiloype	Enkel skiløype	Skiløype gradering enkel, for nybegynnere
48	Middels_skiloype	Middels skiløype	Skiløype gradering middels, for nybegynnere
50	Krevende_skiloype	Krevende skiløype	Skiløype gradering krevende, for erfarne fjellfolk
52	Ekspert_skiloype	Ekspert skiløype	Skiløype gradering ekspert, for erfarne fjellfolk
54	Sykkel_gradering	Sykkel Gradering	
67	Annen_gradering	Annen Gradering	

SERVICE STRUCTURE

SERVICE CREATION

```
CLASS
  NAME "Oslo Bydeler navn"
  MAXSCALE 150000

  LABEL
    #WIDTH 2
    ANTIALIAS true
    FONT "verdana"
    ENCODING "UTF-8"
    TYPE truetype
    COLOR 152 5 20
    SIZE 8
    OUTLINECOLOR 255 255 254
    OFFSET 0 0
    POSITION cc
    #MINDISTANCE 700
    PARTIALS false
    FORCE TRUE
    MINFEATURESIZE 10
  END

END
END
```

```
CLASS
  NAME "Oslo Bydeler"
  MAXSCALE 150000
  STYLE
    OPACITY 60
    SYMBOL 'circle'
    SIZE 4
    OUTLINECOLOR 255 255 255
  END
  STYLE
    OPACITY 60
    #SYMBOL 'circle'
    SIZE 1
    OUTLINECOLOR 120 120 120
  END
END
END
```

```
CLASS
  NAME "Skytebane"
  EXPRESSION "Skytebaneinnretning"
  MAXSCALE 25000
  STYLE
    GEOMTRANSFORM start
    SYMBOL "Strek"
    GAP -10
    ANGLE AUTO
    SIZE 9
    WIDTH 1
    COLOR 1 1 1
  END
  STYLE
    SIZE 1
    WIDTH 1
    COLOR 1 1 1
  END
  STYLE
    GEOMTRANSFORM "end"
    SYMBOL "Skytebane"
    GAP -20
    ANGLE AUTO
    SIZE 11
    WIDTH 11
    COLOR 1 1 1
  END
  STYLE
    WIDTH 1
    COLOR 1 1 1
  END
END
```

CARTOGRAPHY

NORGESKART.NO

SERVICE CREATION

FILTERS

INDEX’s

SCALING

SCALES

DATA MANIPULATION

PERFORMANCE

EXAMPLE – TOPO3

DATA

5 seperate data sets

MAPFILE

Mapfile is over 10,000 lines long

OGC

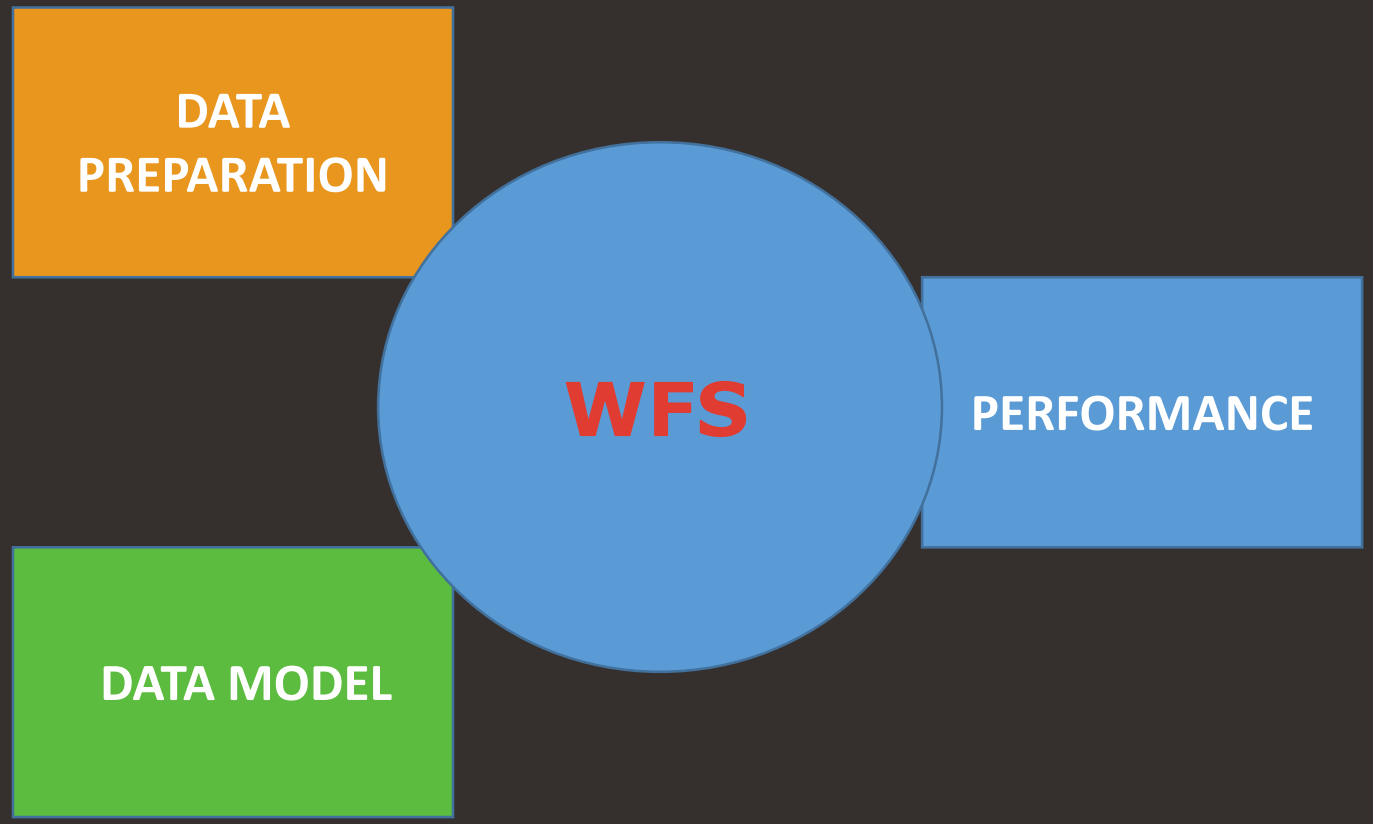
TILES

140,000,000 for full cache

SYMBOLS

80,000 wms calls a day

SERVICE CREATION



WFS SERVICE CREATION

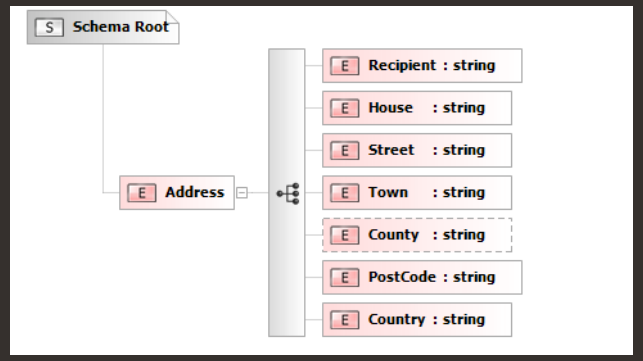
- OPTION 1:
Database setup according to data model

- OPTION 2:
Data is transformed to model after import

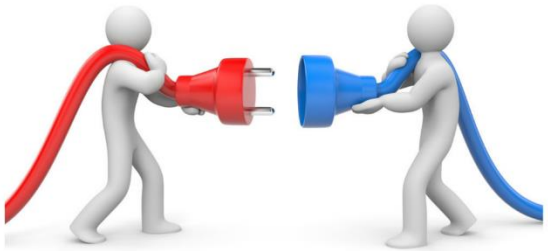
DATA PREPARATION

WFS SERVICE CREATION

UNIFIED MODELING LANGUAGE™



WFS



THE POWER *Of Connections*

DB

DATA MODEL

WFS SERVICE CREATION

RESPONSE TIME

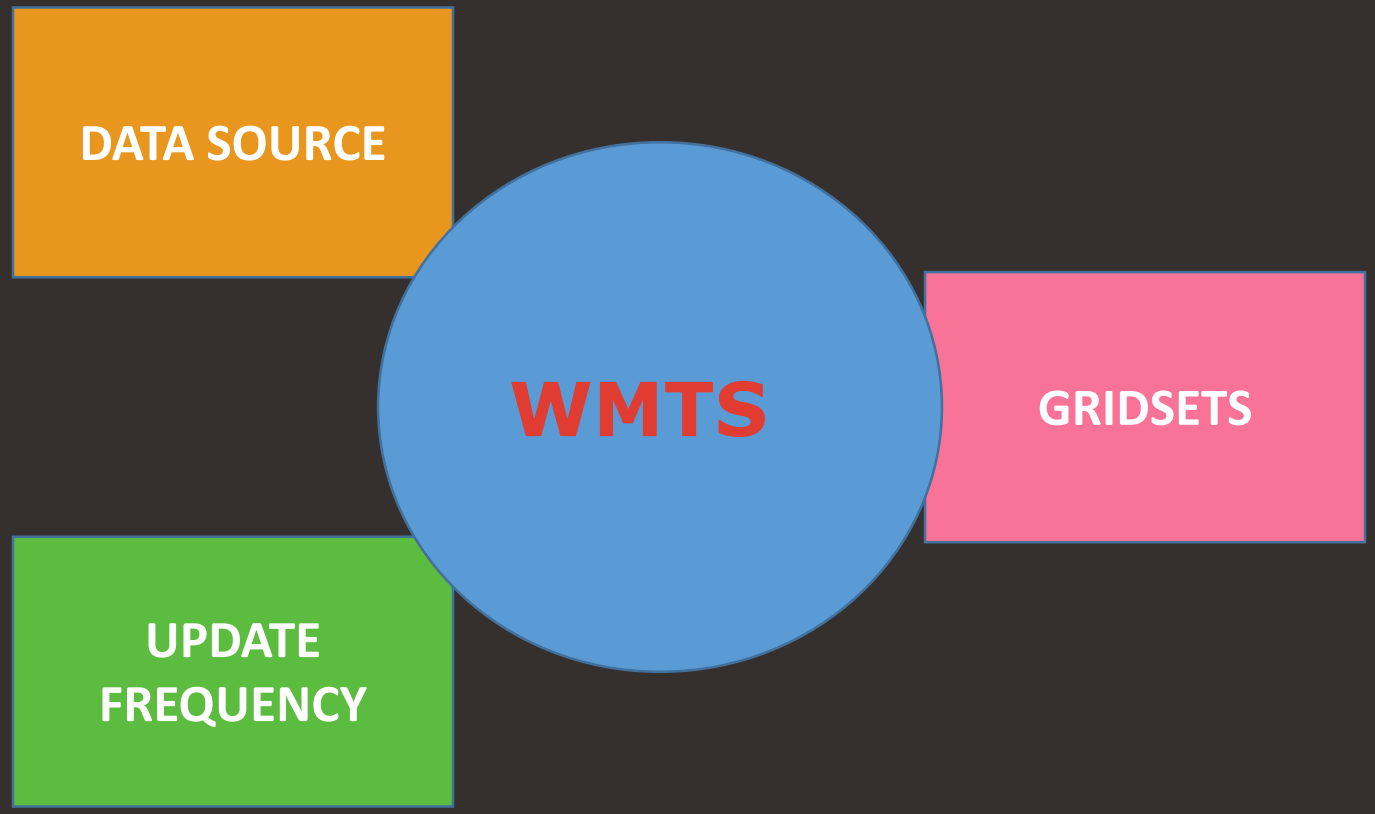
AVAILABILITY

CAPACITY

PERFORMANCE

LARGE DATASETS

SERVICE CREATION



SERVICE CREATION

PERFORMANCE

LAYERS

TRANSPARENCY

DATA SOURCE

INCREMENTAL

VECTOR OR RASTER

DATA SIZE

UPDATE FREQUENCY

SERVICE CREATION

```
<grid name="utm33n">
    <metadata>
        <title>utm33</title>
    </metadata>
    <!--need to look at the grid definitions, this is way too big-->
    <extent>-2500000.00 3500000.00 3045984.00 9045984.00</extent>
    <srs>EPSG:25833</srs>
    <srsalias>EPSG:32633</srsalias>
    <origin>top-left</origin>
    <units>m</units>
    <size>256 256</size>
    <resolutions>21664,10832,5416,2708,1354,677,338.5,169.25,84.625,42.3125,21.15625,10.578125,5.2890625,
    2.64453125,1.322265625,0.6611328125,0.33056640625283203125,0.0826416015625
    </resolutions>
</grid>
```

GRIDSETS

METADATA AND MAINTENANCE

METADATA

METADATA

http://openwms.statkart.no/skwms1/wms.ssr2?version=1.3.0&service=wms&request=getcapabilities

https://www.geonorge.no/geonetwork/srv/nor/xml_iso19139?uuid=de394500-fd30-405c-ab1d-e3be54d01126

GeoNetwork Opensource

SERVICE GETCAPABILITIES

METADATA CATALOGUE – ISO19119

METADATA


```
▼<WMS_Capabilities xmlns="http://www.opengis.net/wms" xmlns:sld="http://www.opengis.net/sld" xmlns:xsi="http://www.w3.org/200
 http://schemas.opengis.net/wms/1.3.0/capabilities_1_3_0.xsd http://www.opengis.net/sld http://schemas.opengis.net/sld/1.1.0/
 service=WMS&version=1.3.0&request=GetSchemaExtension">
 ▼<!--
     MapServer version 6.3-dev OUTPUT=GIF OUTPUT=PNG OUTPUT=JPEG SUPPORTS=PROJ SUPPORTS=GD SUPPORTS=AGG SUPPORTS=FREETYPE SU
  -->
 ▼<Service>
    <Name>WMS</Name>
    <Title>Stedsnavn WMS</Title>
   ▼<Abstract>
      Tjenesten viser stedsnavn etter språk, navnetype, skrivemåtestatus og stedsnavnvedtak.
    </Abstract>
   ▼<KeywordList>
      <Keyword>ssr</Keyword>
      <Keyword>stedsnavn</Keyword>
    </KeywordList>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="http://openwms.statkart.no/skwms1/wms.ssr2?"/>
   ▼<ContactInformation>
    ▶<ContactPersonPrimary>...</ContactPersonPrimary>
      <ContactPosition>WMS ansvarlig</ContactPosition>
    ▶<ContactAddress>...</ContactAddress>
      <ContactVoiceTelephone>+ 47 32 11 81 41</ContactVoiceTelephone>
      <ContactElectronicMailAddress>tjenestedrift@kartverket.no</ContactElectronicMailAddress>
    </ContactInformation>
    <Fees>Norge digital</Fees>
    <AccessConstraints>Copyright Statens kartverk</AccessConstraints>
    <MaxWidth>4096</MaxWidth>
    <MaxHeight>4096</MaxHeight>
  </Service>
 ▼<Capability>
   ▼<Request>
    ▶<GetCapabilities>...</GetCapabilities>
    ▼<GetMap>
       <Format>image/png</Format>
       <Format>image/png; mode=8bit</Format>
       <Format>image/jpeg</Format>
      ▶<DCPType>...</DCPType>
     </GetMap>
    ▼<GetFeatureInfo>
       <Format>plain/text</Format>
       <Format>application/vnd.ogc.gml</Format>
       <Format>text/plain</Format>
      ▼<DCPType>
       ▶<HTTP>...</HTTP>
       </DCPType>
     </GetFeatureInfo>
    ▼<sld:DescribeLayer>
       <Format>text/xml</Format>
      ▶<DCPType>...</DCPType>
     </sld:DescribeLayer>
    ▼<sld:GetLegendGraphic>
       <Format>image/png; mode=24bit</Format>
       <Format>image/png</Format>
       <Format>image/jpeg</Format>
       <Format>image/gif</Format>
       <Format>image/png; mode=8bit</Format>
      ▼<DCPType>
```


SERVICE GETCAPABILITIES

METADATA CATALOGUE – ISO19119

MAINTENANCE TOOLS

DATA IMPORT WMS TESTS

CACHE SEEDING

TRIGGERING METADATA UPDATES

VERSIONING WMS TESTS

TASK MANAGEMENT

TO INFINITY
AND
BEYOND

CROSSING BOUNDARIES

The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries.

— World Wide Web Consortium, W3C Semantic Web Activity[19]

Linked Open Data - RDF

Simplified Datamodel

ONTOLOGY™

Semantic Understanding

http://data.geonorge.no/{namepace}/so/{localId}

Stable de-referensable URI's

Linked Open Data - RDF

Navn fra Sentralt Stedsnavnregister (SSR) | Datasett

<posisjon>; <navn>; <type>;<lang>

API

Bulk Download

PLACENAMES AS RDF

DATA, DATA, DATA

DATA

STYLES

GeoJSON

protobuf
Protocol Buffers

{JSON}

VECTOR TILES

K.I.S.S

SIMPLE DATA

GeoJSON

JSON-LD

GeoJson/JsonLD

THATS ALL FOR NOW FOLKS.....

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