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SmartMet II based Warning System at the FMI

EGOWS2014
Oslo, Norway
2.-5.6.2014
Heli Paajanen, FMI



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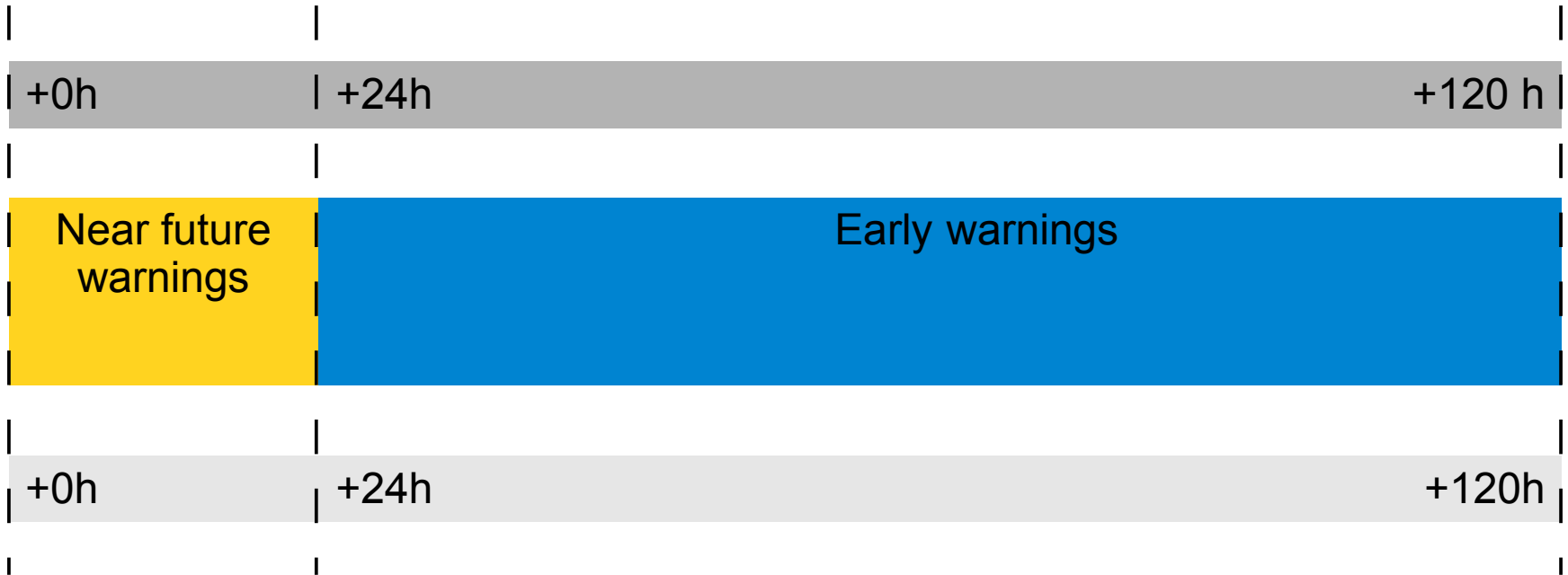
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Warnings Issued by the FMI



Warning Types



For counties

3 awareness levels

15 warning types

Probability

9 warning types



Warning	Warning level 1	Warning level 2	Warning level 3
Traffic weather	Bad road conditions	Very bad road conditions	N/A
Pedestrian	N/A	Very slippery	N/A
Forest fire	In force	N/A	N/A
Grass fire	In force	N/A	N/A
Rain	50 mm/day or 20 mm/h	70 mm/day or 30 mm/h	120 mm/day or 45 mm/h
Rough thunderstorm	15 m/s	25 m/s	30 m/s
Ground wind	20 m/s (gusts) 14 m/s	25 m/s (gusts)	30 m/s (gusts)
Sea wind	(11 m/s May-October)	21 m/s	33 m/s
Wave height	2,5 m (May-October)	4 m	7 m
Sea water height	Sea area specific	Sea area specific	Sea area specific
Icing	Moderate / fast	N/A	N/A
Sea thunderstorm	In force	N/A	N/A
Hot weather (3 days)	+27C	+30C	+35C
Cold weather	-20/-25/-30C South/Central/North	-30/-35/-40C	-35/-40/-45
UV	UV6	N/A	N/A



Issued Where?

Warnings - Ilmatietee

en.ilmatieteenlaitos.fi/warnings

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Home Weather and sea Climate Services and products Scientific themes Research About us

Local weather

Marine weather and Baltic Sea

Warnings

- Avalanche forecast
- UV index
- Rain and cloudiness
- Weather abroad
- Mobile weather and service numbers
- Unit converter

Weather and sea ► Warnings

See local weather:
Enter location...

Warnings
23.5.2014 9:30 -
24.5.2014 9:30
local time

Warnings for the next 24h
Updated 23.5.2014 9:32 local time

Warnings for sea areas
Warnings: Northern Bay of Bothnia: Southwest near gale 14 m/s. Strong wind advisory: Sea of Bothnia, The Quark and Southern Bay of Bothnia: South to southwest wind 12 m/s.

Warnings for land areas
In Central Lapland in the evening severe thunderstorms can produce strong wind gusts, over 15 m/s. Heat warning: Warm weather is expected during the coming 24 hours in the southern and middle parts of the country.

Early warnings for the next 2-5 days
Updated 22.5.2014 14:44 local time

Early warnings for sea areas
No warnings.

Early warnings for land areas
In the southern and middle parts of the country from the Friday noon to the Sunday evening, probability for warm weather is 70 %. Warm weather may cause health problems for groups at risk.

Storm warning
Warning for near gale-force/gale-force wind
Strong wind advisory
Extremely rough waves
Very rough waves
Rough waves
Sea level high / low
UV radiation is strong

Strong wind advisory for inland lakes
Wind warning for land areas
Severe thunderstorm warning
Heavy rain warning
Forest fire warning
Grass fire warning
Bad road conditions
Very bad road conditions
Heat warning
Cold warning

More information on FMI warnings

Related links

Finnish Environment Institute (SYKE)
Water level
Lake surface temperature

www.ilmanlaatu.fi
Air quality in Finland
University of Turku
Pollen report

Meteoalarm
Weather warnings in Europe
STUK - Radiation and Nuclear Safety Authority
Today's dose rates

Finnish Transport Agency
Weather cameras and traffic conditions

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Kumpula
Helsinki

21°C

20.5. 16:00

30%
0.0 mm

04:30 - 22:04

+24°C

Warnings
Severe thunderstorm warning

12-hour forecast

Time	Weather	Temperature	Wind	Precipitation
17:00	Cloudy	21°C	10%	0.0 mm
18:00	Cloudy	19°C	40%	0.1 mm
19:00	Cloudy	16°C	40%	0.1 mm
20:00	Cloudy	15°C	20%	0.0 mm
21:00	Cloudy	14°C	10%	0.0 mm
22:00	Cloudy	13°C	10%	0.0 mm
23:00	Cloudy	12°C	20%	0.0 mm
00:00	Cloudy	11°C	20%	0.1 mm
01:00	Cloudy	11°C	10%	0.0 mm
02:00	Cloudy	11°C	10%	0.0 mm
03:00	Cloudy	11°C	10%	0.0 mm

10-day forecast

Day	Weather	Temperature
Wed	Cloudy	21°C
Thu	Sunny	25°C
Fri	Sunny	22°C
Sat	Sunny	24°C
Sun	Sunny	24°C
Mon	Cloudy	23°C
Tue	Cloudy	17°C
Wed	Cloudy	21°C
Thu	Cloudy	21°C



Issued Where?

"In provinces Kymenlaakso, South Karelia, Etelä-Savo and North Karelia today severe thunderstorms can produce very strong wind gusts, over 25 m/s. In provinces..."



Created: 23.05.2014 09:50 CET | Val'd for: 23.05.2014

Weather warnings: Finland

Awareness Reports - You can find detailed information about the warnings in the awareness reports issued for each area. Select the relevant area.

Ahvenanmaa	CC
Enontekiö	
Etelä-Karjala	CC
Etelä-Pohjanmaa	CC
Etelä-Savo	CC
Inari	
Kainuu	CC
Kanta-Häme	CC
Kemi	
Kemijärvi	
Keminmaa	
Keski-Pohjanmaa	CC
Keski-Suomi	
Kittilä	CC
Kolari	CC
Kuusamo	
Kymenlaakso	CC
Muonio	CC
Paijat-Häme	CC
Pelkosenniemi	CC
Pello	
Pirkanmaa	CC
Pohjanmaa	CC
Pohjois-Karjala	CC
Pohjois-Pohjanmaa Eteläinen	
Pohjois-Savo	CC
Posio	
Pudasjärvi	
Ranua	
Rovaniemi	
Salla	
Satakunta	CC
Savukoski	CC
Simo	
Sodankylä	CC
Taivalkoski	
Tervola	
Tornio	
Utsjoki	
Uusimaa	
Varsinais-Suomi	CC
Ylitornio	

coasts

- Eastern Gulf of Finland
- Eastern Part of northern Baltic
- Northern Bay of Bothnia
- Northern Sea of Bothnia
- Sea of Åland
- Sea of Archipelago
- Southern Bay of Bothnia
- Southern Sea of Bothnia
- The Quark



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Warning System Renewal Project at the FMI



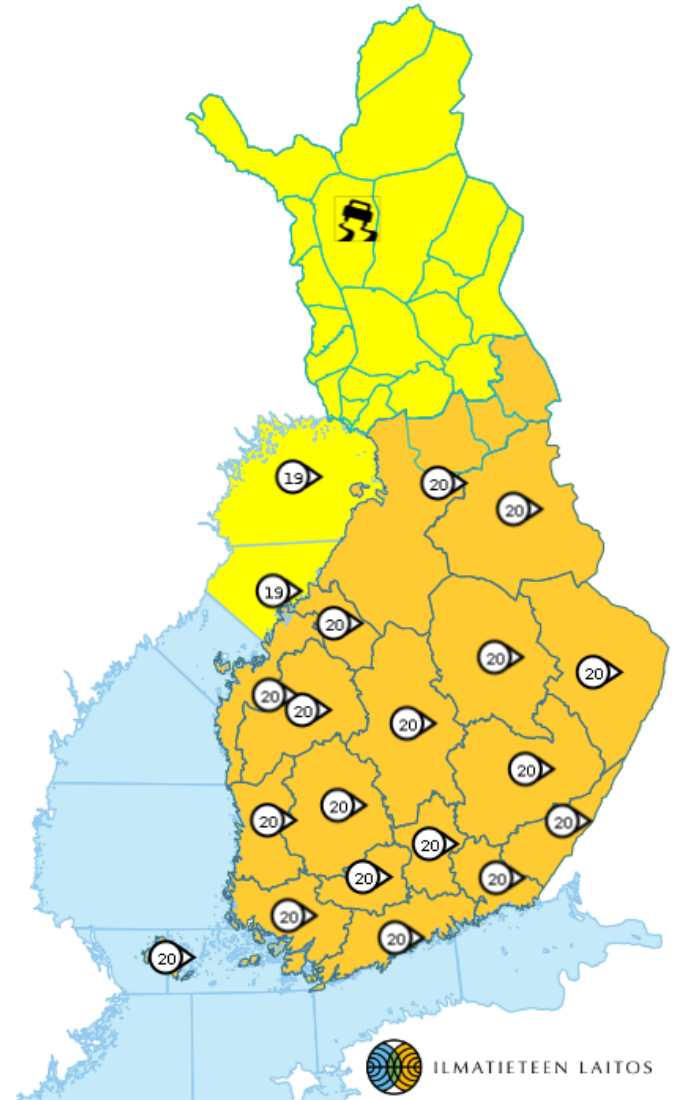
Project Background

- **Why renew the warning system?**
 - Current meteorologist's warning tool out-of-date
 - Obsolete techniques and implementations
 - Bad usability (awkward drop-down menus etc.)
 - Up-to-date warning products demanded
 - Limited temporal and spatial resolution for warnings in the old system → Impossible to generate modern warning products from the data created with the old system
 - Old delivery system disorganized
- **Renewal project started 09/2012**



Project goals for Q1/2015

- Develop a new warning tool for meteorologists
- Implement warning product generation in accordance with the old warning system
- Couple the new tool to the old delivery system
- Implement Meteoalarm compatible CAP data warning product generation and delivery
- Take new meteorologist's warning tool into operational use
- Add warning timeline to the local weather page of FMI's public web site (before summer 2015)





Roadmap after Q1/2015

Renew
warning
graphics and presentation

Use of meteorological
background data as a
first guess



Update
warning
delivery
system

Flash warnings
for the next three hours



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SmartMet II Workstation



General

- Meteorological workstation for creating analysis, forecasts and now also warnings for end production.
- Implemented with Java programming language
- Enables displaying observations, radar & satellite images, and model data on top of different map layers as background data for meteorologist
- As an output of users work the SmartMet II returns GML documents which support OGC standard. These can be utilized in production in several different products.
- SmartMet II takes advantages of webstart techniques. The user of the workstation does not need to install the software to his/her computer. In order to use the software the user needs only internet access and installed Java Runtime Environment (JRE7).



Basic Ideas

- Plugin-based architecture
- The framework takes care of time and area selection
- Data layers, selected by the user, are displayed on top of each other on the map panel
- All requested information is inspected in the same projection so that comparison of the data is easy.
- Meteorologists make their analysis and interpretations on top of the data layers.
- Launch + loading and saving the data network-based



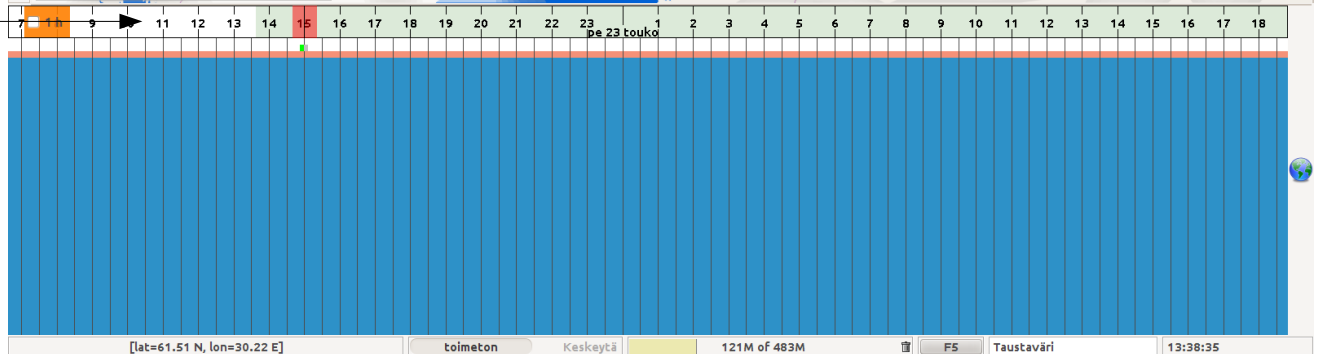
TOOLBAR →

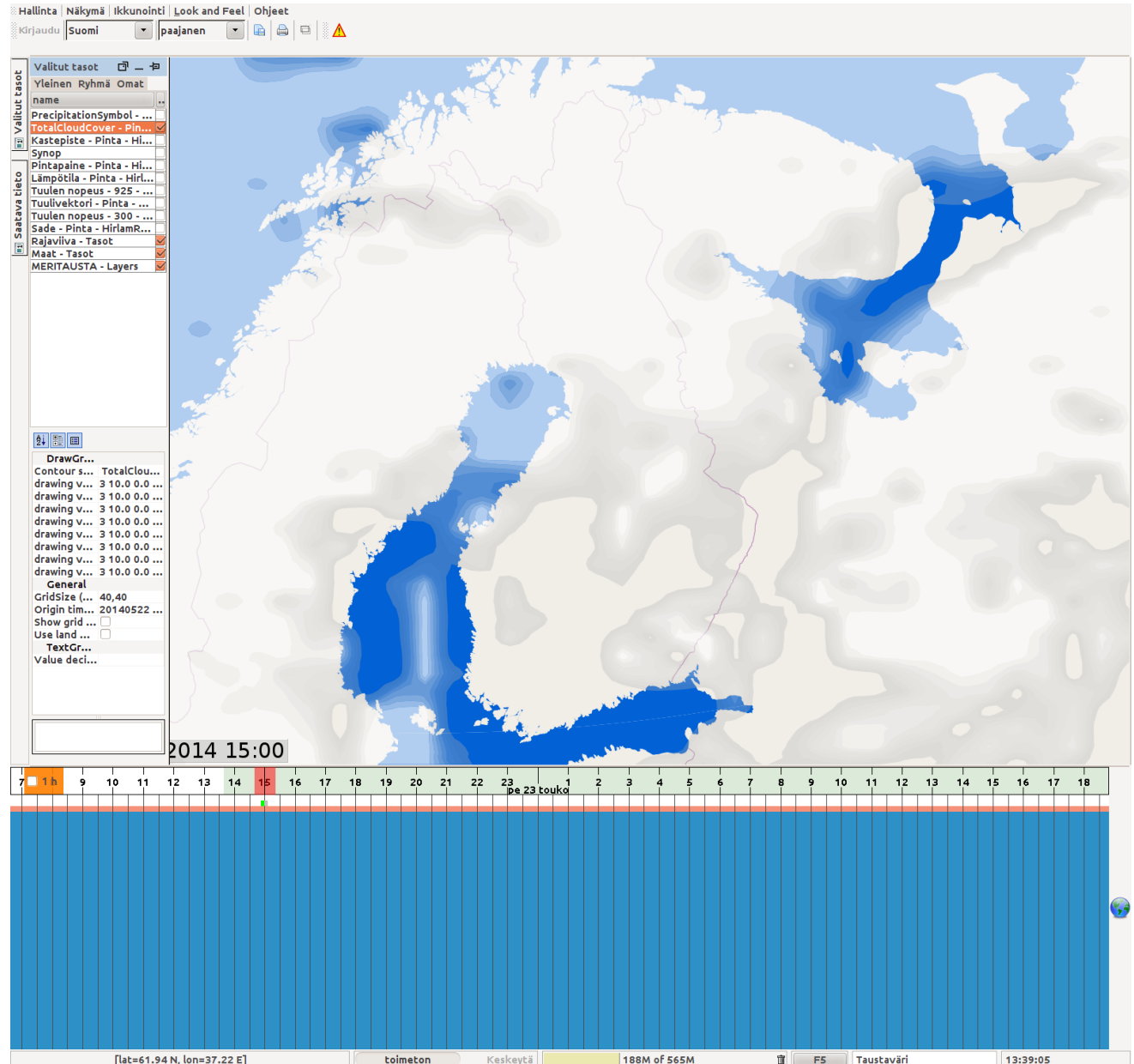
Hallinta | Näkymä | Ikkunointi | Look and Feel | Ohjeet
Kirjautu Suomi paajanen

MAP PANEL →



TIMELINE →





SELECTED DATA LAYERS →

AVAILABLE DATA LAYERS →



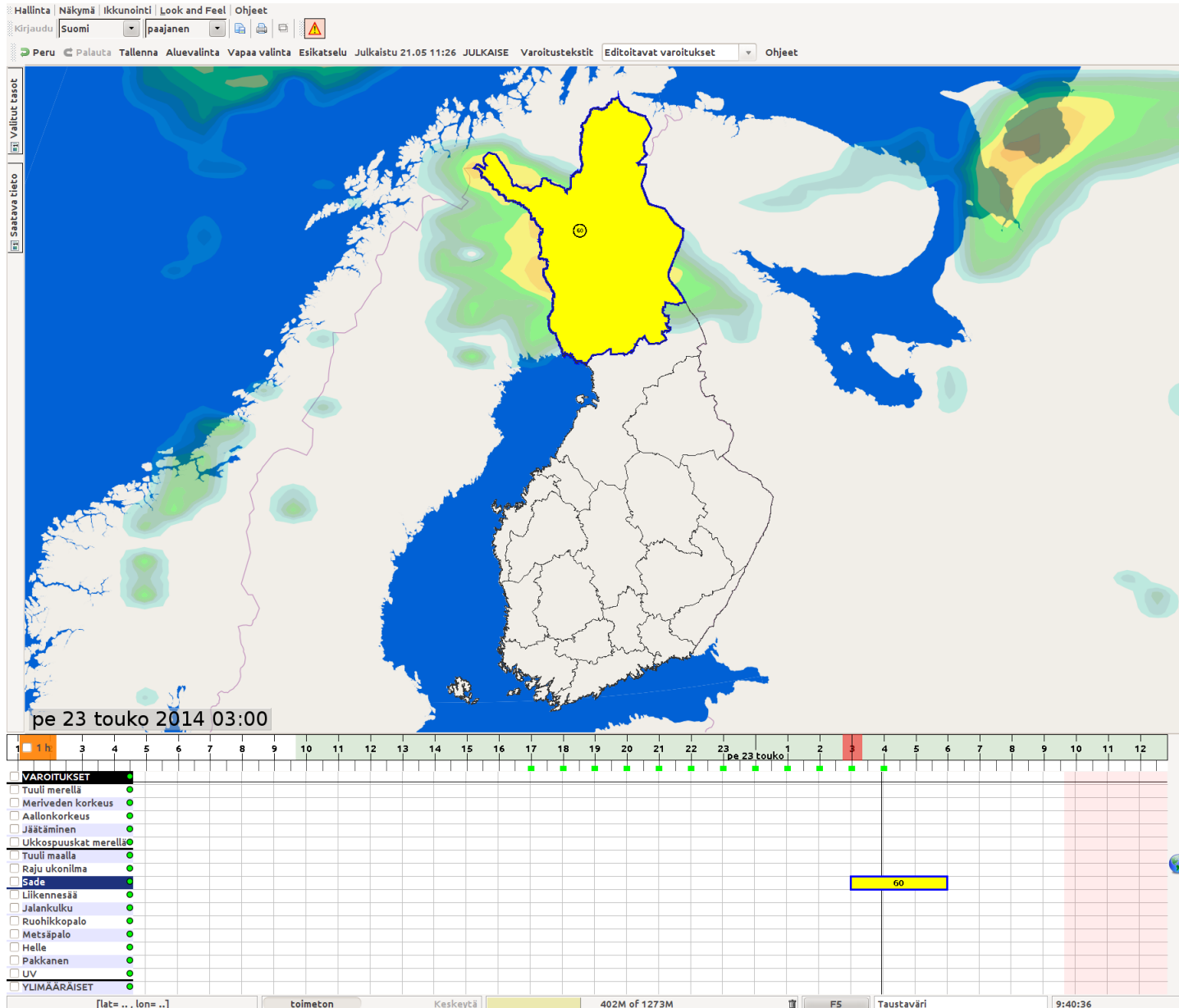
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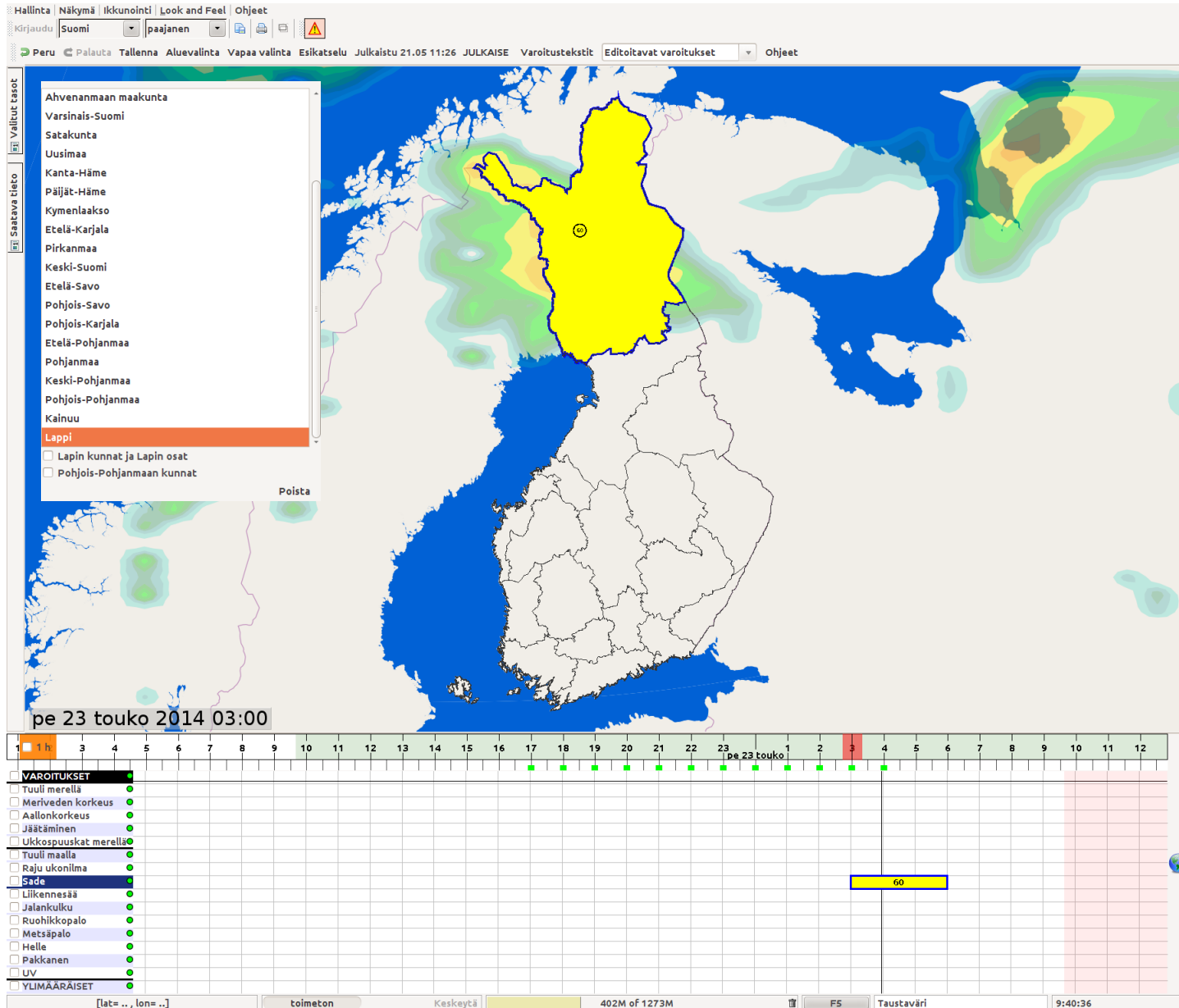
Warnings Plugin

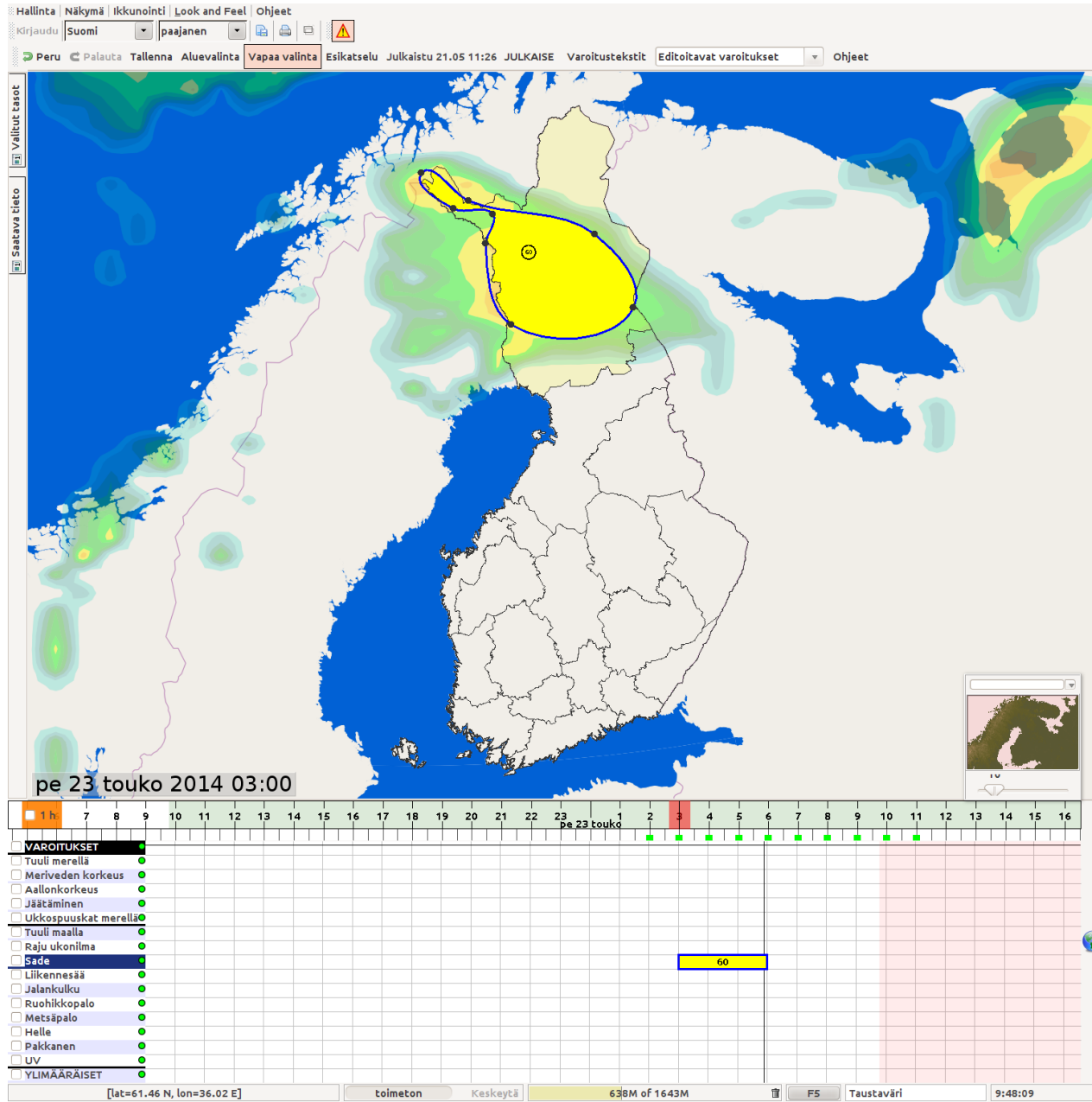


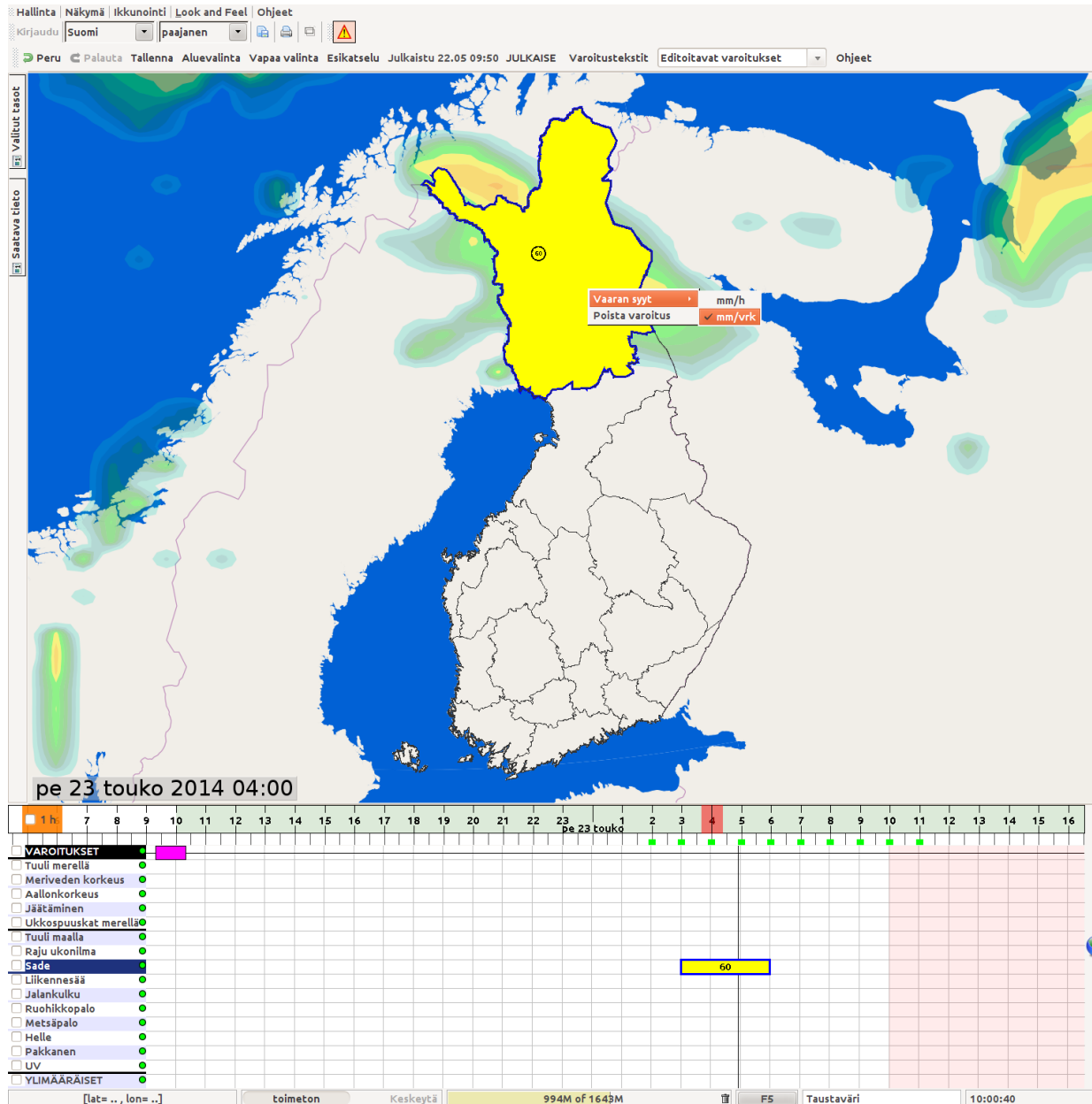
Intro

- A new warning tool for meteorologists
- Implemented as an interactive GUI plugin to the SmartMet II
- Used to create and edit warning data and to launch generation of warning products and their delivery
- Includes also warning text editor
 - With this tool a meteorologist can edit automatically created warning texts and launch generation of warning text products and their delivery.





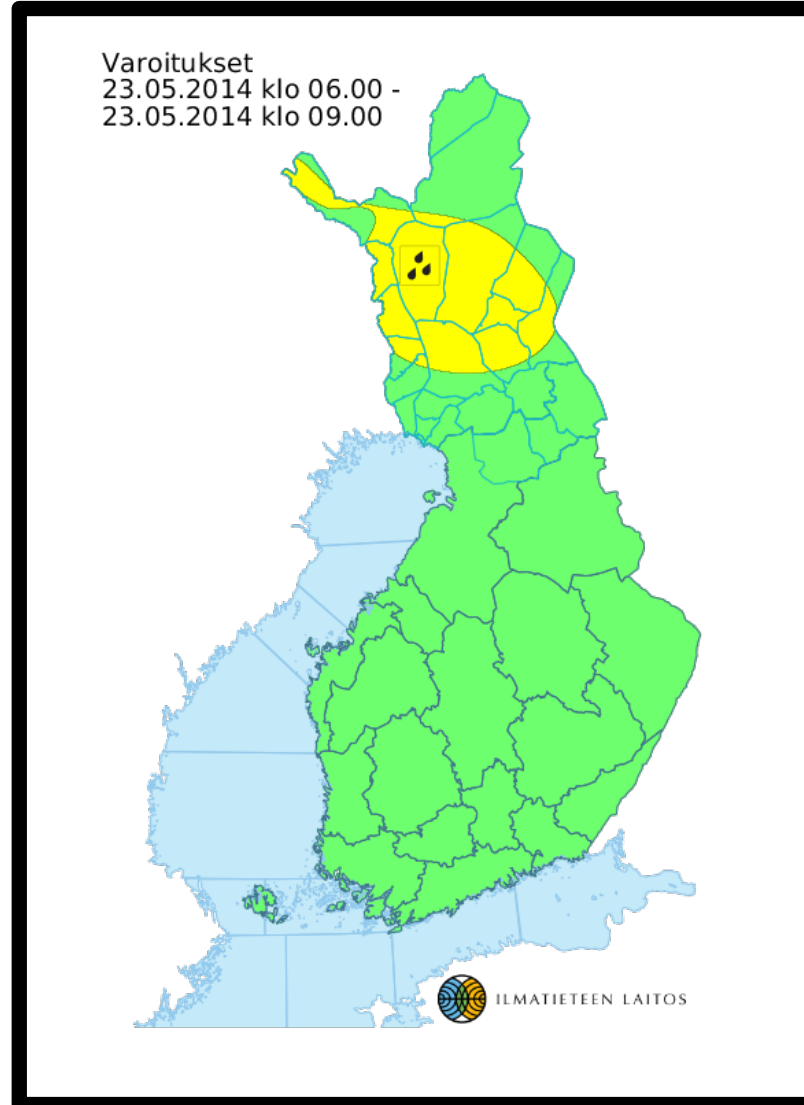






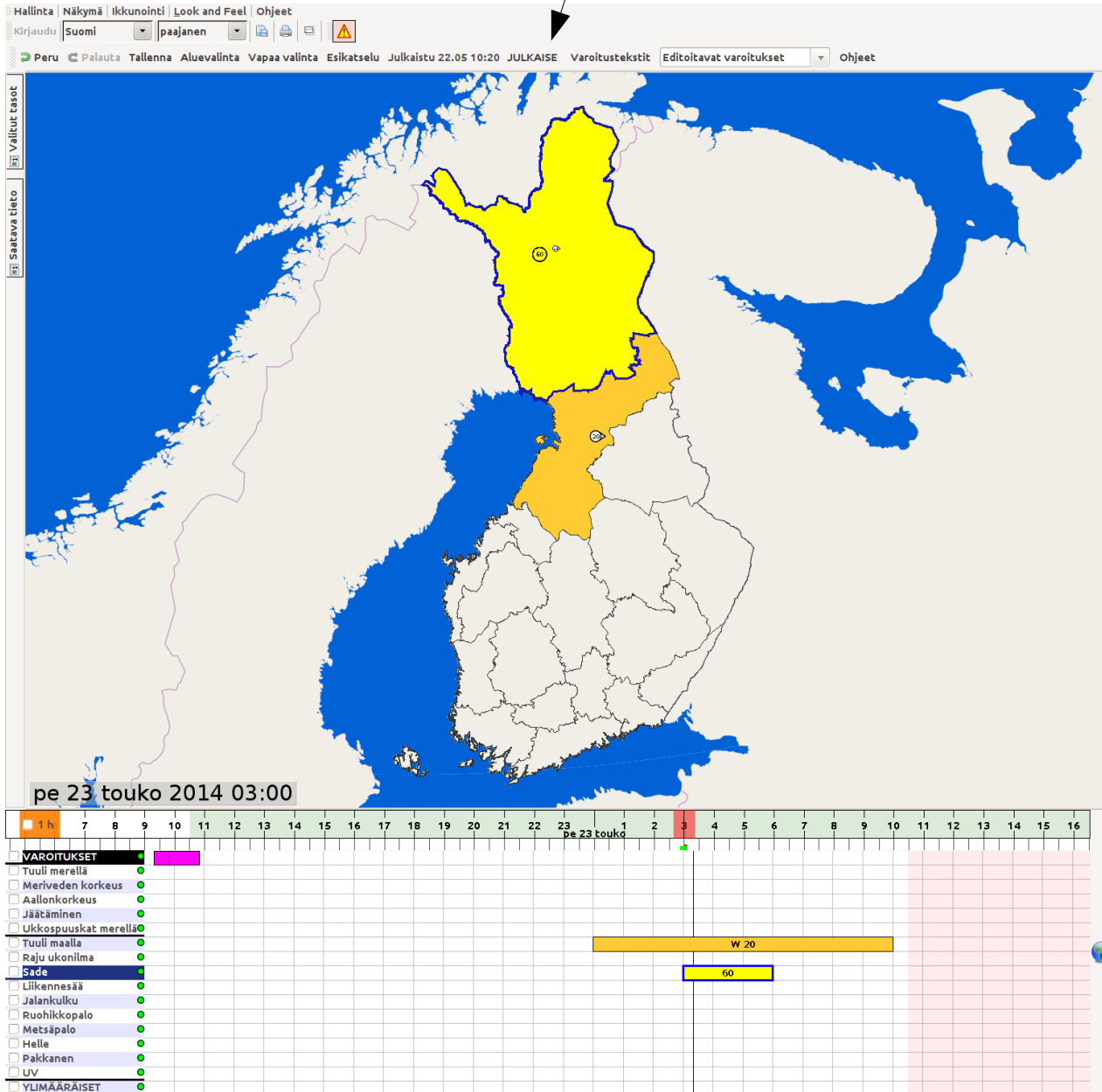
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Preview





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Editor for Warning Texts













Radiotekstit

Lähivuorokauden varoitukset Ennakkovaroitukset

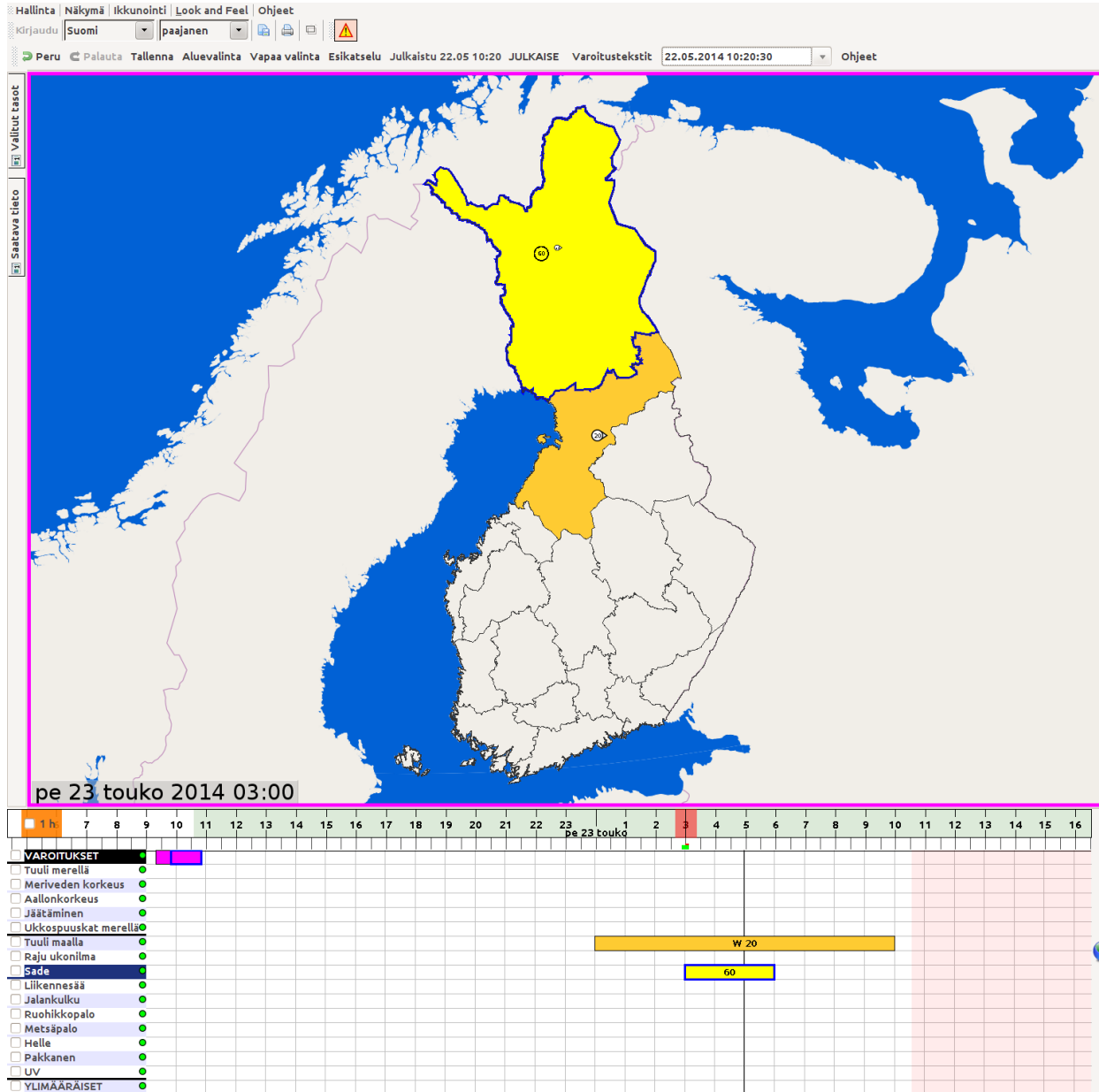
Varoitukset julkaistu: 22.05.2014 klo 10:20:30 Tekstit julkaistu: Uusi teksti  Päänäkymä synkronoitu

Leikkaa Kopioi Liimaa Peru Palauta Tallenna Palauta automaattitekstit Hae edelliset tekstit

Piilota kaikki

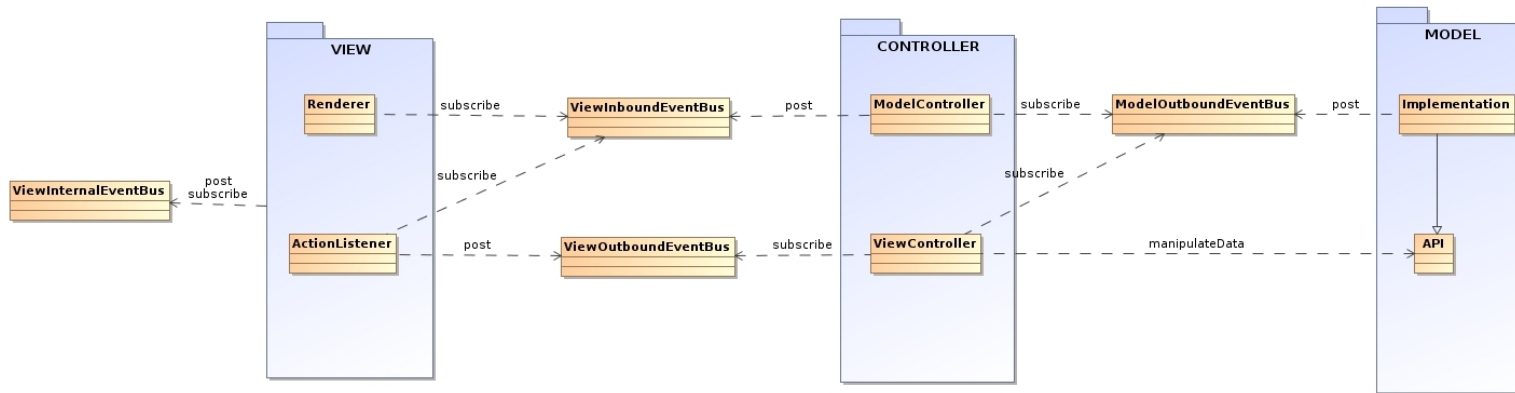
Suomeksi:	Ruotsiksi:	Englanniksi:
<p>Tuuli maalla  </p> <p>Tuulivaroitus maa-alueille: Pohjois-Pohjanmaan ja Lapin maakunnissa länsituuli on vaarallisen voimakasta aamuyöstä alkaen, tuulen nopeus puuskissa 20 m/s.</p>	<p>Tuuli maalla  </p> <p>Vindvarning för landområden: I landskapen Norra Österbotten och Lappland är den västliga vinden farligt kraftigt från och med efternatten, i vindbyarna 20 m/s.</p>	<p>Tuuli maalla  </p> <p>Wind warning for land areas: In provinces North Ostrobothnia and Lapland from the early morning on, strong winds from west may bring strong gusts of 20 m/s.</p>
<p>Sade  </p> <p>Sadevaroitus: Lapin maakunnassa voi sataa aamulla runsaasti, yli 60 mm vuorokaudessa.</p>	<p>Sade  </p> <p>Nederbördsvarning: I landskapet Lappland kan det på morgonen förekomma riklig nederbörd, mer än 60 mm i dygnet.</p>	<p>Sade  </p> <p>Heavy rain warning: In province Lapland in the morning heavy rain of more than 60 mm in the 24 hours can be expected.</p>

Julkaise tekstit Sulje





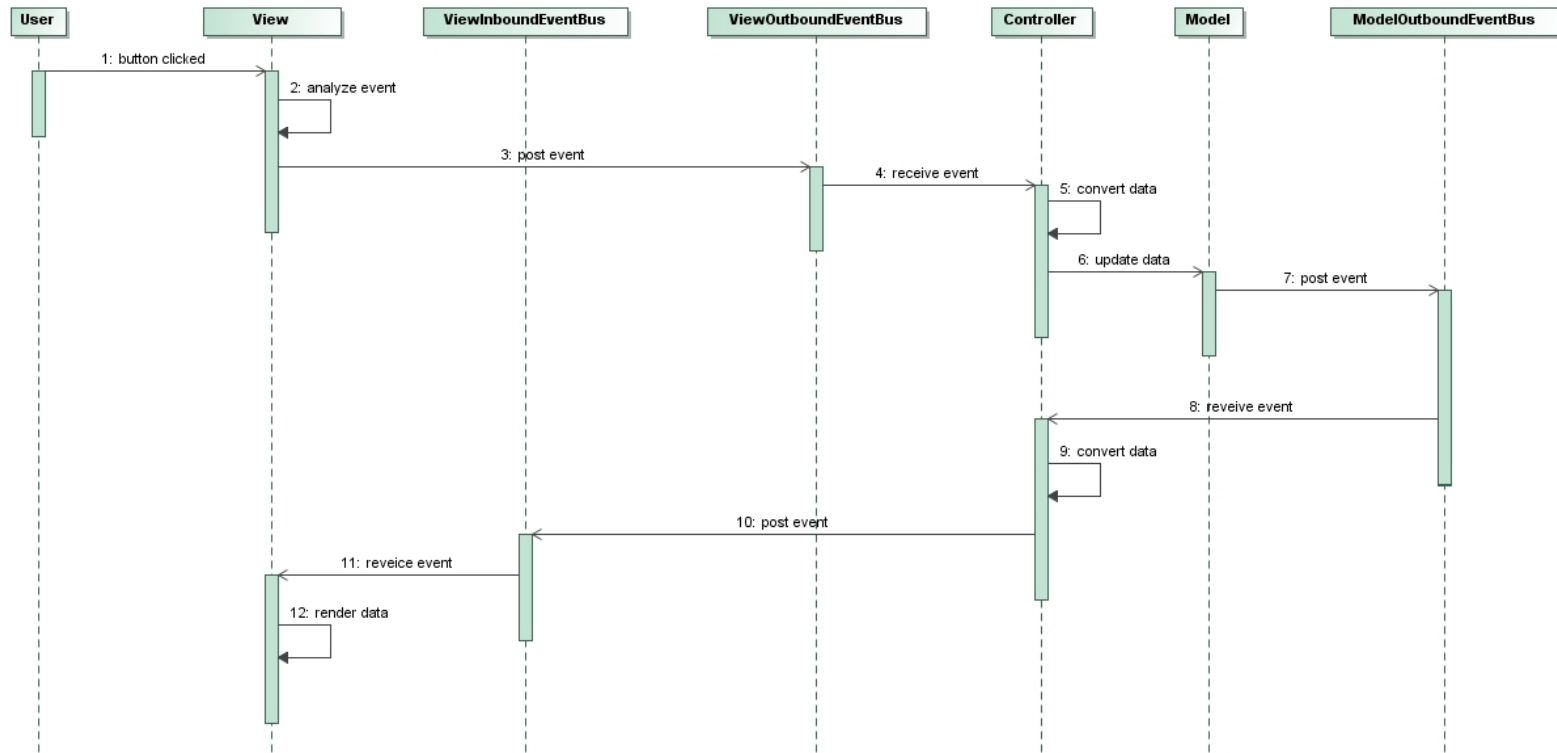
Application Architecture



- Based on MVC design pattern
- Requests between different layers are transported via Google Guava's EventBus
- Threading is enabled with EventBus instances
- All used implementations and EventBus registrations are declared with Spring in xml configuration files

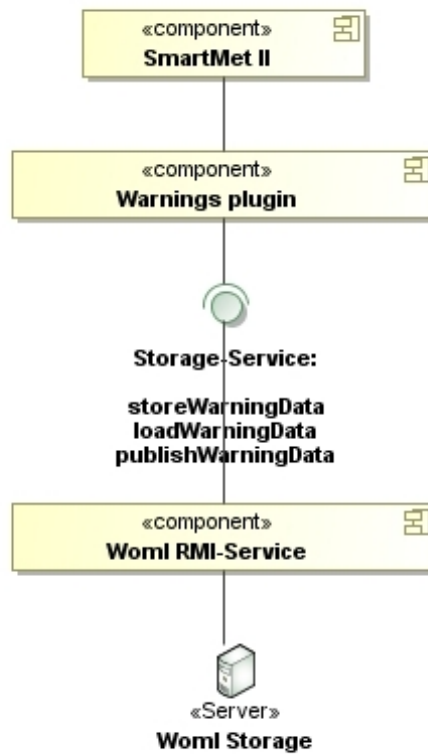


Dataflow Example





Network Architecture





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Warning Products and their Generation

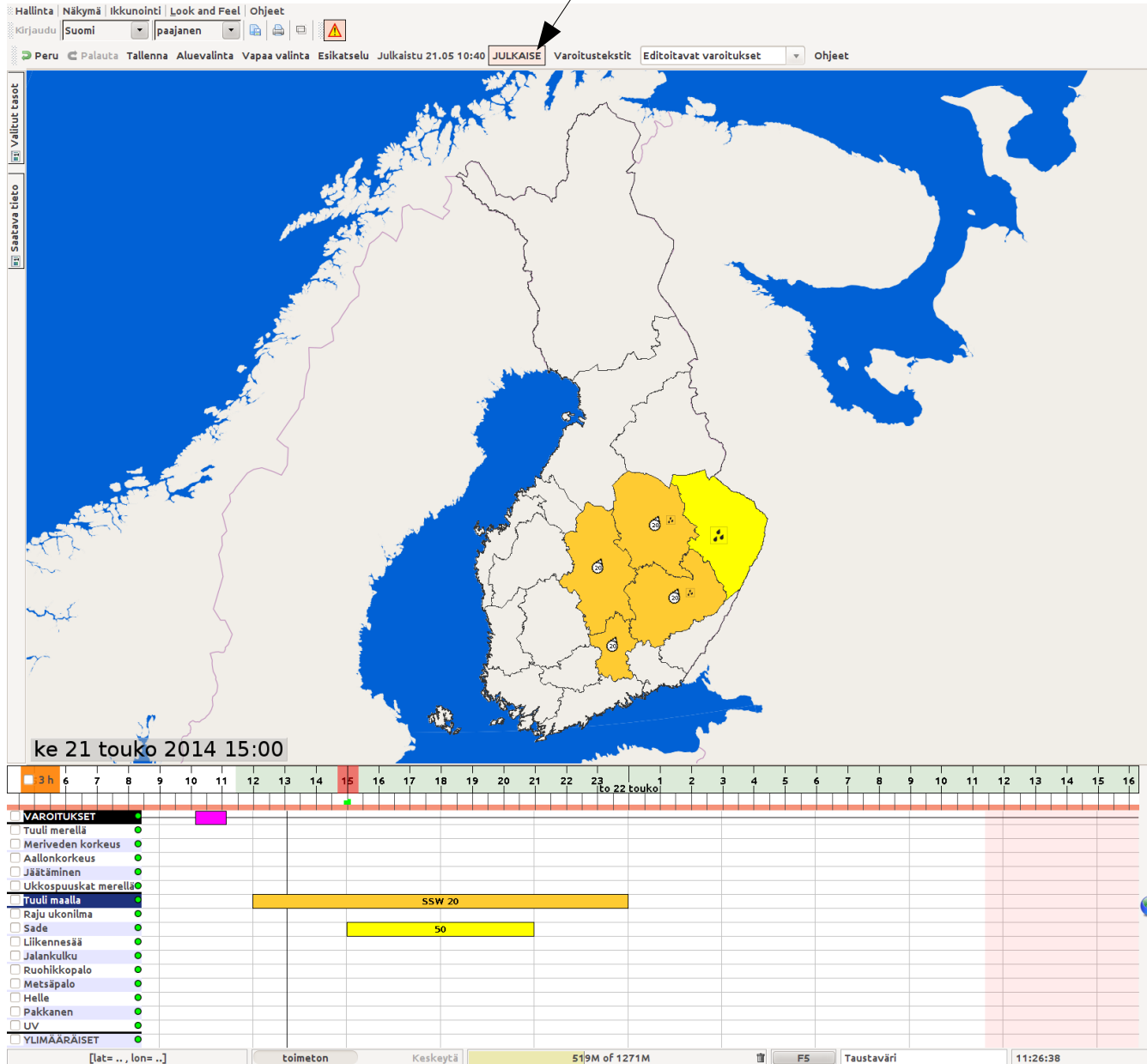


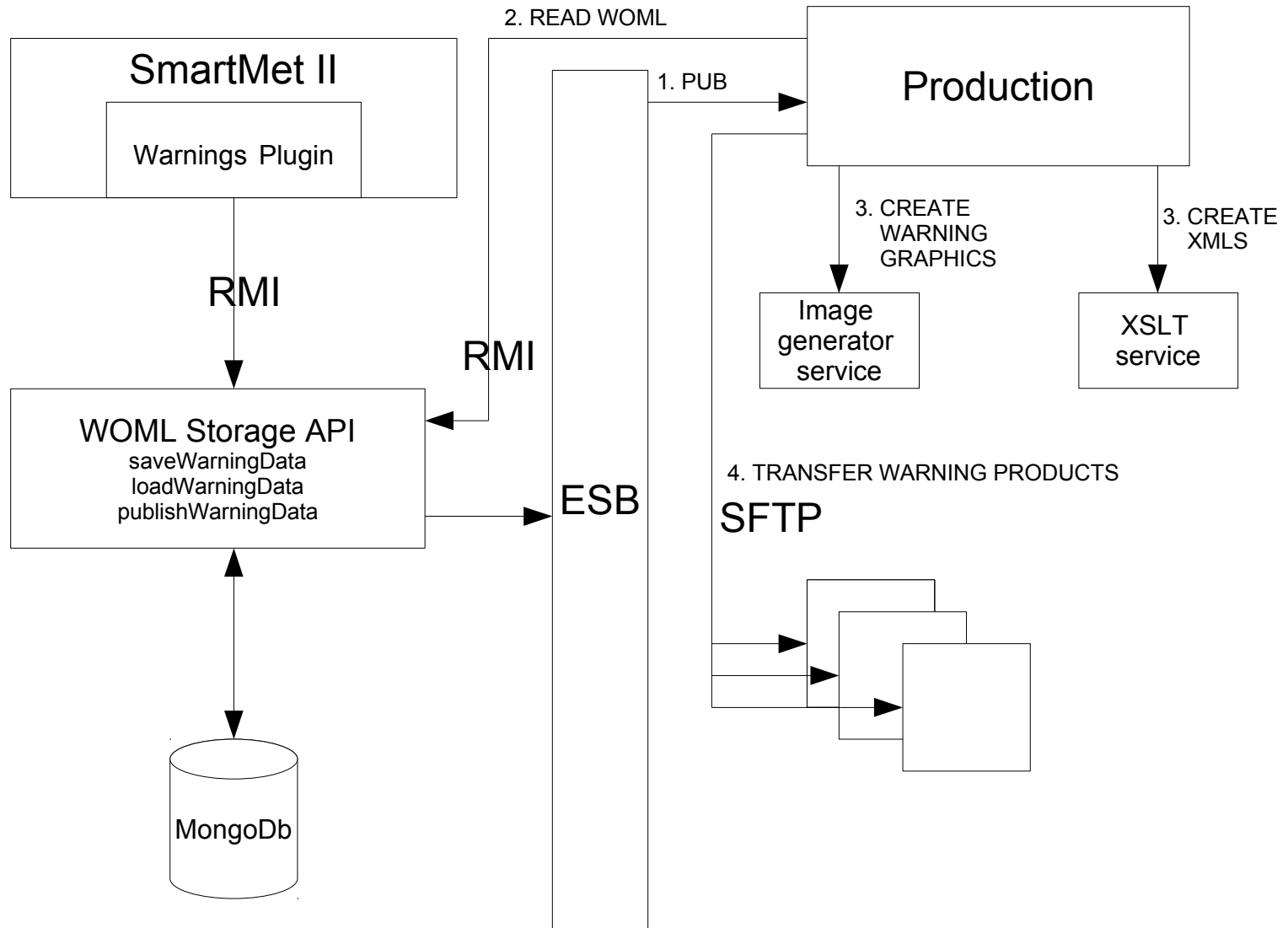
Warning Products

- **The warning data is stored and published as WOML**
 - WOML = Weather Objects Modelling Language
 - <https://agora.fmi.fi/display/WOML/>
 - Defines meteorological phenomena or other objects in a semantically meaningful way by using GML feature model as the basis of the language.
- **The following warning products are generated from the WOML:**
 - Bitmap graphics to be displayed for example at the FMI public web site and in FMI mobile applications
 - XML syntaxes
 - CAP
 - Several FMI specific XML syntaxes
- **Warning texts**
 - Warning text products are generated separately from other warning products.
 - Warning text suggestions are created automatically from the published warning data.
 - Meteorologist can edit automatically generated texts before publishing them.



PUBLISH







Plans for Future

- Reach Q1/2015 goals first
- Then:
 - Renew warning graphics
 - Renew warning data delivery system
 - Prepare technically to disseminate warnings as part of FMI Open Data
 - Renew presentation of warnings
 - For example at FMI public web site and mobile applications
 - Implement flash warnings for the first three hours
 - Utilize meteorological background data as a first guess for warnings



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Thank You!