

A map of Europe with a grid overlay. Finland is highlighted in a dark red color, while other European countries are in shades of orange and yellow. The text is overlaid on the map.

Developing a GIS for private forestry in Finland

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Finnish forests and forestry

- 4,3 hectares of forest per capita
(Europe 0,3 ha, world 0,6 ha)
- 0,5 % of the world's forest land area
- 0,5 % of the world's growing stock
- 1,5 % of the world's commercial cuttings
- 2,8 % of the world's production of sawn goods
- 6,4 % of the world's pulp production



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Forestry in Finland

Economic significance of the forest sector

| | 1980 | 1990 | 2006 |
|---------------------------------------|------|------|------|
| SHARE OF EMPLOYMENT | % | % | % |
| Forest industry | 5.2 | 3.7 | 2.7 |
| Forestry | 2.7 | 1.6 | 0.9 |
| SHARE OF GNP | | | |
| Forest industry | 6.8 | 4.5 | 3.8 |
| Forestry | 4.6 | 2.9 | 1.8 |
| SHARE OF VALUE OF EXPORTS | | | |
| Forest industry | 42.4 | 37.6 | 21.0 |
| Forestry (roundwood exports) | 1.0 | 0.2 | 0.2 |
| SHARE OF INDUSTRIAL PRODUCTION | | | |
| Forest industry | 23.4 | 19.0 | 19.2 |

Source: www.forest.fi



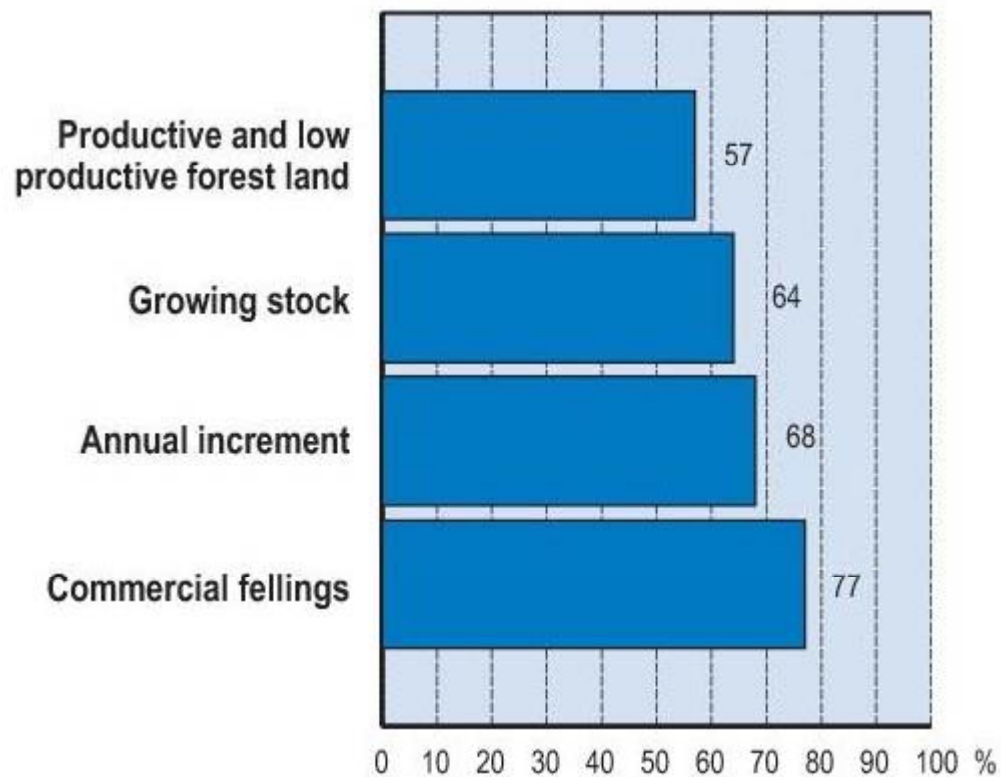
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Forestry in Finland (2)

Share of family forests of...



Source: www.forest.fi



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Forestry Development Centre Tapio

- Since 1907
- Expert organisation for development of forestry
- 90 employees (60 experts)
- A part of Finland's forest administration, partly government funded and partly business funded
- Providing services for the Regional Forestry Centres is one of the main tasks
 - Mostly IT development in cooperation with software developers



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Forestry Centres in Finland



- forest management planning
- forestry grants for private forest owners
- information and guidance in forest management and nature conservation
- forest improvement (forest drainage, forest road construction)
- supervision of the implementation of the Forest Act
- forest damage assessment; sale evaluation
- regional forest programmes
- regional development



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Context

- Inventories for forest management planning are partly funded by public money in Finland
- Most of the forest management planning is done by the regional Forestry Centers (13)
- The forest inventorying method is developed in the 1970's and hasn't changed fundamentally since then
- Developing a new inventorying method and a new database operated with new software is one of the key goals of the Ministry of Agriculture and Forestry
- Tapio develops IT systems and other services for the Forestry Centers



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Strategies for collecting and managing forest resource data and forest management planning

Forest resource data should be available to anyone, but data that can be connected to a certain forest holding only with permission from the owner.

The aim is to maintain a forest resource database that

1. covers the whole country
2. is up-to-date (< 5 years, goal 3 years) and
3. is of good quality (accuracy at least the same as today)

and thus makes operative planning possible.

The area of forest inventory increases to 1,5 mill. ha, inventorying costs decrease by 40 %

- Productivity and cost efficiency must be improved.
- Co-operation between organizations must be improved (data procurement, two-way data flow)
- Forest centres use more of their resources for customer service and advice

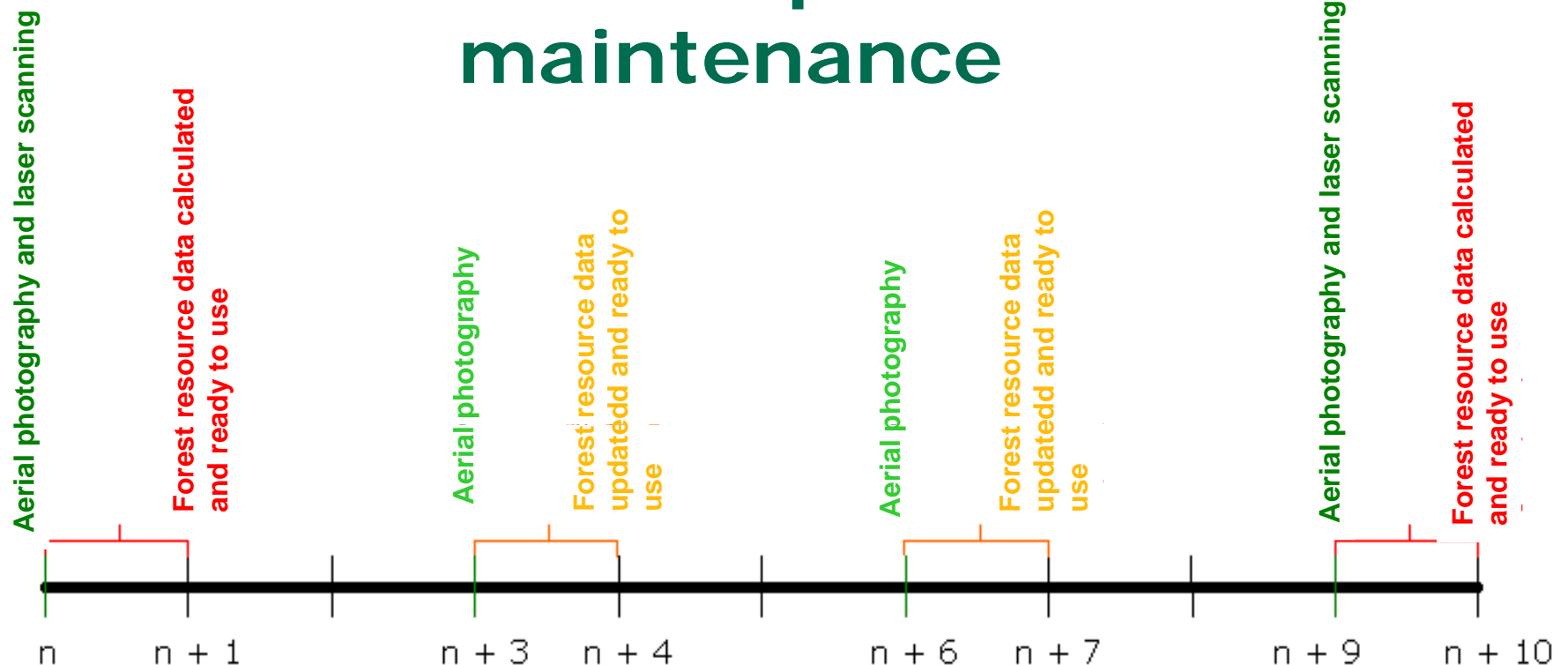


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Forest data acquisition and maintenance



- Acquisition of remote sensing material
- Inventorying process
- Updating process

- Inventory based on remote sensing. The aim is an inventorying cycle of 10 years and an updating cycle of 3 years



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Development of the GIS

- **Project group with representatives from Tapio and the Forestry Centres:**
 - Development of forest inventory methods
 - Specifications
 - Testing
 - Training
- **Software development by various companies, in this project:**
 - GIS application: Tieto Corporation
 - PDA application: Bitcomp Oy
 - Forest data calculations: Simosol Oy, Finnish Forest Research Institute
- **Schedule:**
 - First half of 2010
 - Other software using the same data (e.g. extension services, forest management planning) are developed in other projects.

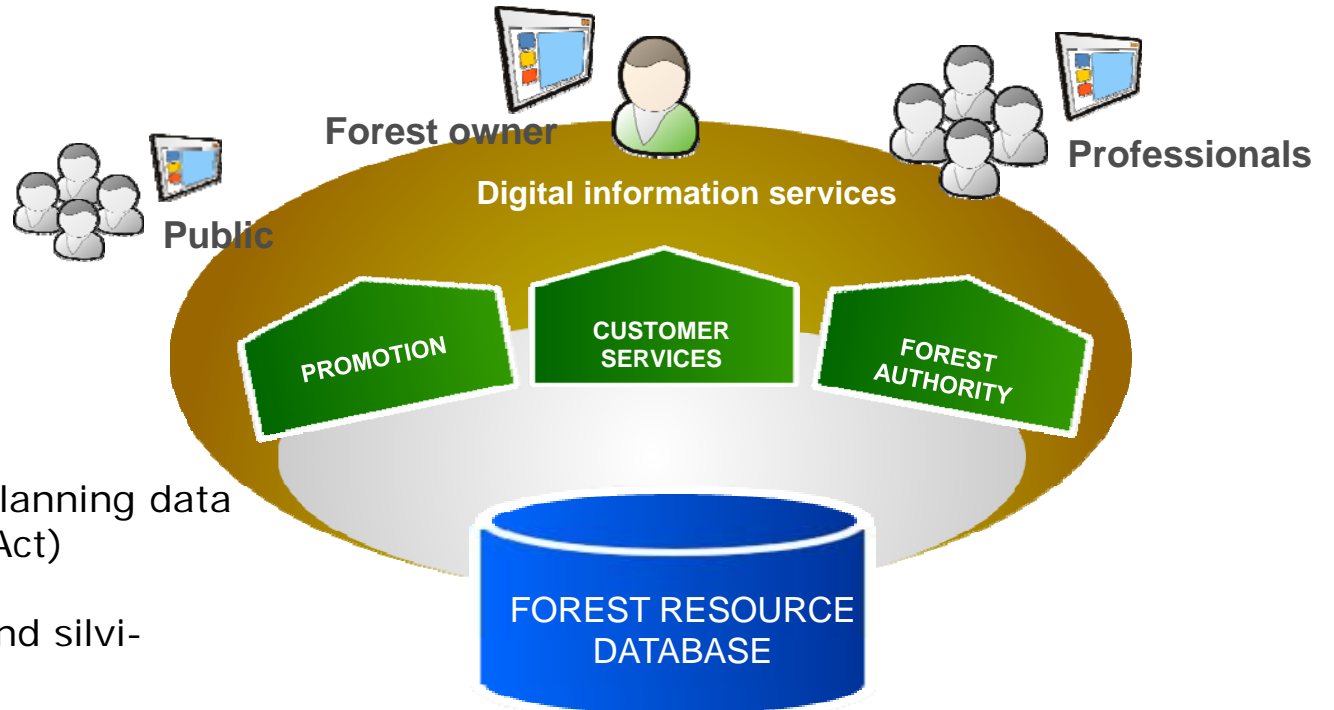


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Centralized database



- Data contents:
 - Forest resource data
 - Forest management planning data
 - Key biotopes (Forest Act)
 - Forest Authority data
 - Carried out cuttings and silvi-cultural works
 - Cadastral data
 - Aerial photographs, laser scanning data
 - Other external geographic data: topographic maps, protected areas, Natura 2000, ground water areas, prehistoric monuments etc.
- Users
 - Current users: Forest authority (~200 users)
 - Initial phase, 2010: Forest data collection and management (~400 users)
 - 2010 and later: Forest extension services (public funding), Forest management planning, Forest improvement, altogether ~850 users



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Data acquisition:

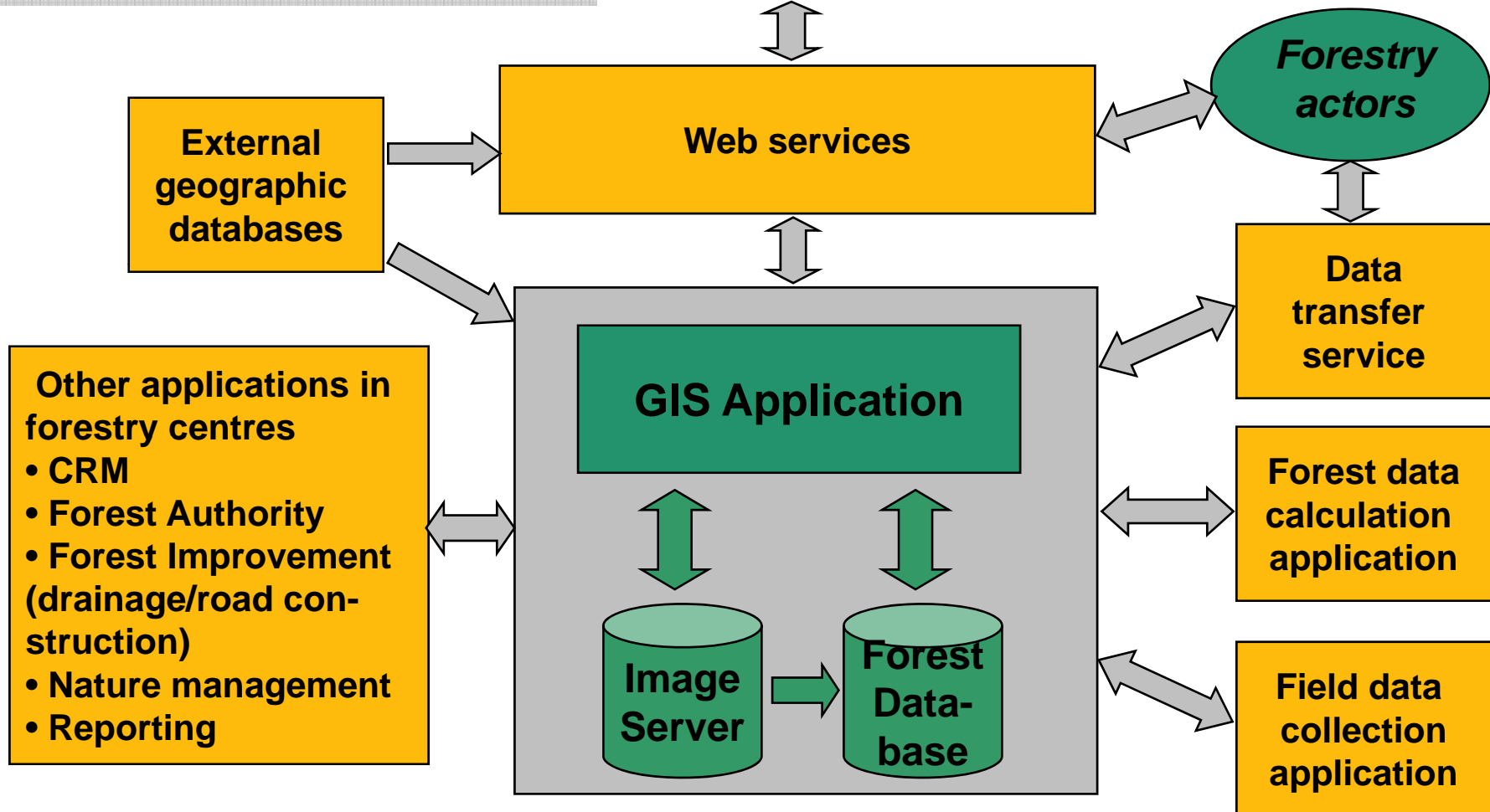
- Regional forest data (inventorying and updating)
- Forest management planning

"UMT"

Forest owner

Products and services:

- Public funding
- Customer funding, ie forest management plans

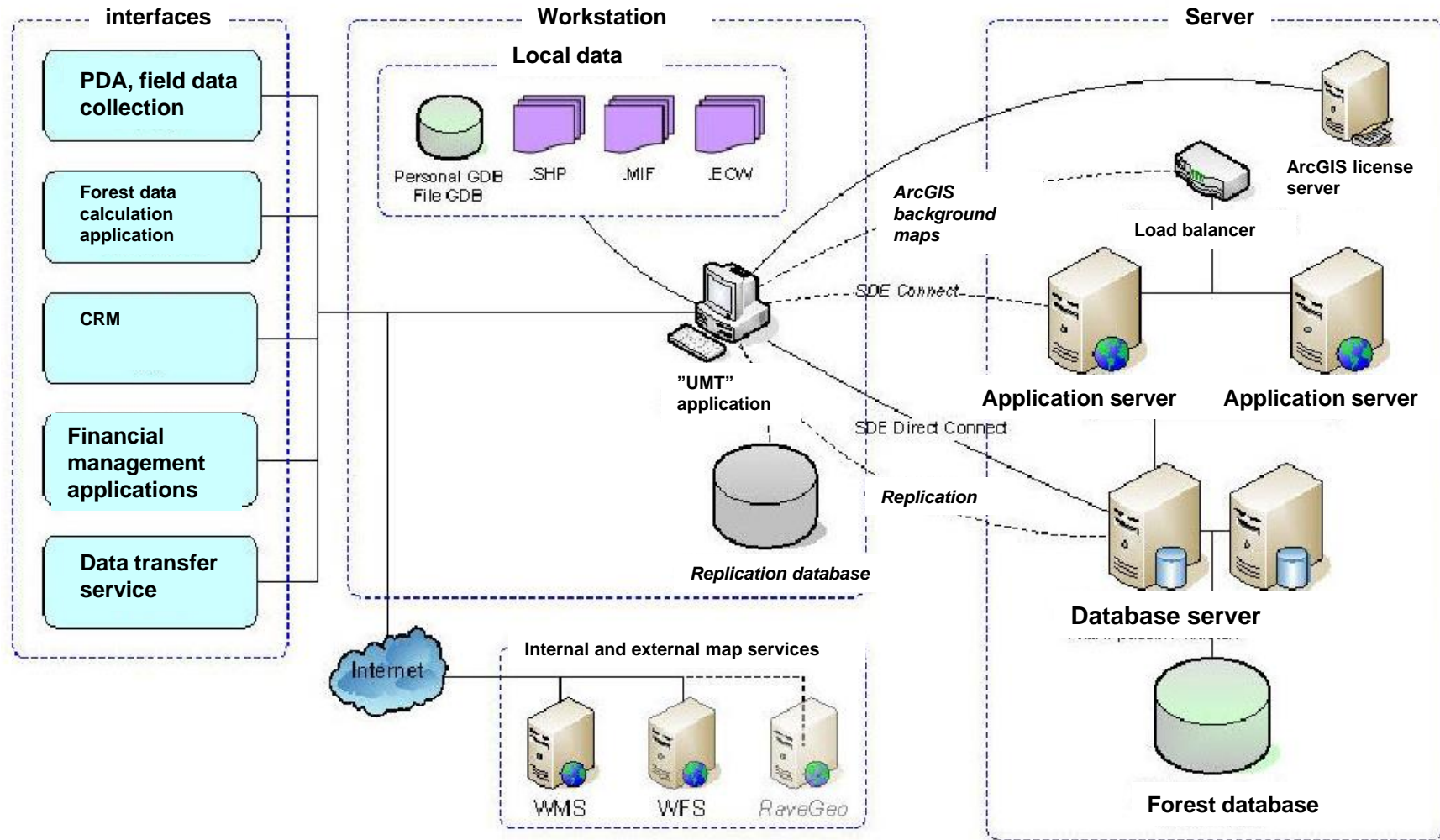


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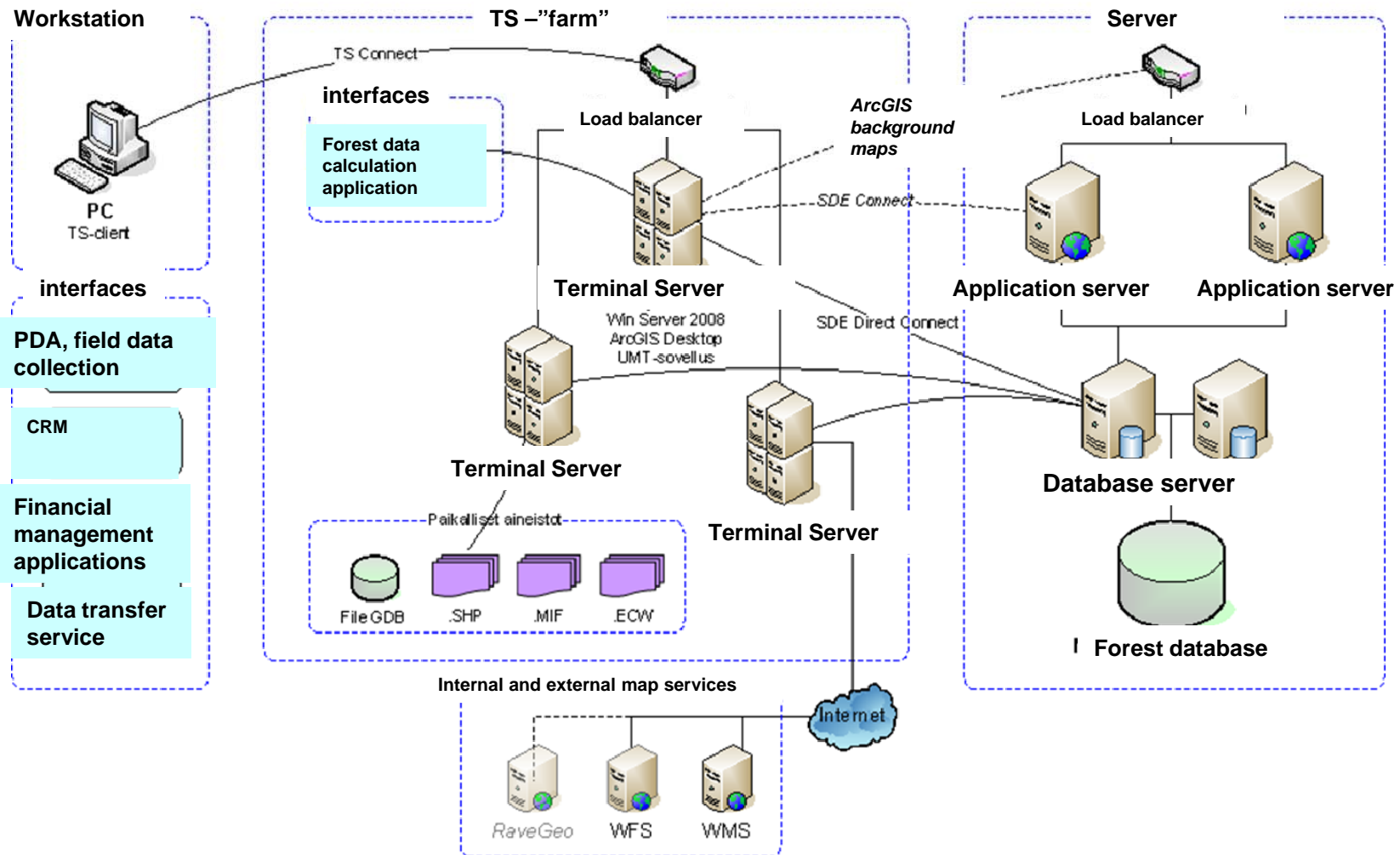


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Architecture



Proposed Terminal – Server architecture



Description

- 2- level architecture, database server and client application.
- Client application: ArcGIS 9.3.1 Desktop tools and tailored functionality based on ArcObjects component library
- Oracle database
- Database connected by ArcGIS Server/ArcSDE
- ArcSDE client connects directly to the Oracle database via SQL*Net protocol (Direct Connect)
- Local files
- Connections to map servers over the Internet (eg. WMS, RaveGeo) and/or connections to the Forestry Centre's own map servers.



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Example: forest stand data

Mv-kuvio

Mv-kuvio

Kuvionno: Pinta-ala: Pr Ar Kp MI Kt KI Ppl Mlt Saav Krai Monm MoLM HTa EhdV Mittauspvm:
14 5,40 1 2 4 60 8 03 1 1 T 0 4.10.2001 Virheet...

Laskentapvm: Ppa: Rluku: Klpm: Kpit: Ikä: Tit: Til (tuk): Til (kui): Kasvu:

Kasvupaikka Puusto Biomassa Toimenpide-ehdotukset Kehityssuhteet Monimuotoisuus Tunniste

Pääryhmä: Alaryhmä: Kasvupaikkaluokka:
1 Metsämaa 2 Korpi 4 Kuivahko kangas, vastaava suo ja puolukk

Maalaji: Kuivatusilanne: Ojitusvuosi:
60 Turvemaa 8 Muuttuma 1986

Kehitysluokka: Pääpuulaji: Metsikön laatu:
03 Varttunut kasvatusmetsikkö 1 Mänty 1 Kehityskelpoinen, hyvä

Saavutettavuus: Käytön rajoitus:
T Vain kun maa on jäässä 0 Ei käyttörajoituksia

1 / 1 Päivitä Muokkaa... Sulje

The rest of the user interface is still under construction

Some products and services based on the forest resource database

- **Services for forest owners, public funding**
 - Free information letter
 - Forest information web service, including Forest Authority matters
- **Services for forest owners, customer funding**
 - New Forest management plan: from inventory report to interactive planning
 - Forest management plan web service
 - Updating service
 - Personal advisor



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Some products and services based on the forest resource database

- **Services for forestry actors**
 - Web service for work planning and marketing
 - Data by stand or forest holding, management based on permissions given by forest owners
 - Forest management planning and advice to customers with agreement with forest companies etc.
 - Different information services (summaries for bigger areas, geographic data etc.)



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