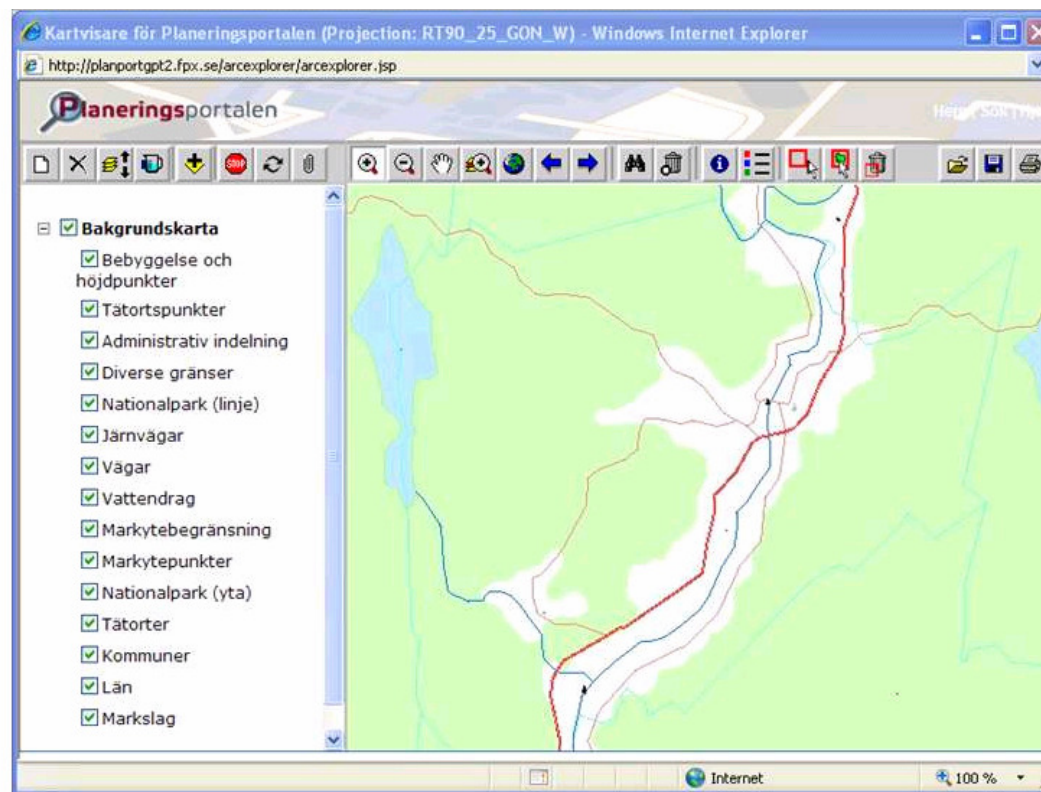


Usability Testing of Legibility Constraints

**Hanna Stigmar and Lars Harrie
Lund University, Sweden**



The Swedish Planning Portal - Planeringsportalen



Our study

- 1. Define readability measures**
- 2. Perform usability tests of the maps**
- 3. Compute readability measures for test maps**
- 4. Evaluate readability measures with respect to usability**
- 5. Select appropriate layers for presentation**



Readability measures

Three measure types:

- Amount of information
- Spatial Distribution
- Object complexity

Five information types:

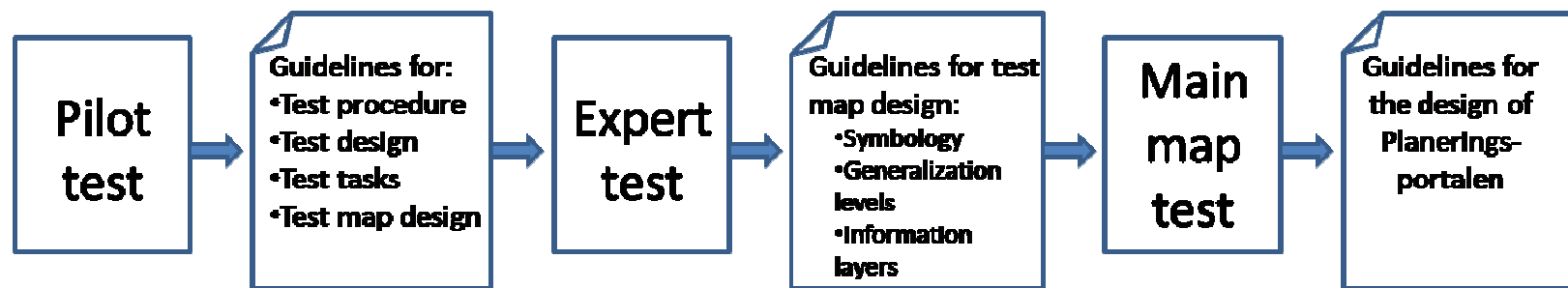
- Minor objects
- Line networks
- Area objects forming tessellation
- Field-based data
- Foreground data



	Measures of amount of information	Measures of spatial distribution	Measures of object complexity
Minor objects	<ul style="list-style-type: none"> • Number of objects • Number of points in the objects • Object line length • Object area 	<ul style="list-style-type: none"> • Spatial distribution of objects • Spatial distribution of points • Number of neighbours • Individual density • Proximity indicator 	<ul style="list-style-type: none"> • Object size • Line segment size • Angularity • Polygon shape
Line networks	<ul style="list-style-type: none"> • Number of objects • Number of points in the objects • Object line length 	<ul style="list-style-type: none"> • Proximity indicator 	<ul style="list-style-type: none"> • Line segment size • Line connectivity • Angularity
Area objects forming tessellations	<ul style="list-style-type: none"> • Number of objects • Number of points in the objects • Object line length • Object area 	<ul style="list-style-type: none"> • Number of neighbours 	<ul style="list-style-type: none"> • Object size • Line segment size • Angularity • Polygon shape
Field-based data	<ul style="list-style-type: none"> • Number of objects • Number of points in the objects • Object line length 	<ul style="list-style-type: none"> • Number of neighbours 	<ul style="list-style-type: none"> • Line segment size • Angularity
Foreground data	<ul style="list-style-type: none"> • Number of objects • Number of points in the objects • Object line length • Object area 		
All objects	<ul style="list-style-type: none"> • Number of object types 	<ul style="list-style-type: none"> • Homogeneity in a group 	



Usability tests



Task types:

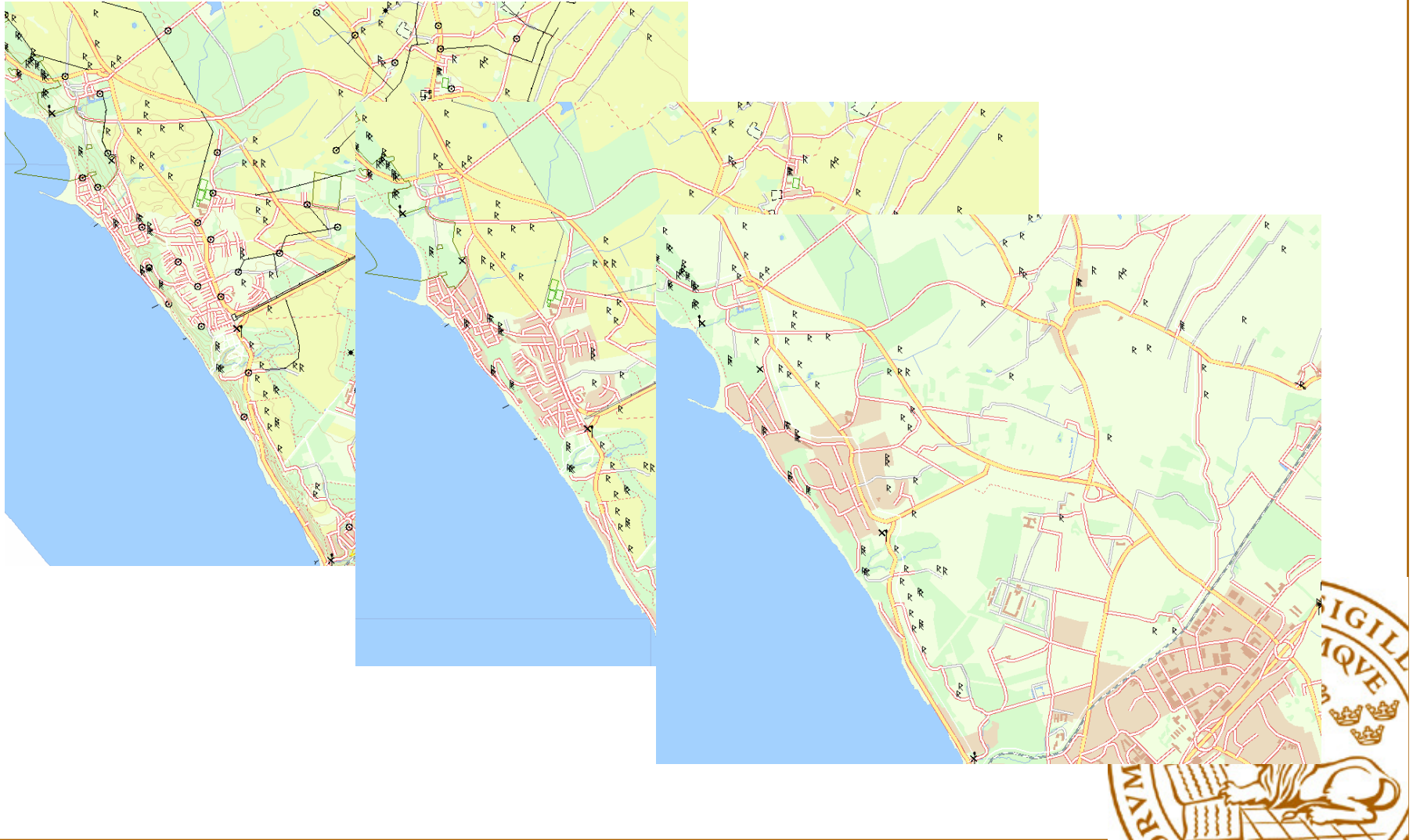
- finding specific feature
- describing feature
- retelling specific feature
- preference test



Thank you!



Pilot test

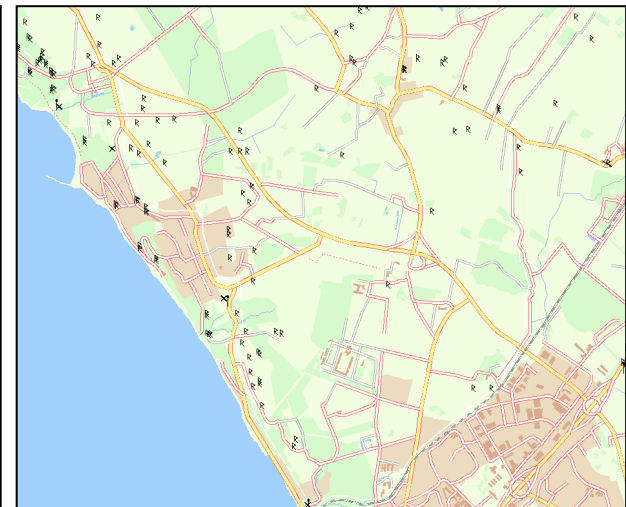
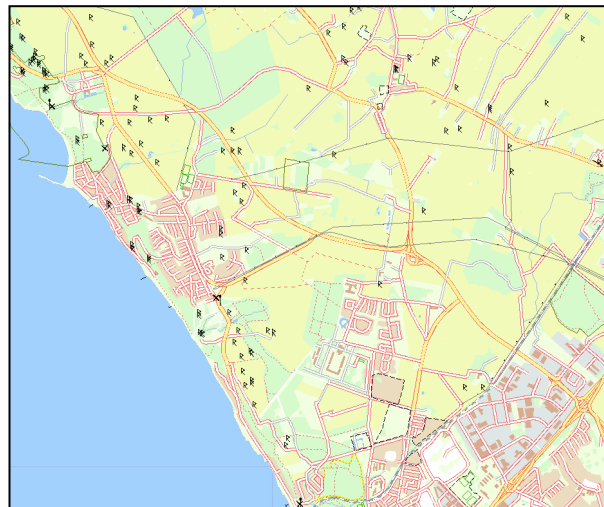
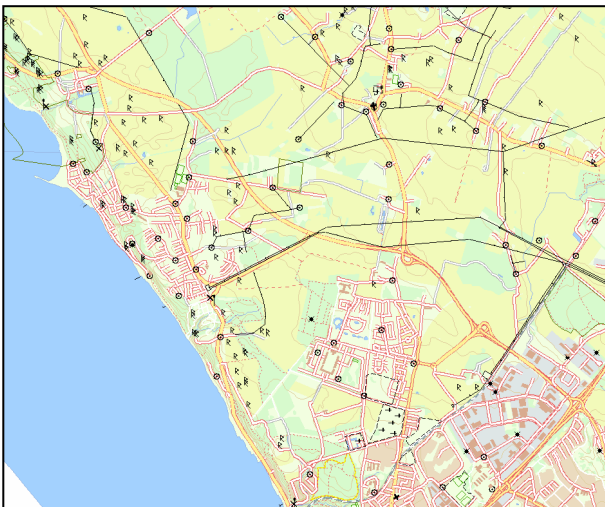
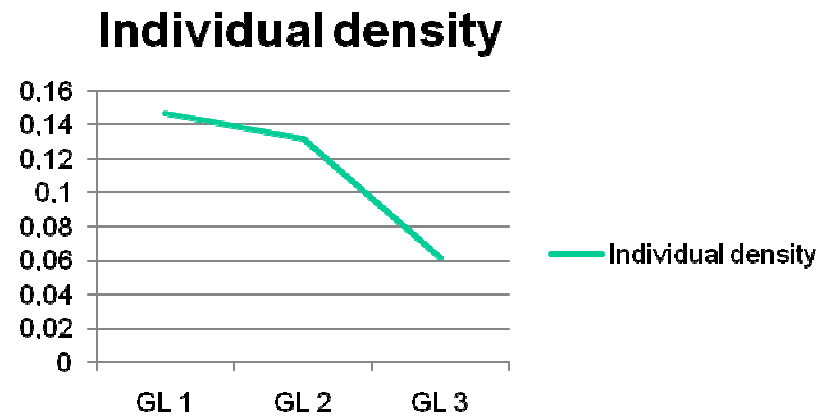


Result of pilot test

- **Test procedure - ok**
- **Test design - ok**
- **Test tasks and discussion questions
- need work**
- **Test map design – needs work**



Result reflected by readability measures



Future work

- **Design and perform expert test:**
 - Improve the test tasks
 - Reformulate the discussion questions
 - Add more information layers
- **Determine how to analyze the readability measures**
- **Design and perform main map test**



Discussion topics

- **Do we cover all (syntactic) aspects of map reading?**
- **How do we design the user tests to let the result be well reflected by the readability measures?**
- **Should we discuss the symbology with the expert users, or just use a predefined one?**
- **Other issues?**

