Digitalisation of the Finnish Matriculation Examination - geography on the first wave in 2016

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  Matriculation Examination Board

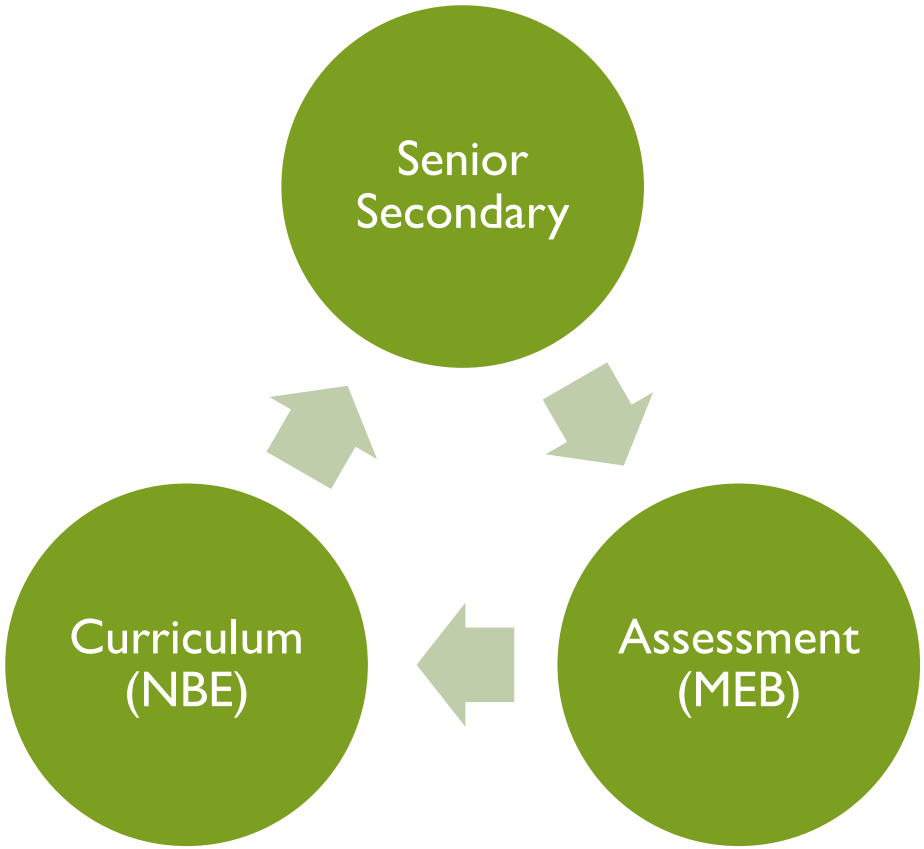
Finnish Matriculation Examination

- Over 150-year-old national institution
- Final exam for upper secondary school (after the 12th school year)
- Easiest way to get accepted to the Finnish and foreign universities for the Finnish students
- Year 2011:
  - About 50 000 individual students
  - Over 200 000 individual tests

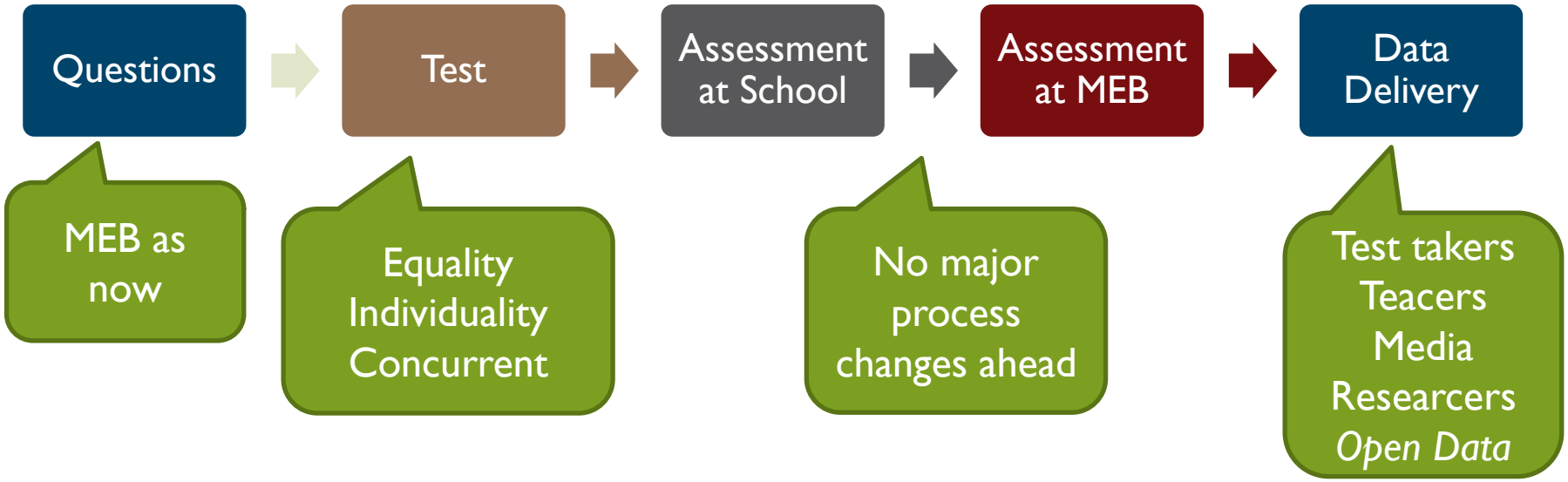
Matriculation Examination Board (MEB)

- Bureau of ample 20 officers and few hundred part-time subject specialists
- Regulated by
  - Section 18 (766/2004) of the Upper Secondary School Act
  - the Act on the Organisation of the Matriculation Examination(672/2005)
  - the Government Decree on the Matriculation Examination (915/2005)
- Financed by test fees (2/3) and government (1/3)

Between a rock and a hard place

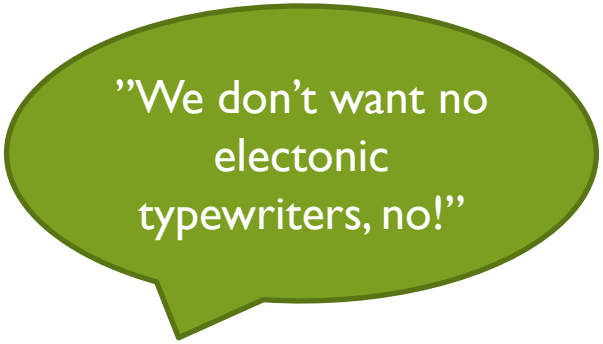


High-level Process Diagram

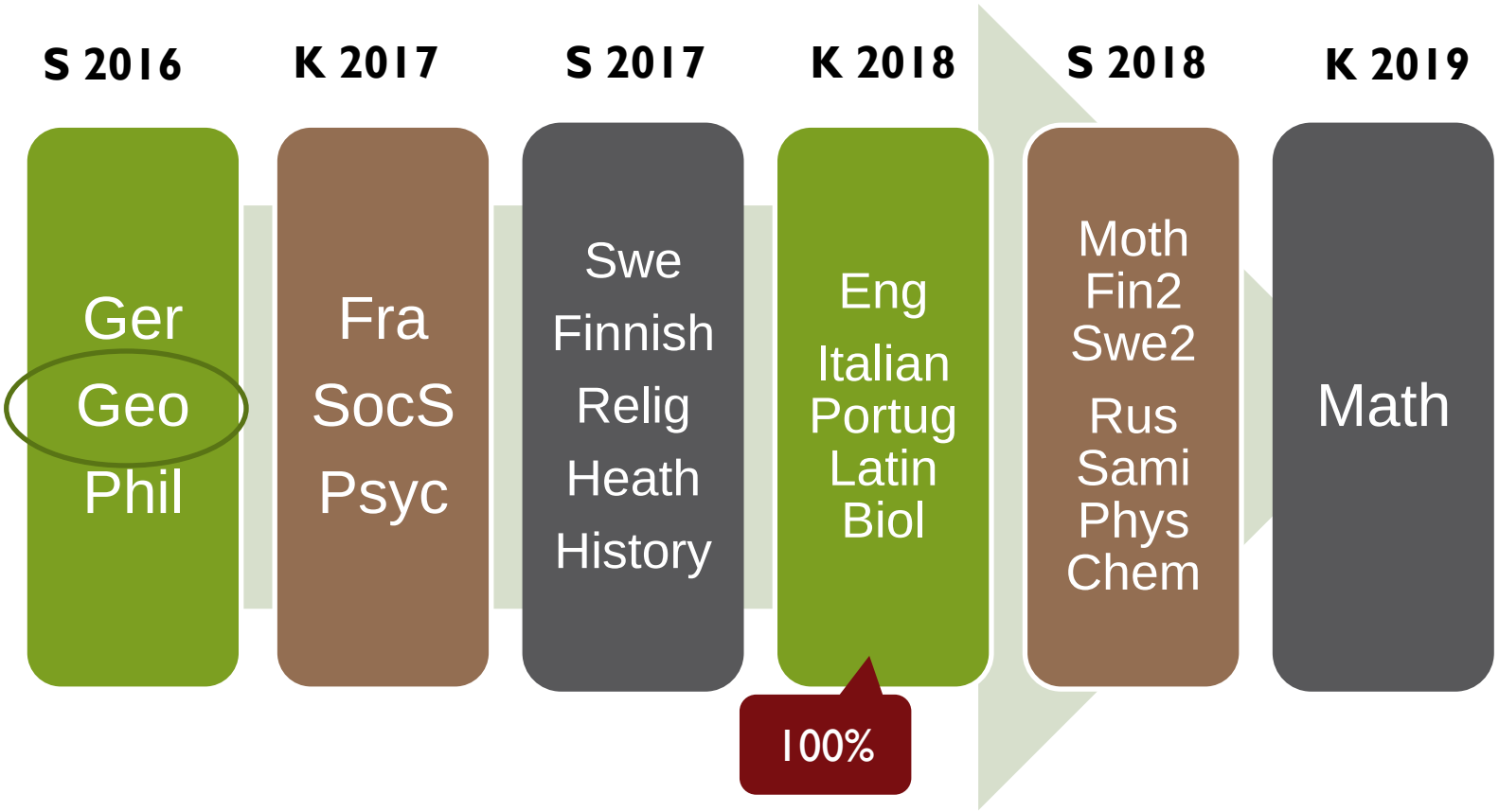


New Possibilities for Authors

- Test authors will probably add more material for the questions
  - Text documents, authentic documents (e.g. advertisements)
  - Pictures, sound, video, simulations
  - Geospatial information
  - Finding correct references, proper use of references
- Students tend to write a bit faster with devices
- The richer questions and materials need more time



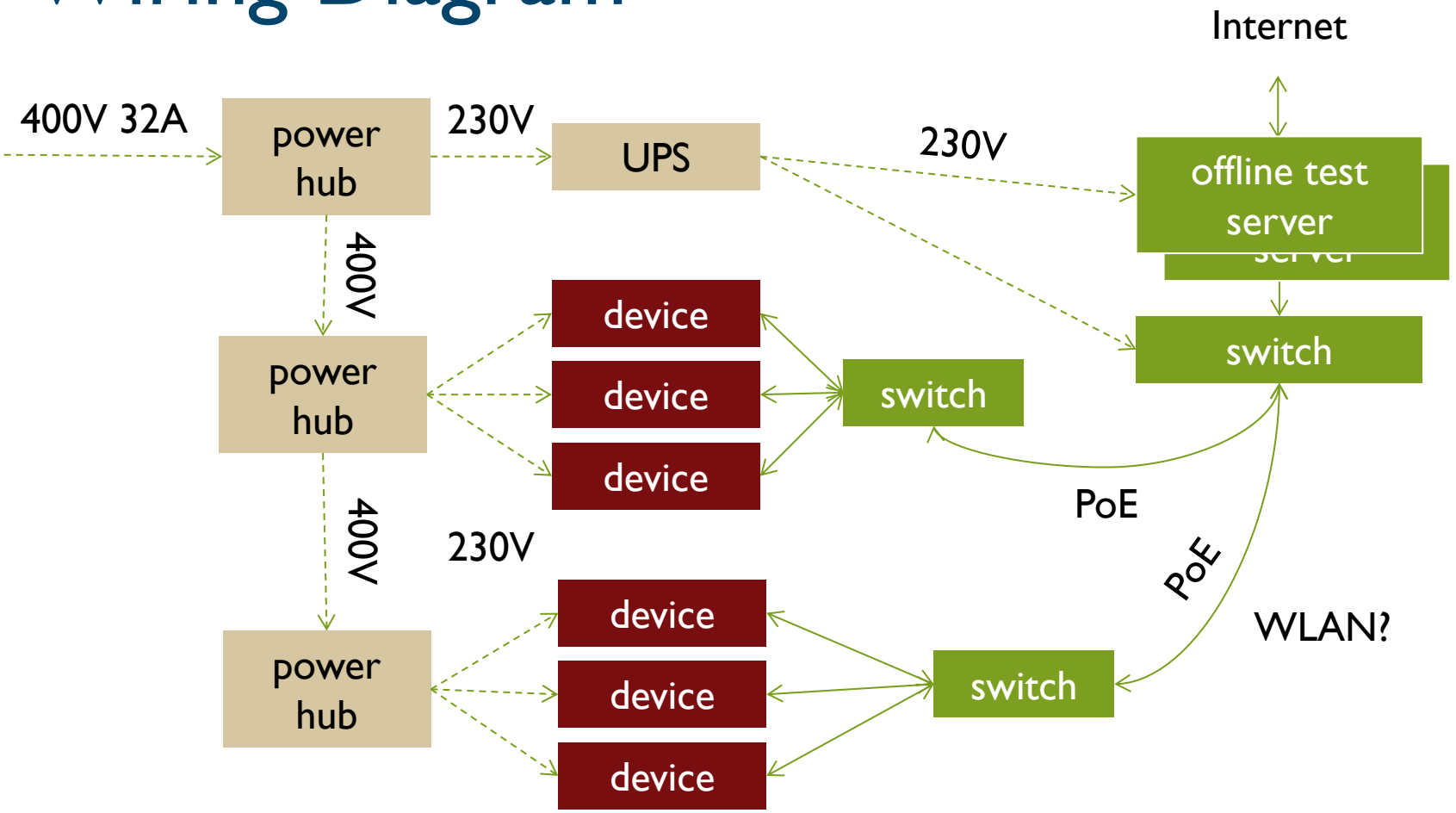
Phases of Implementation



Project Status: First MVP is ready

- Preliminary operational and non-operational requirements are known
- Preliminary threat models and precautions planned
- The coding has started
- First MVP (Minimum Viable Product) is ready
  - Final test for a philosophy course for 20 students
  - Software worked as planned
- Target for the autumn 2014: MVPs for authoring, school server, assessment

Wiring Diagram



Supported Device #1

- First supported device: x86 laptop
  - Very modest requirements : CPU 2 GHz, RAM 2 Gt, bootable from USB/CD, both Ethernet and WLAN, audio (in/out)
  - Demo Live CD/USB based on Debian 8:
    http://digabi.fi/hackabi
    https://github.com/digabi
- Some devices from the schools, some from the test takers (some from the hazardous waste disposal plants)
- Initial software published at digabi.fi

Offline Test Server

- Item Player (HTML5)
- Stores answers, log entries and records to MEB
- Will contain HTML5 web services
  - Article database
  - Service for maps and other geospatial data
  - Dictionary
- MEB supplies installation media (or bootable live)
- Black Box: Not administrable by local IT support
- Workstation-level device should be sufficient, clustering for 100% uptime

Bringing geospatial information to local servers

- Finnish material through Oskari (http://oskari.org)
  - OS user interface for various data sources (Inspire SDI, Finnish SDI)
  - Known to Finnish schools via Paikkatietoikkuna, a service by National Land Survey of Finland
  - Proof of Concept is waiting for load tests
  - EPSG:3067
- International material using Geoserver
  - EPSG:3857

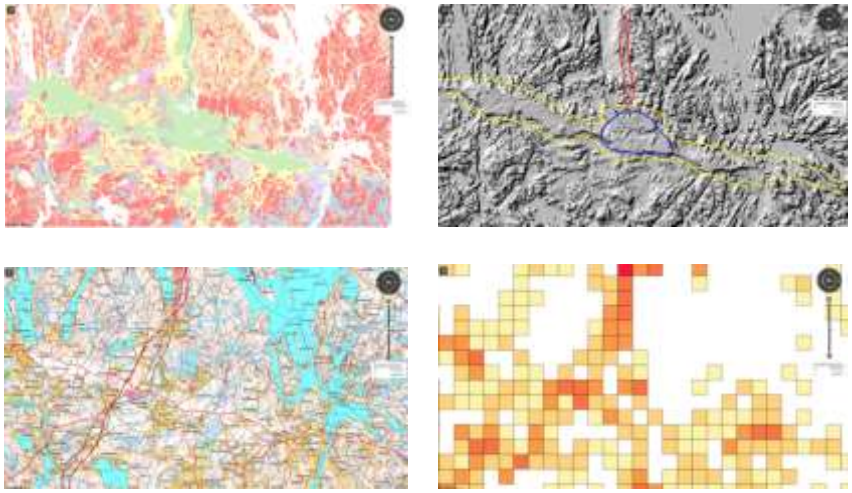
Server architecture

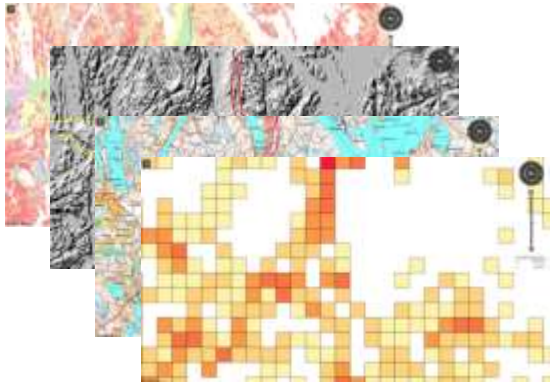
- Exam server (item player)
  - Debian server (live, boots currently from a USB stick)
  - PostgreSQL, nginx, Scala (Java VM)
- Oskari is written in Java
  - Jetty web server ja Java servlet
  - Redis, Geoserver, PostgreSQL, PostGIS
  - MapProxy for offline caching (1-2 terabyte USB storage)

Example 1

a) Nimeä luonnonmaantieteelliset muodostumat, jotka on ympäröity kuvassa sinisellä, punaisella ja keltaisella viivalla.
b) Miten kyseiset muodostumat ovat syntyneet?
c) Miten muodostumat ovat vaikuttaneet maankäyttöön alueella?

Example 2, from separate maps to layered geospatial information





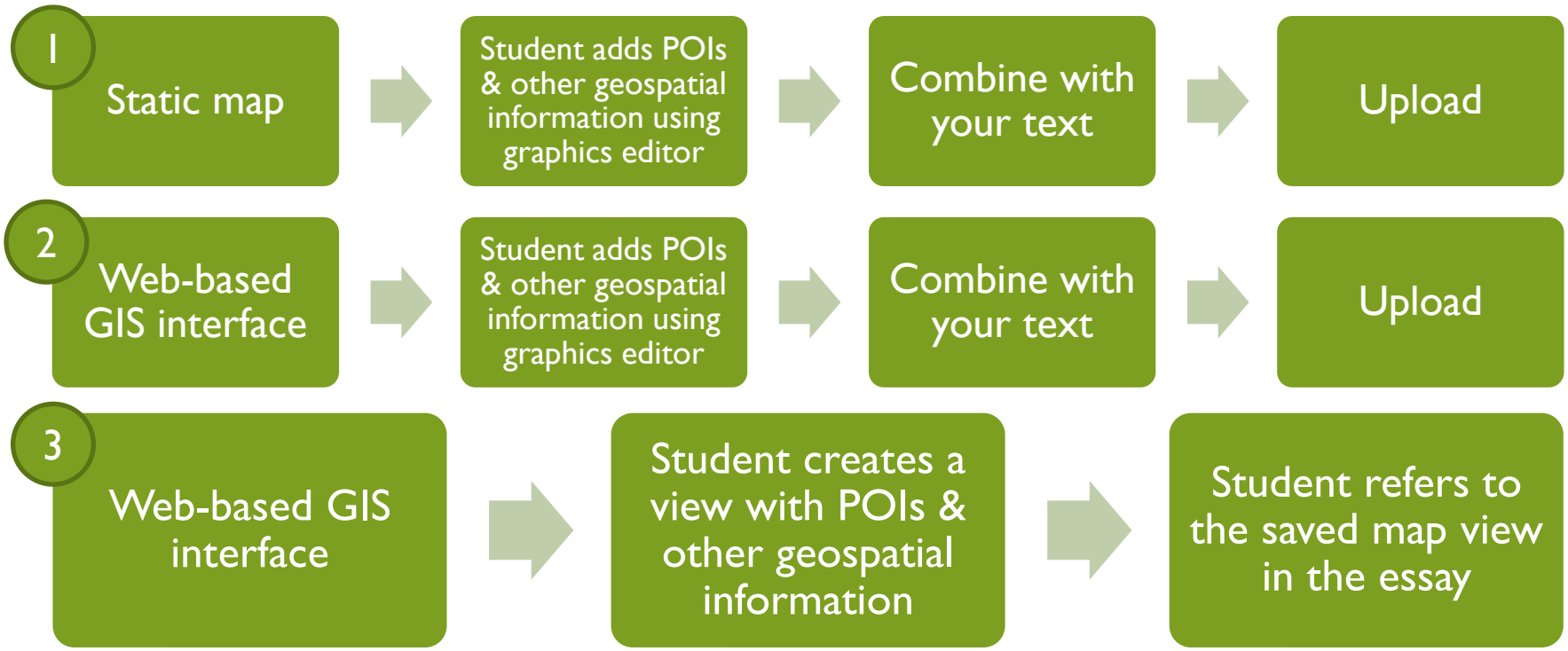
Example 2

a) Laadi Paikkatietoikkunan Karttaikkuna-palvelussa teemakartta (koropleettikartta) kuntien välisestä nettomuutosta Suomessa vuonna 2012.
Valitse teemakartan aineistoksi *”Kuntien välinen nettomuutto / 1000 asukasta”*. Tallenna valmis kartta ja liitä se mukaan vastaukseen.

b) Tulkitse laatimasi kartan avulla maassamuuton alueellisia piirteitä. Pohdi myös maassamuuton syitä. (8 p.)

c) Millaisia seurauksia muuttoliikkeestä on kunnille? (8 p.)

Answering processes



Outcomes so far

- Enhanced interest in web-based geospatial information
  - Paikkatietoikkuna (National Land Survey of Finland)
  - Paikka Oppi (joint effort by 8 organisations, partially funded by National Board of Education)
- Anxiety among geography teachers
  - Spreadsheets to create climate diagrams
  - Geospatial services
  - Cry for in-service training
- A lot of technical challenges for the development team

Schedule

2014/Q3	Operators' Manual
2014/Q3-4	Ethernet or WLAN? Requirements for the hardware
2014/Q4	MVPs cover basic process: authoring items, test and assessment
2015/Q1	First complete version of local server software based on MVPs
2014-2015	The most active years of development
2016/Q1	Large concurrent tests (preliminary exams for spring 2016?)
2016/Q3	First exams (production)

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