Two educational softwares

- DSP and Composing With Sounds

The context for development of DSP

Ministry of education, mid-90s developed new ambitions for technology in schools. In music, children should compose AND use technology

- NOTAM a national studio, at the time the only resource- and competence-center for music technology in the country. Responsibilities for education, dissemination of digital means and methods in research and artistic expression
- Electroacoustic "values" – awareness of listening, learning about sound as physics and art, music of sounds, development of musical competence, interest and tradition

- Music community activity for engaging young people in contemporary music practices, through workshops and performances.

In sum: A general modernization project

And today: The digital revolution is over, and electronic music is the new folk music, with the computer as the main instrument

The challenges

Early 1990s

- The digital revolution was generally in its beginning, signal processing in music was starting to became possible, but was still costly.

- Familiarity with electronic sounds and electroacoustic aesthetics was largely non-existent, but computer games were established (consoles)

- There was virtually no education in music technology at any level in Norway, only a tiny bit at two universities, but mostly on MIDI-level.

- Computers were uncommon among average families.

- The schools did not have computation resources, normally. No educational programs were in place re. digital literacy.

The average computer had small disk capacity, small CPU capacity.

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Educational models and design issues

Hypertext – cross-linking, making references easily available.
Appealing graphics, with fun elements for the users
<u>Self explanatory, easy-to-use software,</u> let the students get answers when they ask, instead of instruction before starting
<u>Modern design, referencing computer games, tech look-and-feel</u>
Complete demo of the program, interactive and with a computer music animation

<u>Constructivist approach to meaning-making</u>
<u>Exploration, non-linear open exploration</u>
Bigger need for help files and iterative help instances
Always sounding results, and with parameter constraints to secure that the results are of acceptable quality for the users

User-selection of material
Creative work as play, independent

Results, presentations for class
Presentations for more public contexts such as festivals, radio…

Software functionality and text content

Made when DSP was only starting to become possible on small computers.
Only synthesis (nearly) was practical on school computers with small capacity.

Sound synthesis: Additive, FM, Plucked string, Buzz, Noise
Distortion: Ring modulation, Sieve, Spectrum shift, Time stretch, Granulation, Scratch, Algorithmic Composition
Effects: Chorus, Flanger, Delay (incl. doppler and resonant filters), Harmonizer, Filter (4 types), Reverb
Sound editing: normal cut, paste, splice, import recorded sounds, reverse, Room acoustics program, changing room parameters.

Help texts to all software, iterative instances of the programs

Tutorial texts: The history of electroacoustic music, What is sound? (Simple acoustics, frequency and amplitude), Sound in the environment, Harmonics and spectra, Sampling, Digital sound in the computer, Synthesis, Musical signal processing , Working with sound vs. working with notes, Algorithmic composition, Cross-disciplinary similarities in the arts, Realtime- and performance technology, The use of technology within popular music

- a mix of acoustic/physical and musicological/philosophical orientation

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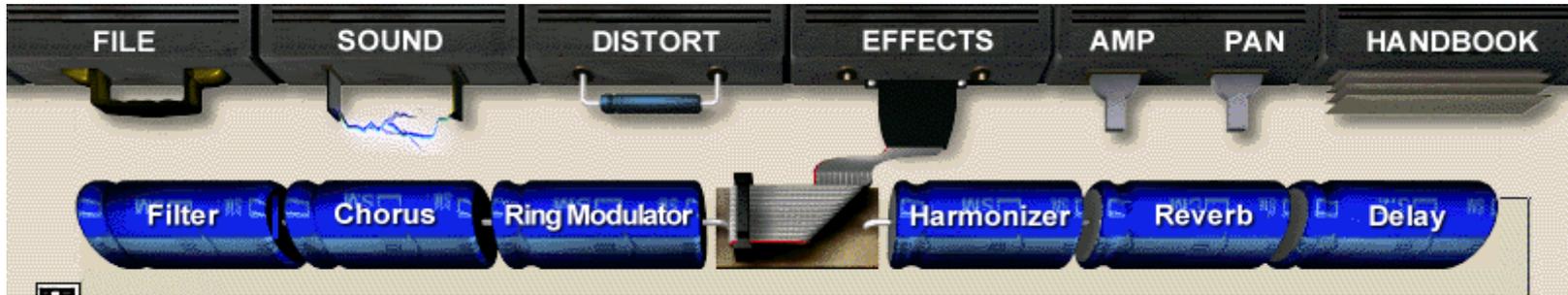
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The context for development of Composing with Sounds

- More technologically mature situation, increased processing power at cheaper price. New development is possible, and needed.

- Educational situation still in need of plans for inclusion of technology.

- International collaboration in tech. development quite common, international consortium of De Montfort university, GRM, ZKM and NOTAM, important centers for technology-based music. Responsibilities for education, dissemination of digital means and methods in research and artistic expression

- Electroacoustic "values" – the aesthetic awareness of listening coupled with physics and psychoacoustics remain the same, however the practices have changed.

- Music community activity for engaging young people in contemporary music practices remain the same, through workshops and performances.
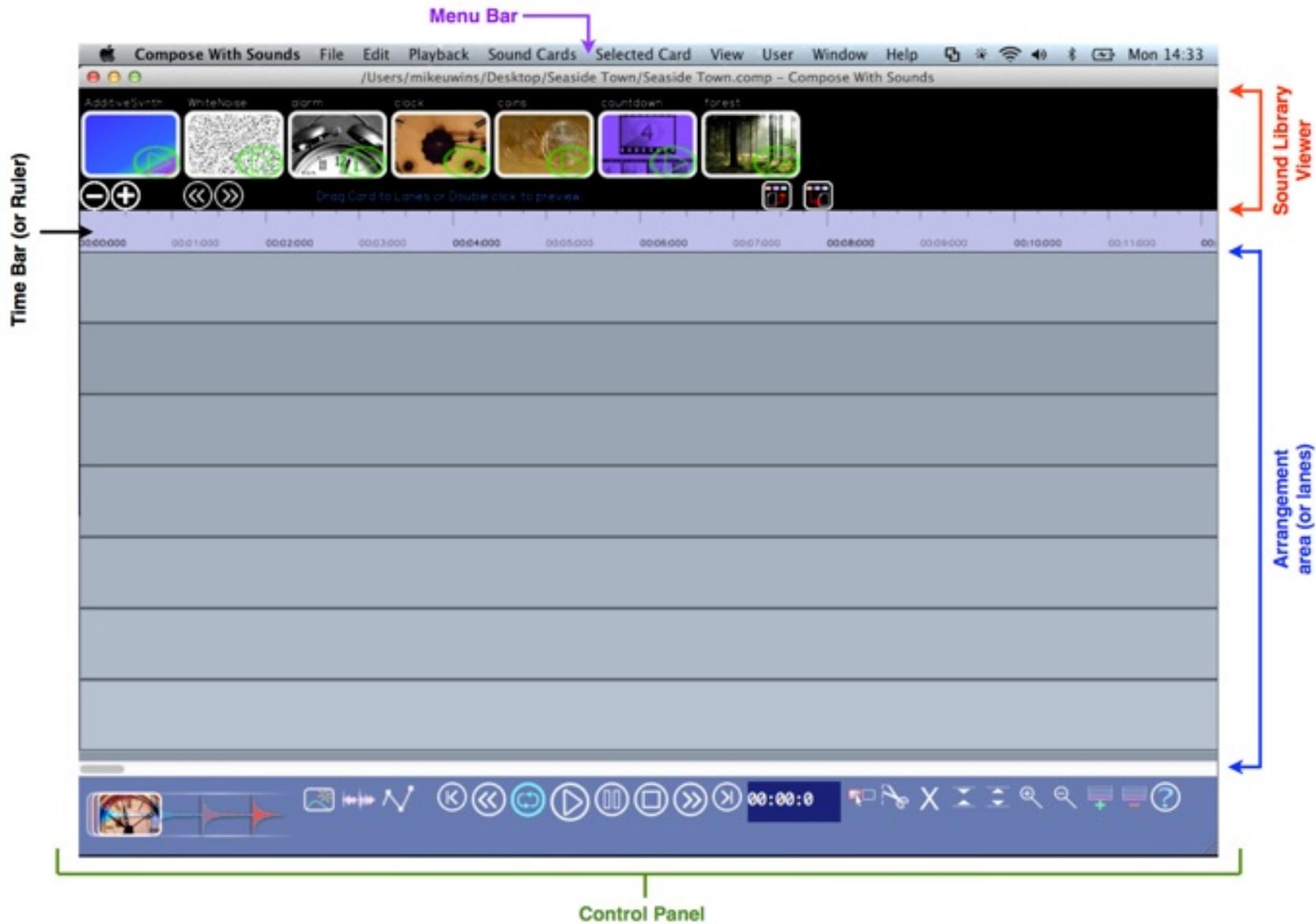
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Delay

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Differences among the softwares

Conceptual differences (abstract or source-cause, waveforms, cards with pictures)
GUI graphic differences, workflow (CwS more dialog windows)
Complexity in language and DSP methods (increased in CwS)
Graphic look-and-feel
Social software wrapping on website (to be developed)

These might be more important than expected

Educational aspects: DSP features open investigation, CwithS in addition provides
<u>learning structures</u>, which can restrict users(pupils) to teachers' sets of sounds and
algorithms, controlling the learning path through the software

Educational texts at DSP website, CwS links to EARS2
CwS uses video instruction instead of textual and interactive demos

Research shows:
Open, not restricted, investigation gives more learning
Dialogue helps learning
Creative work enhances learning also for other disciplines in school

Typical best-practice use, two examples

1) Grünerløkka elementary school, children (12-15)
    attention to personal, local environment, soundscape, children

2) ReMake, highschool students (17-19)
    music and art history, analysis, recreation

Praxis, teaching in the classroom
- adjust content and tasks to age groups
- workshop model
- finding sounds, discussing,
- processing, composing
- presenting, local and wider framework

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Møllergata elementary school, Oslo
- Soundscape, hearing and listening

Children, 5th to 7th grade. Their sound environment
Fit in two double classes - 4 hrs.

- Soundwalk – environmental listening
and discussions, dialogue
- Recording, editing, uploading
- Lab workshop, playing and
recognizing sounds, discussing
- Processing and composing,
talking, discussing
- Presenting

Technology education
hidden in the content
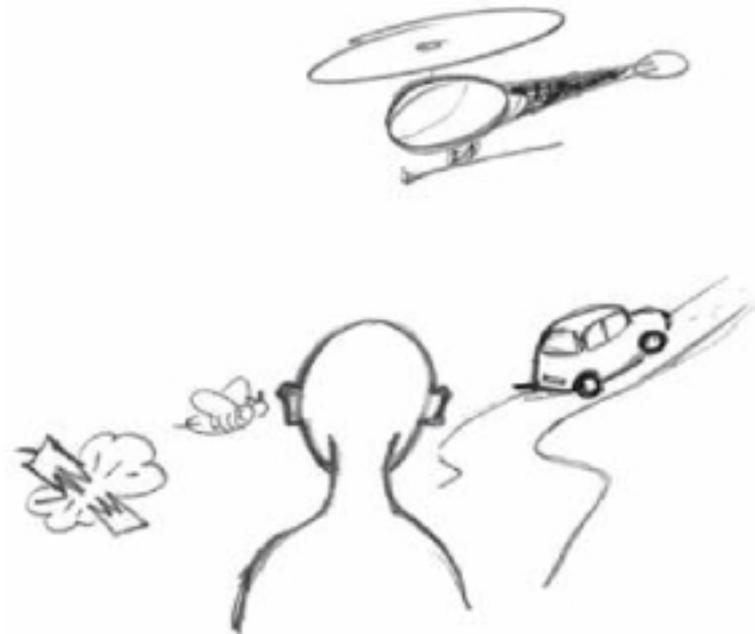
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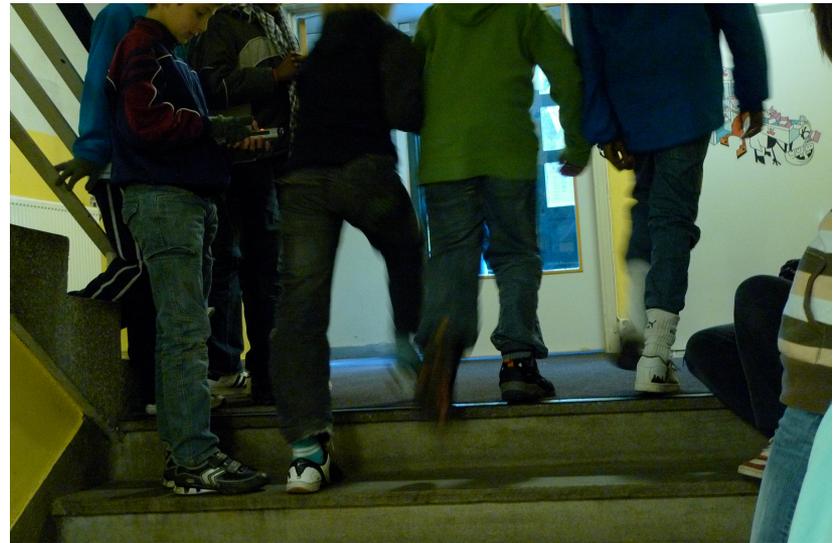
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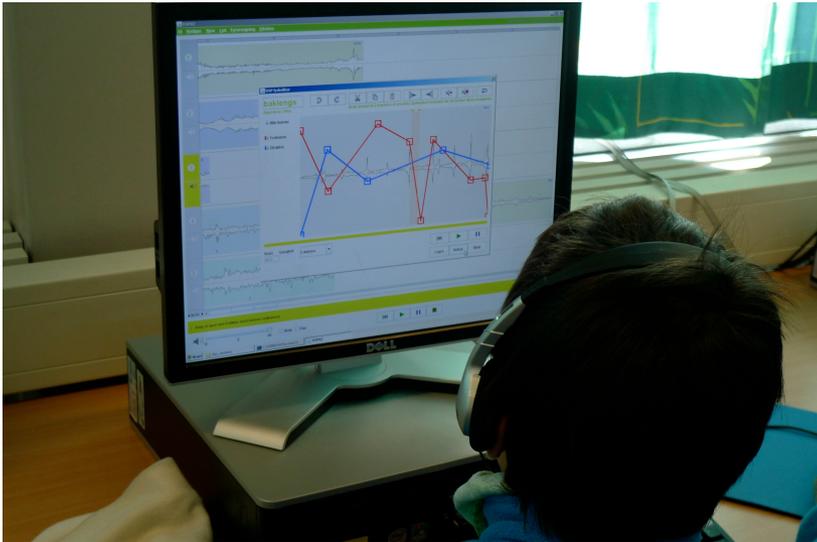
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Elvebakken highschool
- ReMake, a part of the Ultima festival

Educational for high school level.
Art and music historical competence
Music specific listening and analysis
Creative work and presentation with national visibility

Workshop analysis of historical work Berio, *Sinfonia*
          - uncovering structure, developing the reconstruction
Concert experience suring the Ultima festival
Presentation of the installation with the results
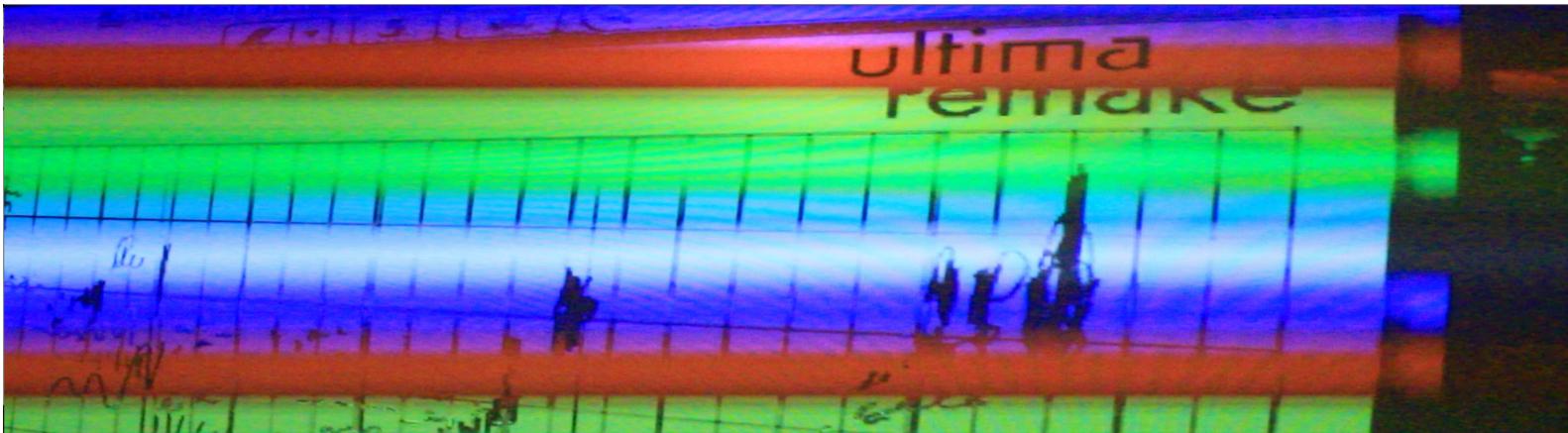
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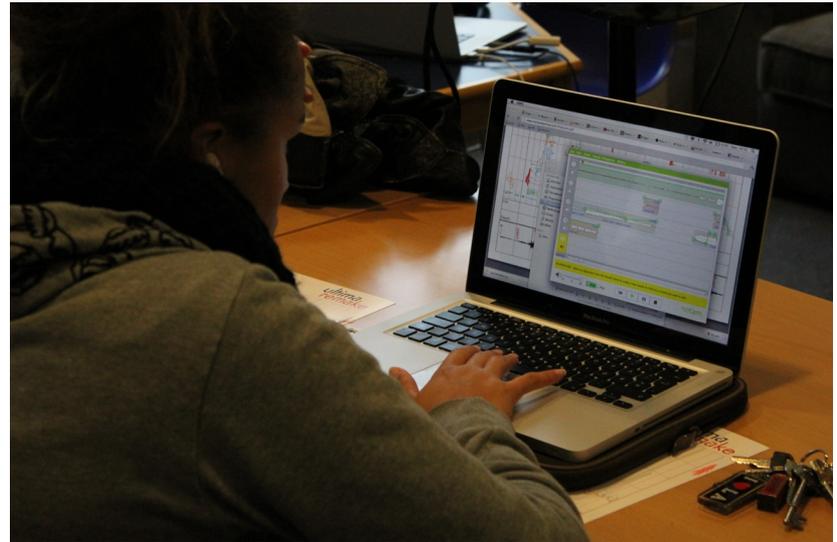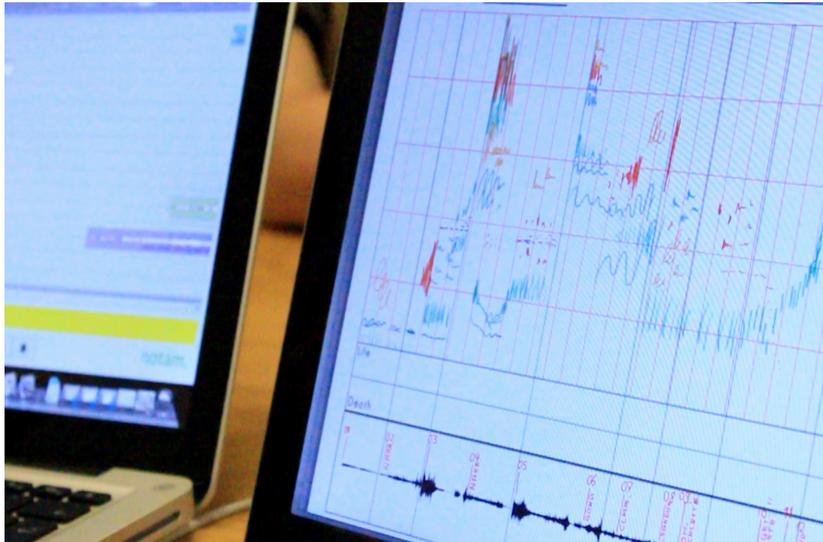
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Challenges in the educational situation

What we know:
- Play is not enough
- Dialogue and sharing gives more learning
- Open exploration gives more learning
- Creativity is essential. (Research shows that artistic work creates new pathways in the brain, optimizes for learning.)

Challenges:
- How can we teach core topics when students are choosing their own learning trajectories?
- How can we make sure that technology does not get in the way, but stays invisible?
- What is optimal software design, educational design, and design of learning materials?

Method:
Observation of practices, video recordings, notes, interviews helps to factually ascertain what has been learned across geology and culture, linking theory and empirical data.

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Thanks for your attention!

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