# Ten Years of OpenMath

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# Dream of a Mathematician

## Helmut Lenzing, Euromath Bulletin, August 1992:

A second instance of my dream relates to Symbolic Computing. Imagine that checking your latest paper you become in doubt whether a certain formula is correct.

Disposing of this phantastic EUROMATH everything needed were to select the formula under review and to invoke a special key.

These actions would activate a powerful Computer Algebra system doing the check and coming back to you with the correct answer.

Extract from an article describing the goals of the Euromath project initiated at the ICM in Warsaw in 1983 and directed initially by Sir Michael Atiyah and Michel Demazure.

# Reality Steps In

David A. R. Wallace: The History of the European Mathematical Society

"A separate body, the European Mathematical Trust (EMT), had set up a so-called EUROMATH project which was intended to produce software which would provide various services including an advanced mathematical document editor and access to a database. The EMS clearly had an interest in such an ambitious project and, accordingly, Antonio St. Aubyn was appointed to liaise with the EMT; **the inherent difficulties of this project were to emerge over time**."

The Euromath Project was started by a proposal of **Teissier** at the ICM in Warsaw in 1983. It became a very large (at that time) project under the auspices of **Sir Michael Atiyah** during 1984 – 1987. The project continued until mid 90's by which time it was seen as a failure.

Reason for "failure": there was no way to encode mathematics properly.

# Example of Cutting and Pasting: Factorization of Polynomials

Mark van Hoeij invented recently a significant improvement to the factorization algorithm. His new algorithm has been implemented in Maple which can now factorize polynomials of a higher degree than what was previously possible.

Example

The following generalized Buswell polynomial is notoriously difficult to factorize.

$$x^{128} - x^{112} + x^{80} - x^{64} + x^{48} - x^{16} + 1$$

If you have PowerPoint with MathType and Maple 7 or later in your computer, you can highlight this polynomial, cut and paste it to Maple and factorize it.

To be able to do this was a goal of the OpenMath project. Commercial software supports now this kind of operations. There is no turning back!

# Structured Documents vs Typesetting

- General Mark-Up Language (GML) Goldfard, Mosher, Lorie 1969
- SGML development begun in 1978
- Euromath Project (1984 – 199X), Math DTD for SGML (1992)

- Typewriters
- Knuth's TeX 1978–85
- LaTeX 1984 – Lamport
- LaTeX became, in the 1990's, the dominant system to write mathematics

This Euromath DTD embedded LaTeX into SGML documents. Meaning of the formulae was not encoded.

# Ten Years of OpenMath and MathML

1 First OpenMath Workshop, ETHZ, December 1993, G. Gonnet.

2 First OpenMath Project supported by the EU. Co-ordinator: M. Seppälä; partners G. Gonnet, J. Davenport, A. Cohen, J. Slater, R. Timoney, H. Lenzing (1994 – 1996). Series of OpenMath workshops begun. **This is the 24th meeting of the group.**

3 3rd OpenMath Workshop, RIACA, February 1995, A. Cohen. The need of a "restricted" OpenMath became apparent.

4a OpenMath Esprit project, Co-ordinator: M. Dewar (NAG)

4b W3C Math Working Group, P. Ion and R. Miner.

5a OpenMath extends MathML

5b MathML 2 released in 2001

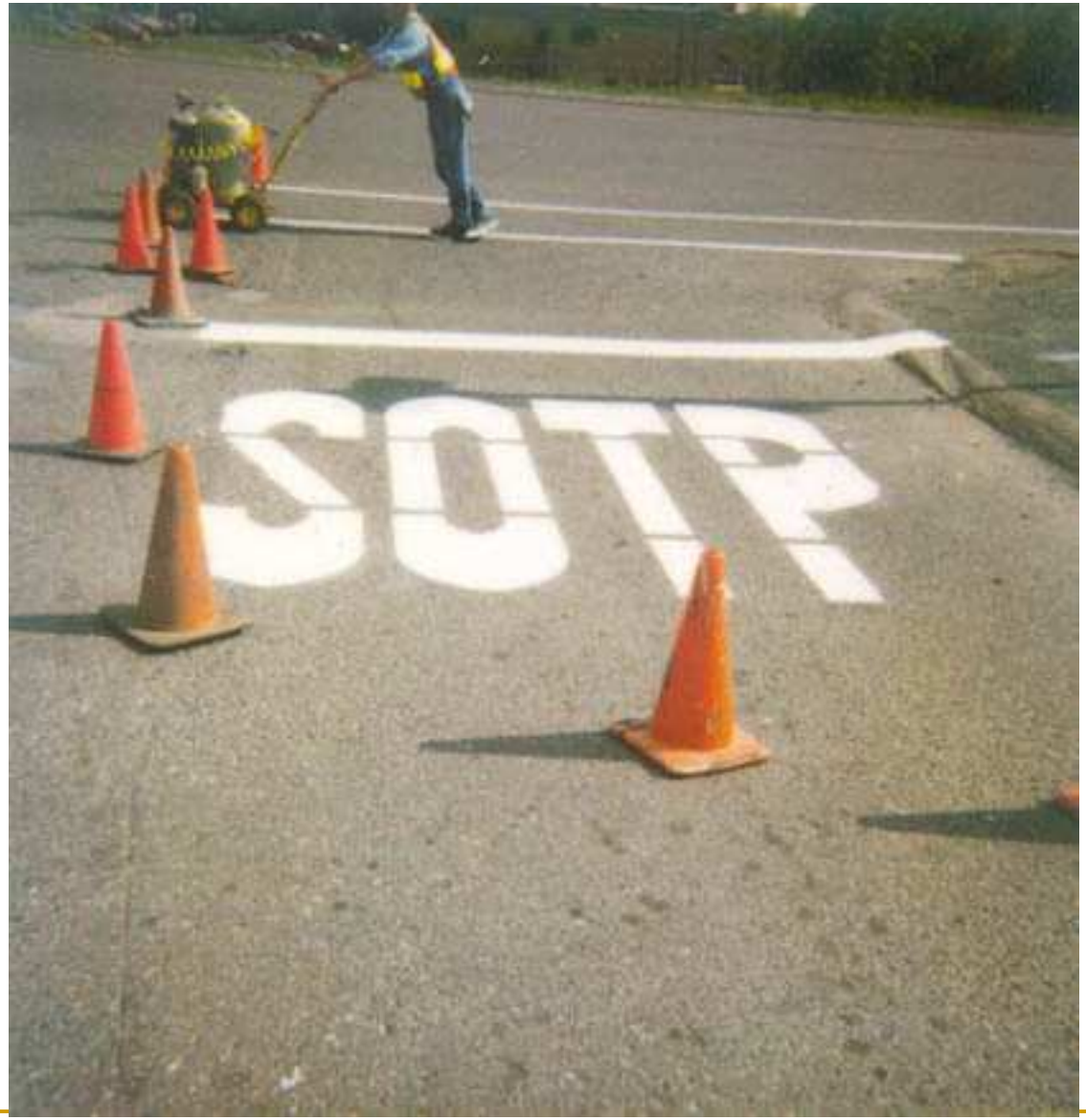
A variety of products support MathML. Leading product: MathType enabling Word and PowerPoint to deal with MathML mathematics.

# Dream of a Mathematician

Helmut Lenzing, Euromath Bulletin, August 1992:

Imagine that in the course of editing a research article you want to **insert a reference** to a paper that you only vaguely remember to exist, and where at most you dispose of partial information on the coordinates. The EUROMATH dream sees no problem at all: **passing this partial information to your computer** and pressing a special key will provoke the system to search first in your personal database, if necessary the system will — without any further human intervention — continue the search in a bibliographical database held by your research group/institute and finally **consult on line at a remote place a database for the Zentralblatt or the Math Reviews.**

This is reality now thanks to AMS, Math Reviews, Zentralblatt. Even more general functionalities are provided by EndNote and other such programs, and by Google. **There is no turning back!**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