

MathML for publishing

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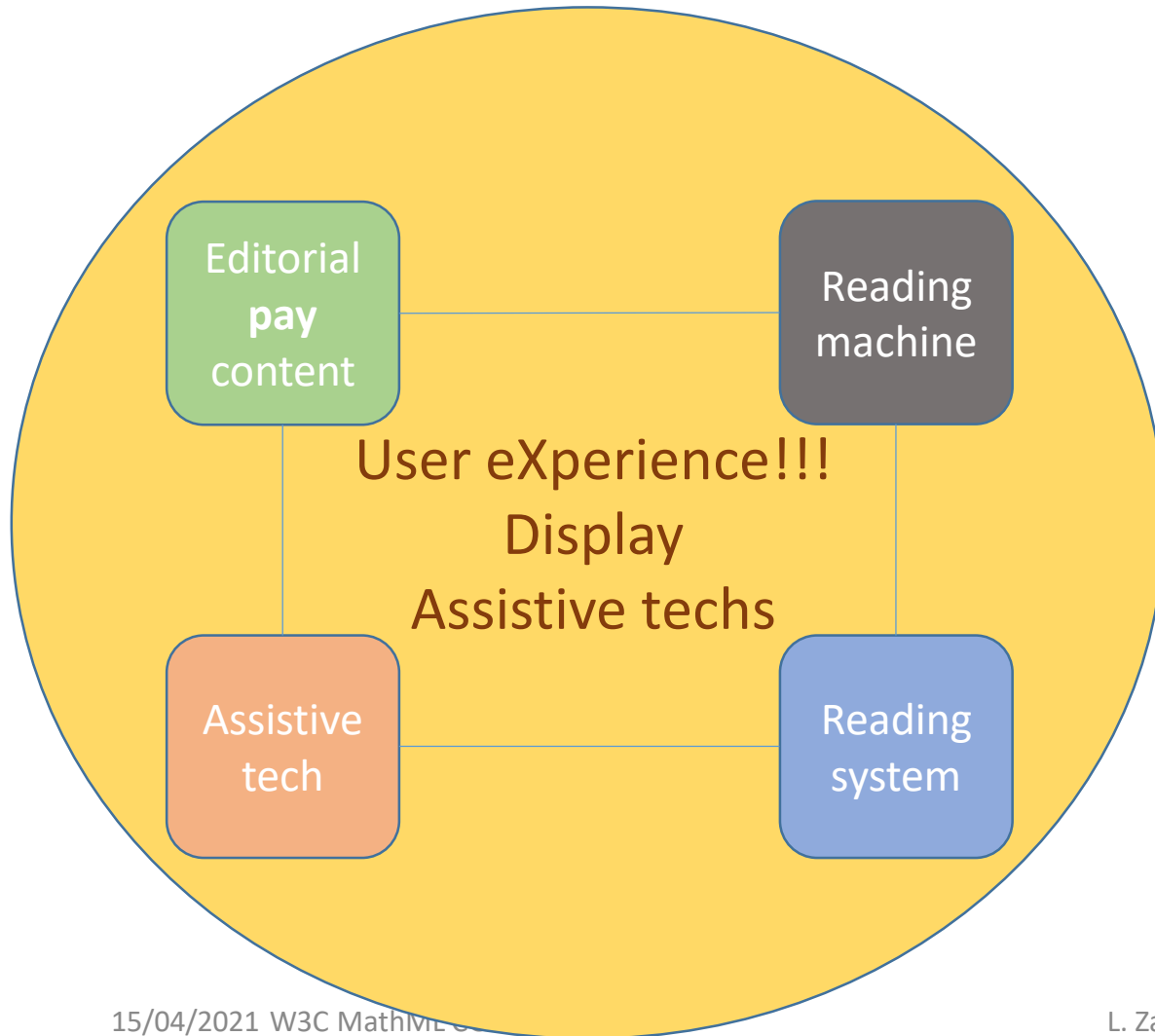
Publishing ecosystem

Publishing ecosystem

- Production
 - Paper products
 - Digital products
 - Physical products: USB key, DVD (declining)
 - Dematerialised products:
 - Downloadable content files (PDF, EPUB reflowable/fixed layout) ⇒ offline contents
 - Downloadable desktop (declining) / mobile applications (iOS, Android, ...) ⇒ offline contents+services
 - Web sites ⇒ online contents
 - Web applications ⇒ online contents+services (LMS type or not, based on LRS or not, with offline+synchro mode or not)
- Distribution
 - Product catalog
 - Product access
 - Physical distribution in sales outlets
 - Digital access: distribution platforms for downloadable files, « website » hosting
- Reading
 - Digital products
 - Reading machines: desktop, tablet, smartphone, assistive device (including peripheral equipment)
 - Reading systems (online/offline/mixed):
 - Proprietary standalone application
 - Free EPUB reader (iBooks, Thorium, Calibre, etc.)
 - Proprietary EPUB reader based on standard SDK (Radium, webkit, etc.)
 - Common web browser alone
 - Proprietary plugin on web browser
 - End users
 - 4-99 years old
 - Inclusive publishing (for ALL, with/without disabilities)
 - Native accessible publishing strategy (Editis, and all French publishers) respecting WCAG and ARIA standards
 - [European directive on A11y](#) entry in force in June 2025

Publishing digital ecosystem nightmare

Responsible but not guilty?!



- Need for W3C web standards
 - Interoperability of editorial content
 - Responsiveness of editorial content
 - Accessibility (of textual & non textual content) of editorial content + application
- Need for W3C web format support, including expected behaviors
 - Online & offline editorial MathML content
 - Display everything (no loss) correctly (no corruption) – Core/full MathML support
 - Style according publisher’s stylesheet vs user’s preferences
 - Transcript non textual content into relevant text
 - Vocalize online/offline text transcription according to content language
- Need for true MathML support (no more math as image = unsatisfactory workaround)!



Editorial content production

Editorial content production

- Authoring by scientific authors
 - Hand writing (sic)
 - LaTeX
 - Word
 - With Word Math Editor
 - With MathType/MathMagic plugin
 - eLearning authoring tools
 - Off-the-shelf software (Create, mAuthor), with LaTeX/Math editor (Wiris)
 - Proprietary software: XML authoring tool: GUI for WYSIWYM mode – MathQuill component
- Product manufacturing by technical subcontractors
 - Input
 - Formula authoring with MathType, MathMagic as standalone application versus Desktop Publishing software (DTP)
 - Formula integration into publication
 - XML 1rst: mostly MathML formulæ, rarely but still some **image formulæ**
 - [DTP](#): mostly **image formulæ**, rarely native proprietary MathType/MathMagic formula!
 - XML/HTML5 exported from DTP: mostly **image formulæ**, rarely MathML conversion from MathType/MathMagic
 - Output
 - PDF print / XML / HTML5
 - Image-formula / MathML-formula

Math contents for end users

Reading, interactions, scoring

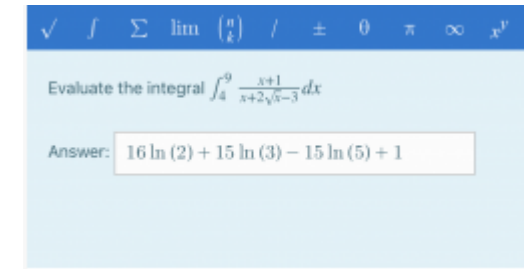
Reading Math formula

- Publishing sectors
 - Education
 - Teaching institutions => school programs full coverage, with/without LMS
 - Families => school program partial coverage, no LMS ever?
 - Not education also, as any novel/essay may contain math!
- Visual experience (display)
 - Publisher's global styling + local styling
 - Overloaded by user preferences eventually
 - Font family, size (homothetic resize of text & MathML, reflow of text & MathML in page layout)
 - Spaces: line spacing, word spacing, letter spacing, margin width
 - Colors: background/text
 - Block / inline formula (reflow of text)
- Other experiences
 - Based on textual transcription of math formula (text in MathML tags, @altext, @intent?)
 - Vocal experience with Text To Speech (TTS)
 - Tactile experience with Braille keyboard

$$x = \frac{-5 \pm \sqrt{5^2 - 4 \cdot 2 \cdot 2}}{2 \cdot 2}$$

Interactions with/on math formula

- LMS (eLearning Management System)
- Exercise interactions
 - Question answering with “text” area
 - Inline gap filling
 - Interactive formula (gaps into the formula)
- User interaction to enter/complete a formula
 - Math editor widgets added to input menu (ex: TinyMCE alike)
 - Keyboard / GUI input / both
 - Copy-paste from-to the widget
 - Copy-paste from the current text onto the widget (=> Web browser copy-paste + widget consumer)
- Technology
 - Format:
 - Static formula: plain-text/MathML/LaTeX/proprietary
 - Interactive formula: proprietary
 - Math editors plugins for specific LMS (ex: Moodle’s MathType plugin)
 - Math editors widgets for any web app integration
 - https://en.wikipedia.org/wiki/Formula_editor (see my Excel filter)



Soit a, b, c trois nombres réels avec $a \neq 0$.

On appelle fonction polynôme du second degré toute fonction P définie sur \mathbb{R} pouvant être exprimée sous la forme:
 $P(x) = ax^2 + bx + c$.

On considère la fonction f définie pour tout réel x par $f(x) = 3x^2 - 18x + 28$. f est une fonction polynôme du second degré car elle s’écrit $f(x) = ax^2 + bx + c$, avec $a = \square$, $b = \square$ et $c = \square$.

On considère la fonction g définie pour tout réel x par $g(x) = -2x^2 - 16x - 33$. g est une fonction polynôme du second degré car elle s’écrit $g(x) = ax^2 + bx + c$, avec $a = \square$, $b = \square$ et $c = \square$.

$$\frac{1}{5} \times 4 = \frac{4}{\square}$$
$$3\left(x - \frac{3}{\square}\right)\left(x - \frac{1}{\square}\right)$$
$$d = \frac{b-a}{\square}$$
$$y_2 = f(\square + d)$$

Available systems								
Name	Keyboard input	GUI input	TeX support	MathML support	Raster export	Automatic expression layout	Computation support	Output formats
Mathcha Editor Mathcha	Yes	Yes	Yes	Yes	Yes (SVG, or print as PDF)	Yes	No	PNG, PDF, LaTeX, SVG
Calcinator Math Editor	Yes	Yes	Yes	No	No	No	Yes	HTML, LaTeX
CodeCogs Equation Editor	Yes	Yes	Yes	Beta	Yes	Yes	No	PNG, JPG, SVG, SWF, EMF, MathML, LaTeX, URL
FxSolver	Yes	Yes	No	Yes	Yes (print as PDF)	Yes	No	PDF
iMathEQ editor	Yes	Yes	Yes	Yes	Yes	No	No	PNG, MathML, SVG, LaTeX
Math I Can Do	Yes	Yes	Yes	Yes	Yes	Yes	Yes	LaTeX (standard and MathJax-friendly), MathML, SVG, PNG, JPEG, WEBP, PDF
MathEditor	Yes	Yes	Yes	No	No	Yes	Yes	json, LaTeX
MathLive	Yes	Yes	Yes	Yes		Yes	No	LaTeX, MathML, CSS+HTML, speech
MathQuill	Yes	Yes	Yes	No		Yes	via MathJS	LaTeX
WebEQ Equation Editor	Yes	Yes	No	Yes	Yes	No	No	
LaTeX4technics	Yes	Yes	Yes	Yes	Yes	Yes	No	PNG, JPG, GIF, SVG, PDF, MathML, LaTeX
WIRIS editor	Yes	Yes	Yes	Yes	Yes	No	No	PNG, MathML, LaTeX, Flash

Scoring



- LMS (eLearning Management systems) need
 - Self-correcting exercises
 - Automatic detection of student's answer status (wrong/correct)
 - Used for student's feedback + score calculus + certification
 - Scoring is then used for student follow-up (global reporting), and evaluate success/fail in the training
 - Comparison between editor's answer / student's answer
 - Comparison format?!
 - TeX / LaTeX
 - Presentation / Content MathML
 - Exact/fuzzy match?!
 - What is a "correct" / "wrong" student's answer?...
 - Already difficult for simple text
 - Impossible when open question calling for open answer
 - Distance tolerance in text: sensitive to caps, accents, spaces, punctuation, word order (scoring parameters set by good LMS)
 - What distance calculus possible between math formulæ (answered/requested)?!

