Browse and Print: Problems and Solutions

Jonathan Fine, Open University, UK

EuroPython, Florence, 21 June 2011

Overview

This talk has four parts

- Math on web pages
- Print and the Renaissance
- Technical problems and prospects
- New media and being human

Math on web pages

MathJax home page — www.mathjax.org

MathJax

Beautiful math in all browsers

News Demos Resources Community Sponsors Contact Get MathJax

MathJax is an open source JavaScript display engine for mathematics that works in all modern browsers.

No more setup for readers. No more browser plugins. No more font installations… It just works.

LaTeX:

$$J_\alpha(x) = \sum_{m=0}^{\infty} \frac{(-1)^m}{m!\Gamma(m+\alpha+1)} \left(\frac{x}{2}\right)^{2m+\alpha}$$

MathML: $c^2 = a^2 + b^2 - 2ab\cos\theta$

(Math rendered by MathJax)

Latest news: American Physical Society continues as MathJax Supporter (5/13/11) More news ›

MathJax features and benefits

High-quality typography. MathJax™ uses modern CSS and web fonts, instead of equation images or Flash, so equations scale with surrounding text at all zoom levels. See how this works in the scaling math demo.

Works in all modern browsers. This allows the math in your content to be seen clearly by virtually all readers, even those using smart phones. See supported browsers.

Look at math in top right corner. It's not a bitmap!

Previous slide math, enlarged to the max

$$J_\alpha(x) = \sum_{m=0}^{\infty} \frac{(-1)^m}{m!\,\Gamma(m+\alpha+1)} \left(\frac{x}{2}\right)^{2m+\alpha}$$

This math scales because it uses

- Math fonts derived from TEX's
- Web fonts (downloaded by browser from server)
- Math typesetting derived from TEX's
- HTML-CSS for sizing and positioning of glyphs from fonts

This works, for display, in all modern browsers.

Can IE 8 print HTML-CSS?

The MathJax formula previews fine in Internet Explorer 8 (but because of technical problems I can't show you this yet).
(I print to PDF to get scalable output, but MathJax not working on my PDF printing machine.)

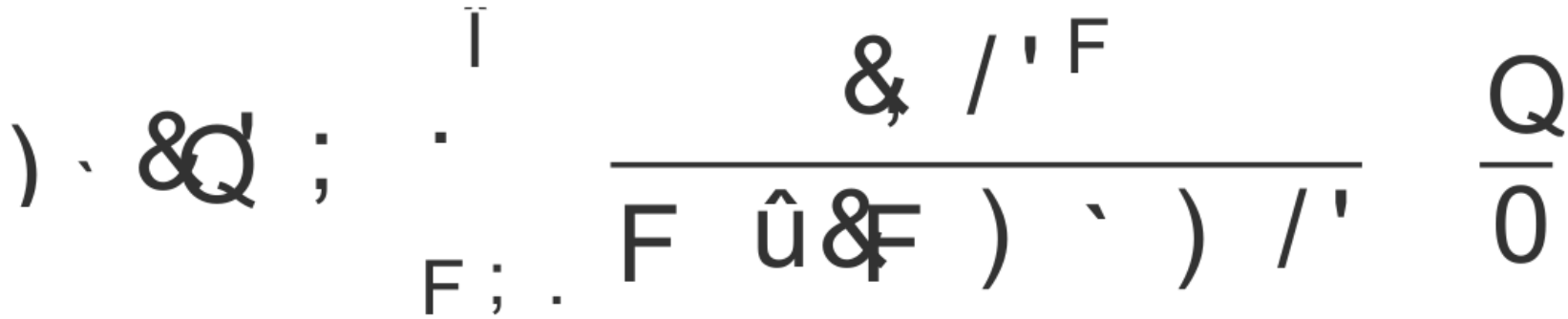
Can Firefox 3.6 print HTML-CSS?

Right locations, wrong fonts.

$$J_\alpha(x) = \sum_{m=0}^{\infty} \frac{(-1)^m}{m!\,\Gamma(m+\alpha+1)} \left(\frac{x}{2}\right)^{2m+\alpha}$$

Can Chrome HTML-CSS?

Completely wrong fonts.



Can Opera print HTML-CSS?

Oh dear, what has happened here?

$$J \quad (x) = \qquad m = 0$$

Or use Scalable Vector Graphics (SVG)

SVG will work for display in Firefox, Chrome and Opera. But not, of course, in Internet Explorer 8. Here's what we get.

$$J_\alpha(x) = \sum_{m=0}^{\infty} \frac{(-1)^m}{m!\,\Gamma(m+\alpha+1)} \left(\frac{x}{2}\right)^{2m+\alpha}$$

The LaTeX source for the formula.

```
J_\alpha(x) =
    \sum_{m=0}^\infty
    \frac{(-1)^m}{m! \, \Gamma(m + \alpha + 1)}
    {\left({\frac{x}{2}}\right)}^{2 m + \alpha}
```

Printing web pages containing SVG

On limited tests

- Works fine on Firefox 3.6.
- For Chrome and Opera, SVG converted to low-res bitmap.
- Not on IE 8, of course.
- Not tested in IE 9.

Web typography conclusions

Web browsers support for display and print of complex material, such as math.

- Open source web fonts work for display on all modern browsers.
- SVG works for display on all modern browsers except SVG.
- SVG works for print on Firefox.
- HTML-CSS doesn't work for print (except perhaps on IE8).
- Think of HTML-CSS as SVG emulation.

Print and the Renaissance

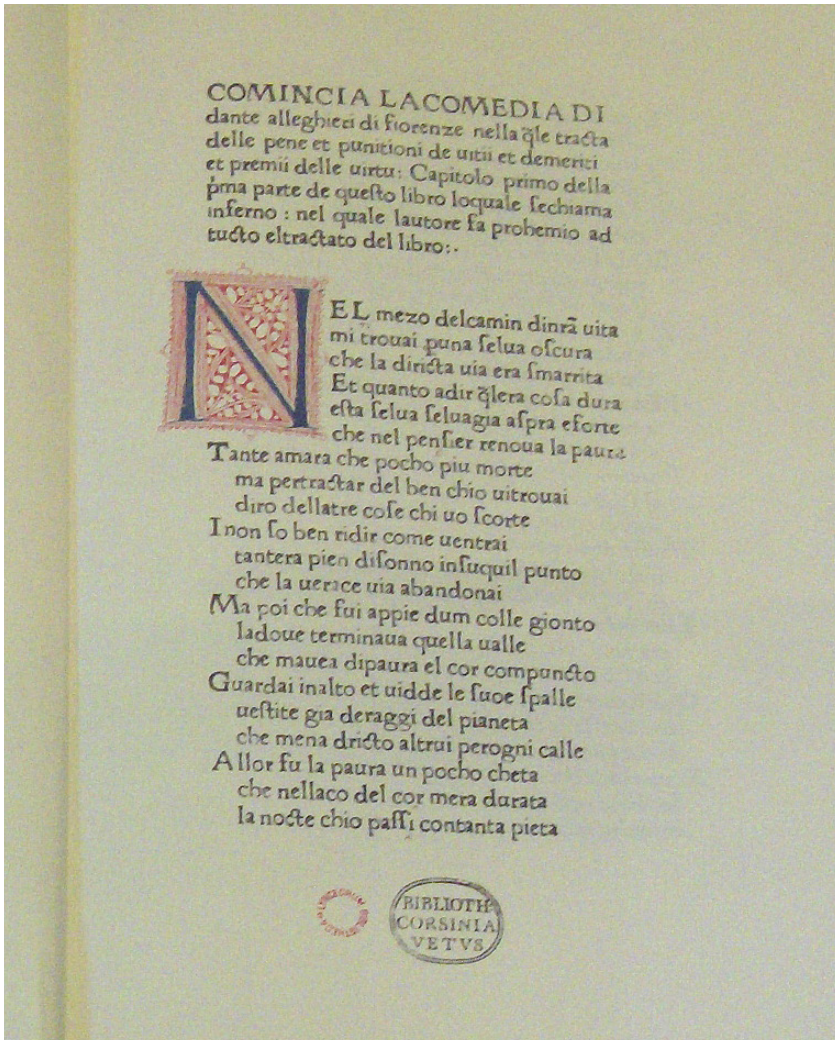
Dante Alighieri (1265 –1321)

Born in Florence, died an exile. Author of the *Divine Comedy*. Father of the Italian language.

Italian Dante Society lists 827 manuscripts from 14th and 15th Century.

First print edition 1472 (Foligno). Of 300 copies printed 14 still survive.

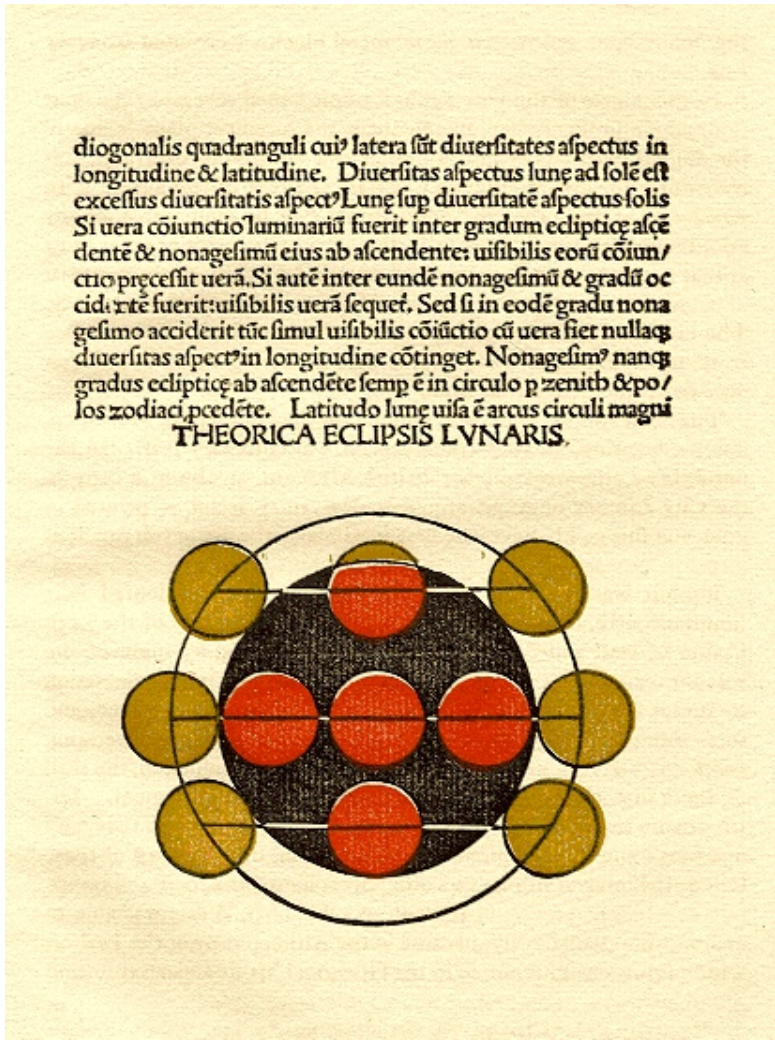
Further editions: Mantua and Venice (1472), Naples and Venice (1477), Naples again (1478–9), Milan (1478), Florence (1481).



COMINCIA LACOMEDIA DI
dante alleghieri di fiorenze nella q̃le tracta
delle pene et punitioni de uitii et demeriti
et premii delle uirtu: Capitolo primo della
p̃ma parte de questo libro loquale sechiama
inferno : nel quale lautore fa prohemio ad
tucto eltractato del libro:.

NEL mezo delcamin dinr̃a uita
mi trouai puna selua oscura
che la dricta uia era smarrita
Et quanto adir q̃lera cosa dura
esta selua seluagia aspra eforte
che nel pensier renoua la paura
Tante amara che pocho piu morte
ma pertractar del ben chio uitrouai
diro dellatre cose chi uo scorte
Inon so ben ridir come uentrai
tantera pien disonno insuquil punto
che la uerace uia abandonai
Ma poi che fui appie dum colle gionto
ladoue terminaua quella ualle
che mauea dipaura el cor compuncto
Guardai inalto et uidde le suoe spalle
uestite gia deraggi del pianeta
che mena dricto altrui perogni calle
Allor fu la paura un pocho cheta
che nellaco del cor mera durata
la nocte chio passi contanta pieta

BIBLIOTH
CORSINIA
VETVS



diogonalis quadranguli cui⁹ latera sũt diuersitates aspectus in
longitudine & latitudine. Diuersitas aspectus lunę ad solẽ est
excessus diuersitatis aspect⁹ Lunę sup diuersitatẽ aspectus solis
Si uera cõiunctio luminariũ fuerit inter gradum ecliptice aſcẽ
dentẽ & nonagesimũ eius ab ascendente: uisibilis eorũ cõiun/
ctio precessit uerã. Si autẽ inter eundẽ nonagesimũ & gradũ oc
cidentẽ fuerit: uisibilis uerã sequet. Sed si in eodẽ gradu nona
gesimo acciderit tũc simul uisibilis cõiũctio cũ uera fiet nullaq;
diuersitas aspect⁹ in longitudine cõtinget. Nonagesim⁹ nanq;
gradus ecliptice ab ascendẽte semp ẽ in circulo p zenith &po/
los zodiaci pcedẽte. Latitudo lunę uisa ẽ arcus circuli magni

THEORICA ECLIPSIS LVNARIS.

First printed edition of Dante's Divine Comedy, Foligno, 1472.
Diagram showing eclipse of moon, printed Erhard Ratdolt, Venice, 1485. (Both from Wikipedia.)

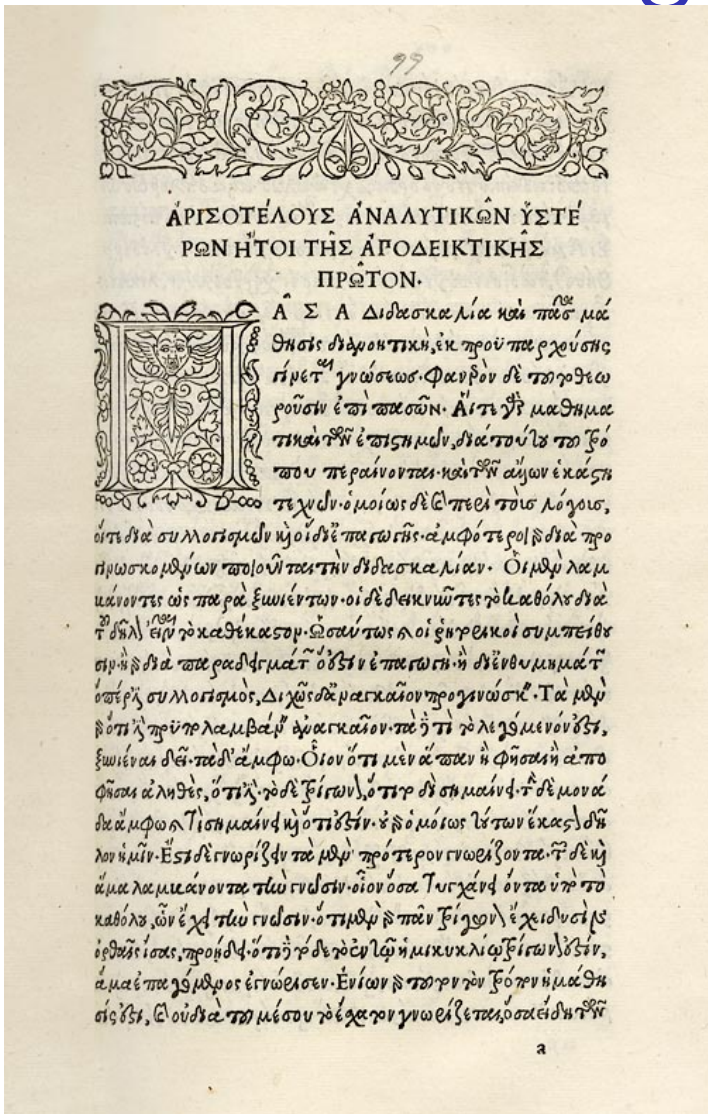
Editio princeps

Before print books were made by making a hand-written copy. This was expensive and introduced errors. An *editio princeps* is the first printed edition of a manuscript work.

Some editio princeps

- 1455, The Bible (in Latin), Johannes Gutenberg, Mainz.
- 1465-70, Augustine, Confessiones, Mentelin, Strasbourg.
- 1482, Euclid's Elements (in Latin), Erhard Ratdolt, Venice.
- 1495–8, Aristotle, Aldus Manutius, Venice.
- 1513, Plato, Aldus Manutius, Venice.
- 1516, New Testament (in Greek), Basel.
- 1520–3, The Talmud, Daniel Bomberg, Venice.
- 1525, Galen, Aldine Press, Venice.
- 1533, Euclid's Elements (in Greek), Basel.

Aristotle and Virgil in print

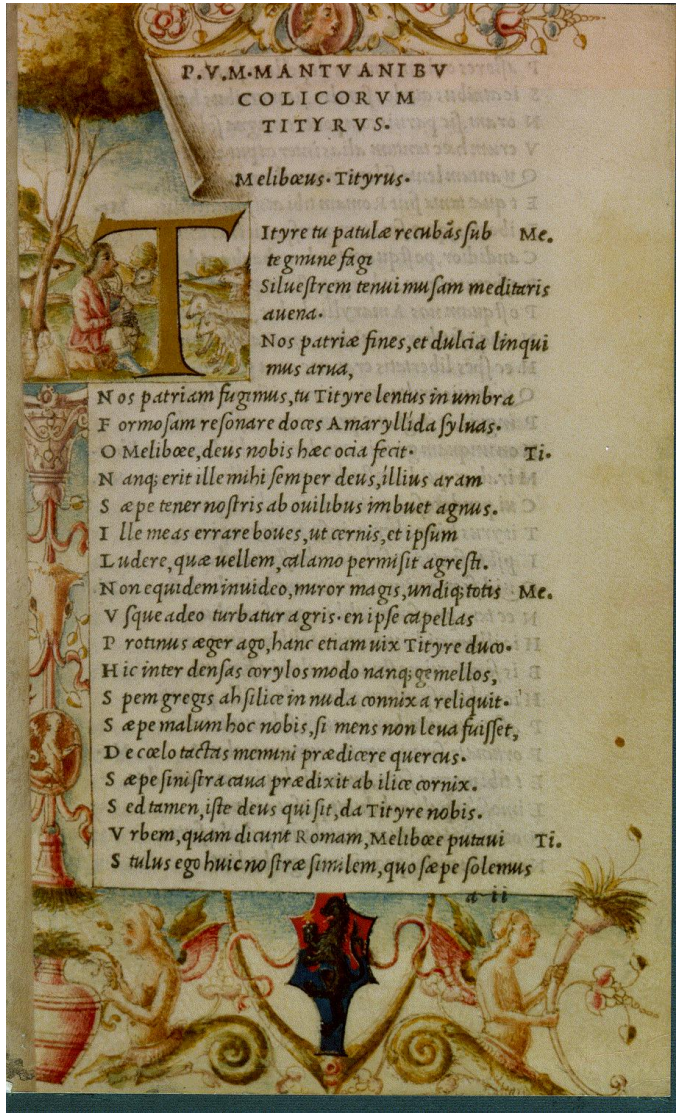


99

ΑΡΙΣΟΤΕΛΟΥΣ ΑΝΑΛΥΤΙΚΩΝ ΥΣΤΕ
ΡΩΝ ΗΤΟΙ ΤΗΣ ΑΠΟΔΕΙΚΤΙΚΗΣ
ΠΡΩΤΟΝ.

ΠΑΣΑ διδασκαλία καὶ πᾶσα μά
θησις διανοητικὴ, ἐκ προϋπαρχούσης
γίνεται γνώσεως. Φανερὸν δὲ τοῦτο θεω
ροῦσιν ἐπὶ πασῶν. Αἴτε γὰρ μαθημα
τικαὶ τυγχάνουσιν οὖσαι, διὰ τούτου τοῦ
τρόπου περαίνονται· καὶ τῶν ἀγωνι ἑκάσ
τη τεχνῶν· ὁμοίως δὲ καὶ περὶ τοὺς λόγους,
οἵτε διὰ συλλογισμοῦ εἰσὶν οἵτε διὰ τῶν
πρωτικῶν συλλογισμῶν· ἀμφοτέρων δὲ διὰ προ
γινωσκομένων ποιοῦσι τὴν διδασκαλίαν· ὅτι μὲν λαμ
βάνοντες ὡς παρὰ ξυνιέντων· οἱ δὲ δεικνύουσι τὸ καθόλου διὰ
τῶν καθ' ἕκαστον· ὡσαύτως καὶ οἱ ῥητορικοὶ συμπείθου
σιν· ἢ διὰ παραδείγματος ὄντος ἐπαγωγὴ· ἢ διὰ ἐνθυμήματος
συλλογισμός. Διχῶς δὲ ἀναγκαῖον προγινώσκειν· τὰ μὲν
ὅτι πάντως ἀναγκαῖον ὑπάρχειν τὰ λεγόμενα ὄντα,
ξυνιέναι δεῖ· περὶ ἕκαστον δὲ ὅτι μὲν ἔστιν ἢ φῆσαι ἢ ἀπο
φῆσαι ἀληθῆ, ὅτι δὲ τὸ τρίγωνον, ὅτι τοιόνδε μανθάνειν· τὰ δὲ μονά
δα ἕκαστον τί ἐστι μανθάνειν ἐστὶν ὅτι ὄντα· ὁμοίως τὰ τῶν ἄλ
λων ἕκαστα. Ἔστι δὲ γνωρίζειν τὰ μὲν πρότερον γνωρίζοντα τῷ δὲ ἧτ
ἄμα μανθάνοντα τῷ γνῶσιν· οἷον ὅσα τυγχάνει ὄντα ὑπὸ τὸ
καθόλου, ὧν ἔχει τὴν γνῶσιν· ὁτιμὴ πᾶν τρίγωνον ἔχειν δυσὶ
ὀρθαῖς ἴσας, προῄδει· ὅτι δὲ τὸ ἐν τῷ ἡμικυκλίῳ τρίγωνον τοιόνδε ἐστίν,
ἅμα ἐπίστατο ἐγνώρισεν· ἐνίων δὲ τοιοῦτον τρόπον ἡ μάθη
σίς ἐστι, οὐδὲ τὸ μέσον τὸ ἔλαττον γνωρίζεται, ὅσα εἰδικῶν

a



P.V.M.MANTVANI BV
COLICORVM
TITYRVS.

Melibœus. Tityrus.

Tityre tu patulæ recubãs sub tegmine fagi — Me.
Siluestrem tenui musam meditaris auena.
Nos patriæ fines, et dulcia linquimus arua,
Nos patriam fugimus, tu Tityre lentus in umbra
Formosam resonare doces Amaryllida syluas.
O Melibœe, deus nobis hæc otia fecit. — Ti.
Nanq; erit ille mihi semper deus, illius aram
Sæpe tener nostris ab ouilibus imbuet agnus.
Ille meas errare boues, ut cernis, et ipsum
Ludere, quæ uellem, calamo permisit agresti.
Non equidem inuideo, miror magis, undiq; totis — Me.
Vsque adeo turbatur agris. en ipse capellas
Protinus æger ago, hanc etiam uix Tityre duco.
Hic inter densas corylos modo nanq; gemellos,
Spem gregis ah silicæ in nuda connixa reliquit.
Sæpe malum hoc nobis, si mens non leua fuisset,
De cœlo tactas memini prædicere quercus.
Sæpe sinistra caua prædixit ab ilice cornix.
Sed tamen, iste deus qui sit, da Tityre nobis.
Vrbem, quam dicunt Romam, Melibœe putaui — Ti.
Stulus ego huic nostræ similem, quo sæpe solemus

a ii

Aristotle, printed Manutius, 1495–8. Virgil, printed Aldine Press, (1501). (Both from Wikipedia.)

Laurentian Library

- Commissioned by Medici family in 1523, planned and built by Michelangelo, opened in 1571.
- 11,000 manuscripts and 4,500 early printed books.
- Most descriptions focus on the architecture (by Michelangelo).
- Great efforts were made to make copies of books not in collection.
- Much of their manuscript collection is now online.

Aldus Manutius (1449–1515)

Italian humanist, printer and publisher. Set up shop in Venice, later became Aldine Press.

- Invented italic type, modern use of semi-colon.
- Introduced handy pocket editions (octavos) in an inexpensive format.
- 1502 Aldine of Dante's Divine Comedy became standard edition for 300 years.
- Printed about 10 editions a year of various books (see editio princeps) with normal print run of 200 to 500.

The impact of print

Aldus Manutius was printing about 10 editions a year.

10 editions a year with a print run of 500 for each edition is all manuscripts in Laurentian Library every 27 months. Manutius was just one of many printers active at that time.

Books were no longer chained to libraries. Manutius set out to create books that would fit in the pocket.

Printed books were considerably more identical than hand copied books.

Technical problems and prospects

SVG and PDF

- SVG is like PDF but part of the web page.
- Why can't I publish my slides . . .
- . . . as part of a web page.
- Supported by all modern browsers (except IE8).
- Can emulate using web fonts and HTML-CSS.

SVG and Flash

- Flash not good on mobile devices.
- SVG does many things Flash can do.
- Google developer's svgweb emulates SVG on Flash.
- SVG plus Flash has high 90% coverage.

LaTeX and Sphinx

- TeX is great typesetting program (by Don Knuth).
- LaTeX is large and complex front end to TeX.
- LaTeX 3 project will solve SGML and XML problems.
- Still waiting (since about 1992).
- Sphinx is great for browse and print technical documentation.
- Sphinx is not there yet for scholarly publication.

New media and being human

What happened then and now

- Print helped spread the Renaissance.
- Big change in human relatedness.
- The internet is another big change.
- What change in human relatedness?

Comparisons

- Server farms are new libraries?
- Search acting as librarian?
- Large-scale personal publication.
- Commercial change.

Bonus slides

Santa Maria Novella, Florence

Upper facade due to Leone Battista Alberti in 1456–70. Picture from Wikipedia.

Leon Battista Alberti (1404–1472)

- Illegitimate son of Florentine merchant, studied classics in Padua and law at Bologna.
- Wrote *De pictura* (On Painting) in 1435 (in Latin).
- 'first scientific study of perspective', Wikipedia.
- Italian translation, Della Pittura, in 1436.
- Editio princeps was 1540 (Basle).
- Also wrote *De re aedificatoria* (On the Art of Building) in 1443–1452. Published 1485 (Florence).
- 'Through his book, Alberti opened up his theories and ideals of the Florentine Renaissance to architects, scholars and others', Wikipedia.

Giorgio Vasari (1511–1574)

- Built what is now known as the Vasari corridor.
- Author of *Le Vite de' più eccellenti pittori, scultori, e architettori da Cimabue insino a' tempi nostri* aka *Vite* (Lives), published in Florence in 1550.
- Second edition in 1568, with woodcut portraits.
- 'Consistent and notorious favour of Florentines' (Wikipedia).
- Despite this, still basis for biography of many artists, such as Leonardo da Vinci.