Dalhousie Distributed Research Institute and Virtual Environment

ACCESS: Who gets what access, when and how?

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IMU
International Mathematical Union

Digitizing Mathematics
MSRI Workshop
15-17.04.05

Dalhousie Distributed Research Institute and Virtual Environment

The IMU Executive and the CEIC strongly endorse this initiative and stand ready to assist

- to the degree that IMU/CEIC actions would be welcomed
  - and can be afforded

➤ For example a brief best practice document on **Digitization** covering minimum standards for topics like

- resolution, alignment, color standards,
- compression, OCR, metadata
- registration

➤ We see urgency
- the window is closing rapidly
- arguments over details must be settled or deferred

Importance of access to legacy scholarly mathematical literature: our patrimony

- convincing other disciplines via case studies?

• need sound Information Retrieval tools (IR)
- meshing rich **Metadata** with **Google** expectations

• plus **federated** search/content dictionaries
- use our CS/IT colleagues
- 7 IR specialists at Dalhousie/4 at Waterloo, etc

• for engineers and economists not only area experts
✓reproductive or algebraic **K theory**?
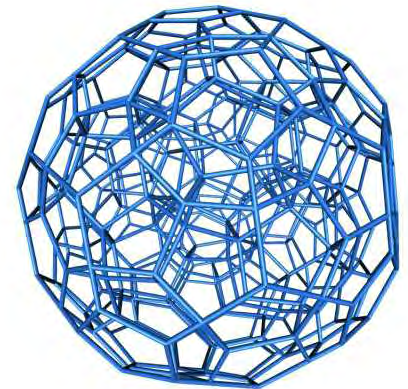
Sample approach: CMS

A Prototype for the Federated
World Directory of Mathematicians
(FWDM)

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Strengthens current journal publishing system through enhancement (value added to current/future journal runs)

- Coherent reference linking
- Cross discipline linking
- Application linking
- Object level meta-data
- Compatibility not uniformity

   - adding value to the publishing cycle whether or not a direct purchase is made

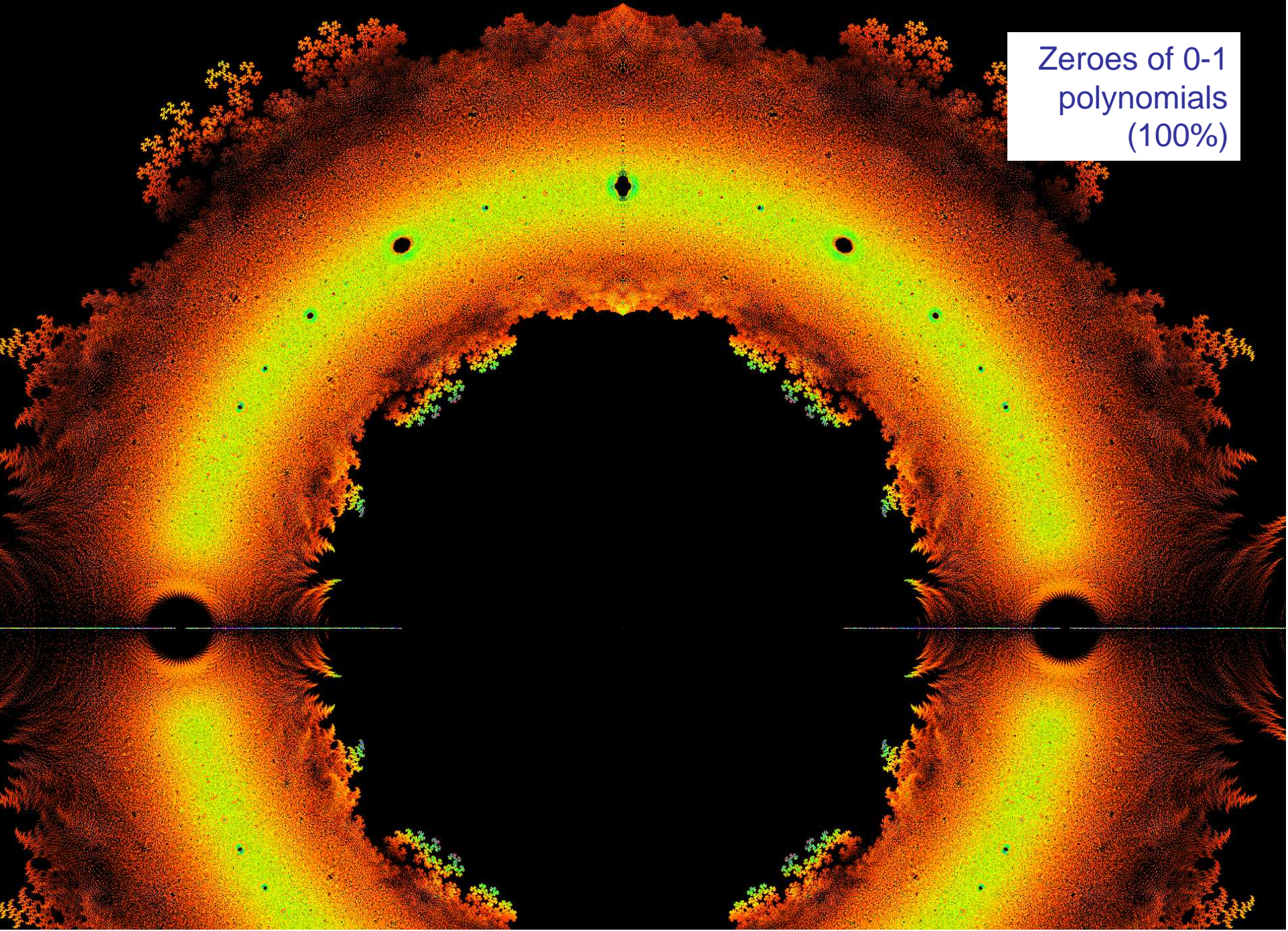## Compatibility with current and emerging forms of mathematical publishing

- Mathematical OCR
    - launching from/to applications
        - Excel, NIST, Maple, SketchPad, Dictionaries …
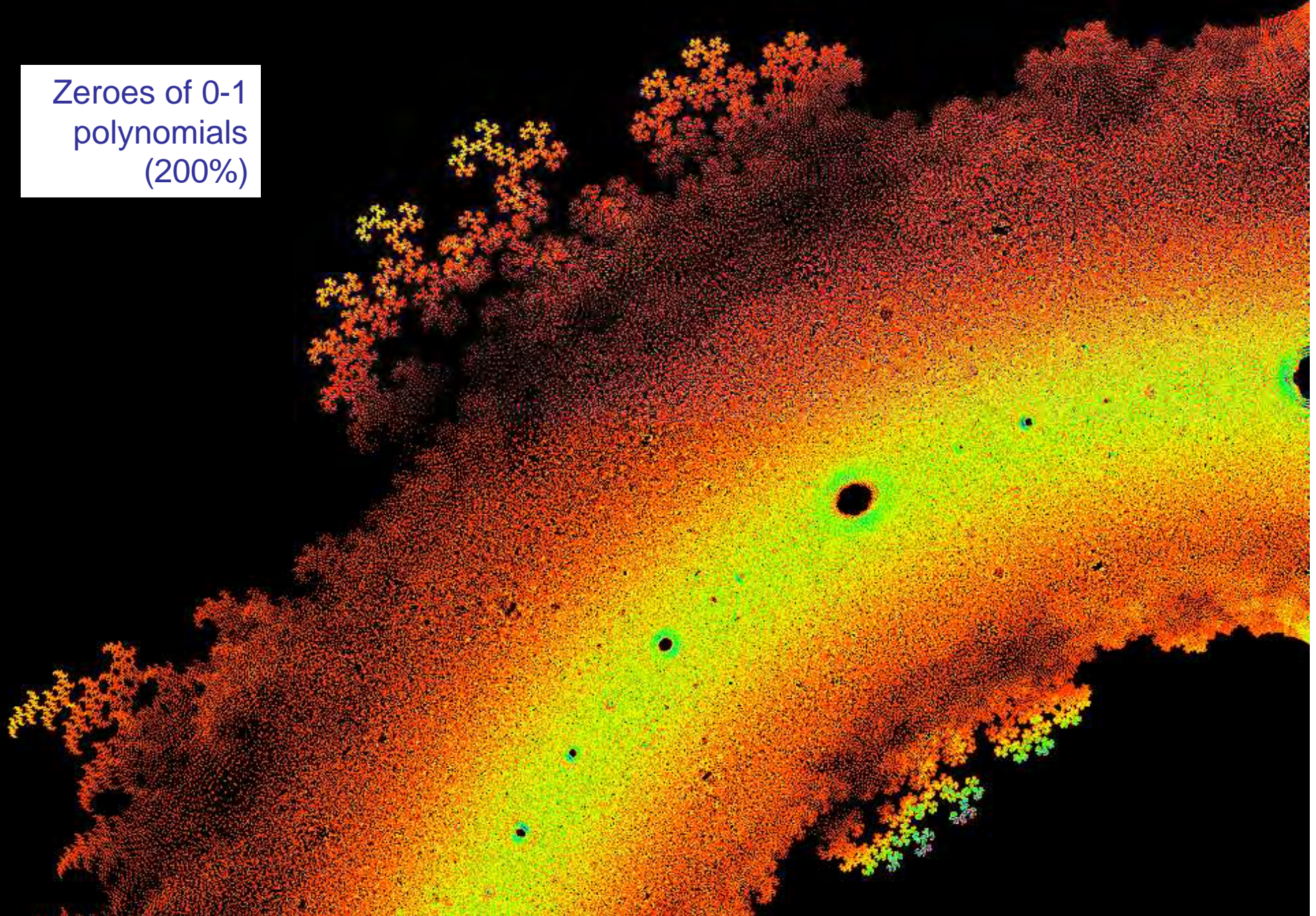
- Graphics
    - ((3)(6))00 dpi is valuable?
        - images
        - old manuscripts

➢ Good electronic design is fairly robust
    - Organic Math (1994)

Zeroes of 0-1 polynomials (15%)
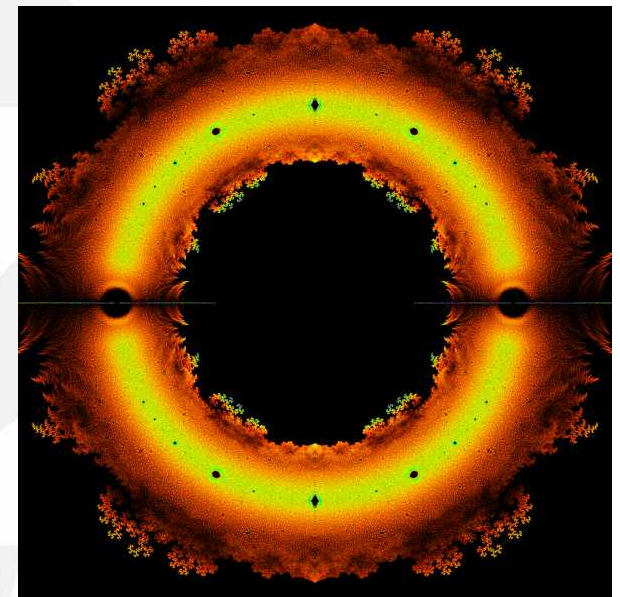
Zeroes of 0-1
polynomials
(100%)

Zeroes of 0-1 polynomials (200%)

Ueber die Anzahl der Primzahlen unter einer gegebenen Grösse.

(Berliner Monatsberichte, 1859, November.)

$$\prod \frac{1}{1-\frac{1}{p^s}} = \sum \frac{1}{n^s},$$

$$\int_0^\infty e^{-nx} x^{s-1}\, dx = \frac{\prod(s-1)}{n^s}$$

$$\prod(s-1)\cdot \zeta(s) = \int_0^\infty \frac{x^{s-1}}{e^x-1}\, dx.$$

$$\int \frac{(-x)^s\, dx}{e^x-1}$$

Universal Access Principle. Material beyond the "moving wall" should be freely available to all

➢ important for the individual

➢ important for development of science

➢ important for publishers

- otherwise there will be fewer links to material behind the moving wall

- part of a "contract" with the mathematical community, which referees papers and populates editorial boards

• access costs

- easier to solve on institutional than individual basis

Open Access (author pays) Model
is ill suited to mathematics

– puts mathematical publishing at the mercy of university administrators and wealthier disciplines

– might gradate mathematicians according to their ability to pay more or less expensive publication charges
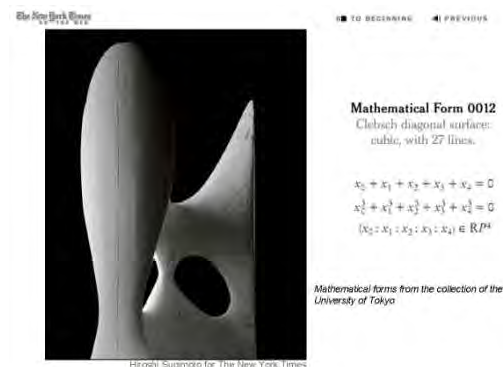
Development aspects in light of limited (library) infrastructure in the developing world (DCSG)

- Internet has removed major obstacles to scientific research in the developing world - especially true in mathematics (WDML)

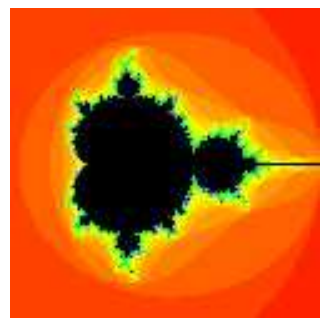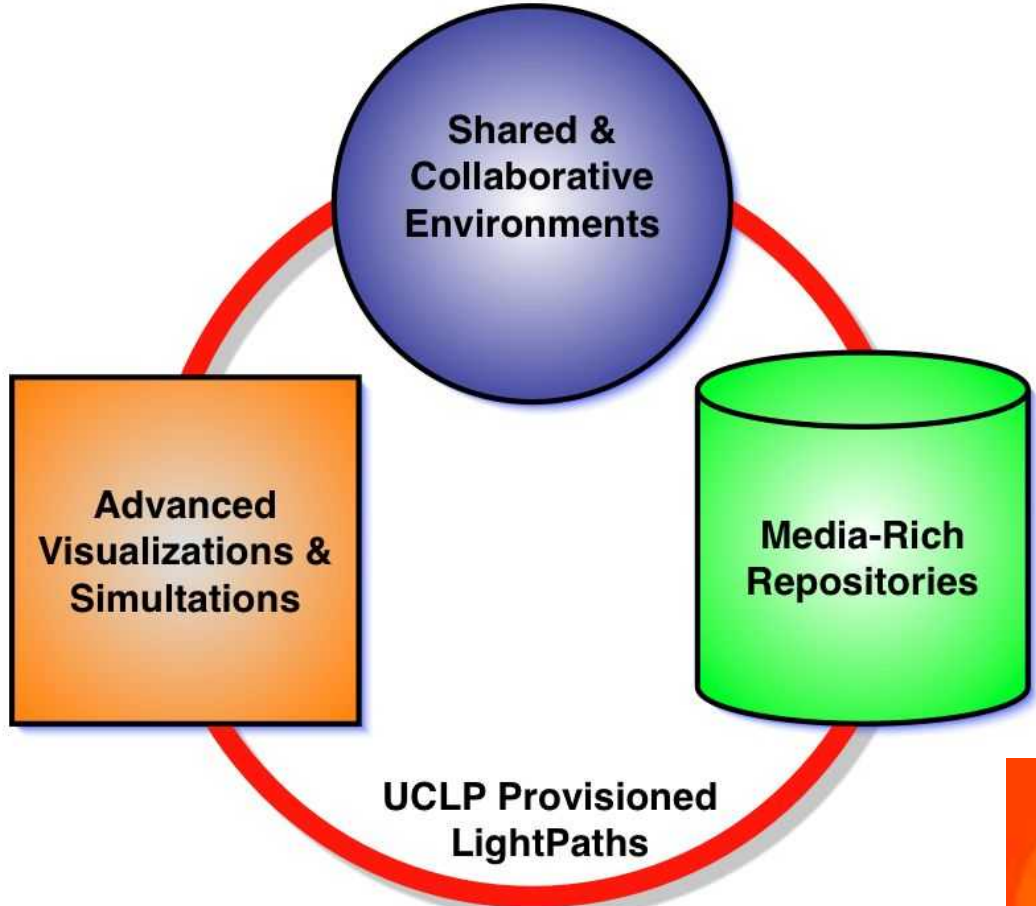It is in long-term interest of publishers to promote research in developing countries

  - **mechanisms are not obvious** ("countries" are not internally homogeneous)
  - free or low-cost access to current material for the poorest countries.
        INASP
        ICTP Document delivery service
  - moving wall should be eliminated or varied for developing countries

  - IMU Developing Countries Strategy Group should interact with WDML

The Future …

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- UCLP for
  - visualization
  - learning objects
  - haptics …

Shared & Collaborative Environments

Advanced Visualizations & Simultations

Media-Rich Repositories

UCLP Provisioned LightPaths

C3 Membership

The Future …

Touch sensitive interactive DDRIVE

Immersive Polyhedra

and the 3D GEOWALL