



# *Connexions*

## **Building Communities and Sharing Knowledge**

*Richard G. Baraniuk*  
Rice University

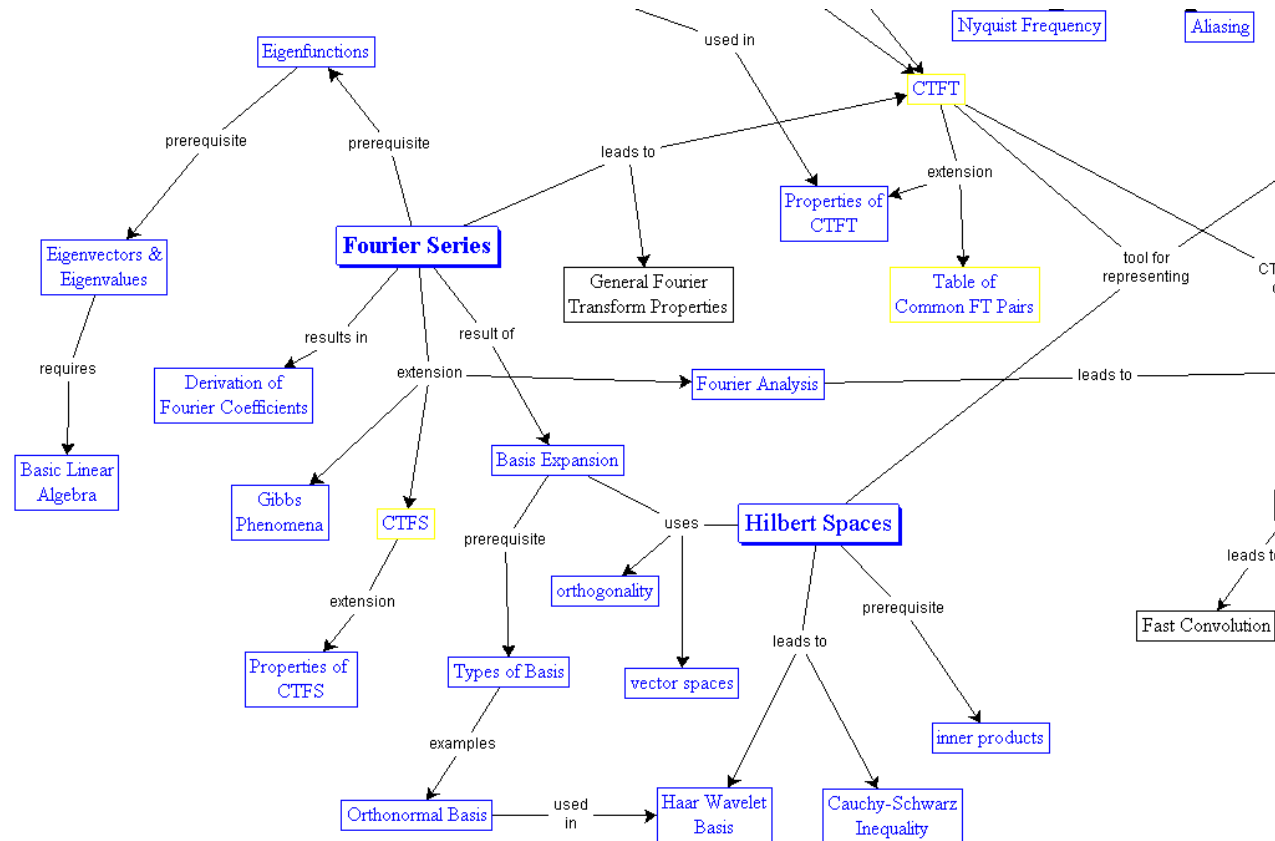
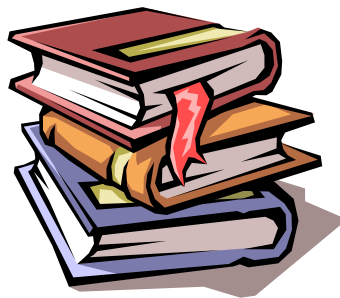
[cnx.rice.edu](http://cnx.rice.edu)



# from Traditional Publication ...

- **Content/Knowledge**

- disconnected; stove-piped
- difficult to integrate across disciplines
- difficult to reach different learning styles





# from Traditional Publication ...

- **Content/Knowledge**

- disconnected; stove-piped
- difficult to integrate across disciplines
- difficult to reach different learning styles
- glacially slow development process
- static
- limited access

- **Communities**

- poorly supported
- collaboration difficult
- limited feedback
- not sustainable



# ... to *Collaborative* Publication

- Collaboration on a *global spatial scale*  
*fine time scale*
- **Aim:** change the nature of interactions  
among *people* and *content*

*scientists*  
*organizations*

*educators*  
*governments*  
*public*

*students*  
*industry*



# Connexions

*Knowledge should be free, open, and shared*

- *Connexions* is a rapidly growing *commons* of free scholarly materials and a powerful set of free software tools to help
  - *authors* worldwide publish and collaborate
  - *instructors* worldwide rapidly build and share custom courses
  - *learners* worldwide explore the links among concepts, courses, and disciplines



# Connexions

- **Commons** of educational materials
  - forum for creating knowledge; *living repository*
  - open access; *open contribution*
  - *global; cross-institutional; grassroots organized*
  - *feedback*
  
- **Collaboration** and **Reusability**
  - technologically (XML, open-source toolkit)
  - intellectual property (Creative Commons licenses)
  - educationally (modular, “learning objects”)
  - multi language support
  
- Connexions aims to serve the global educational community



# Connexions

Authors



*ideas  
information  
concepts*

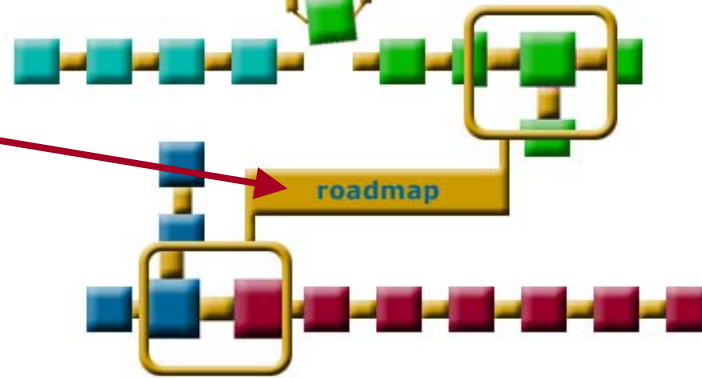
Instructors



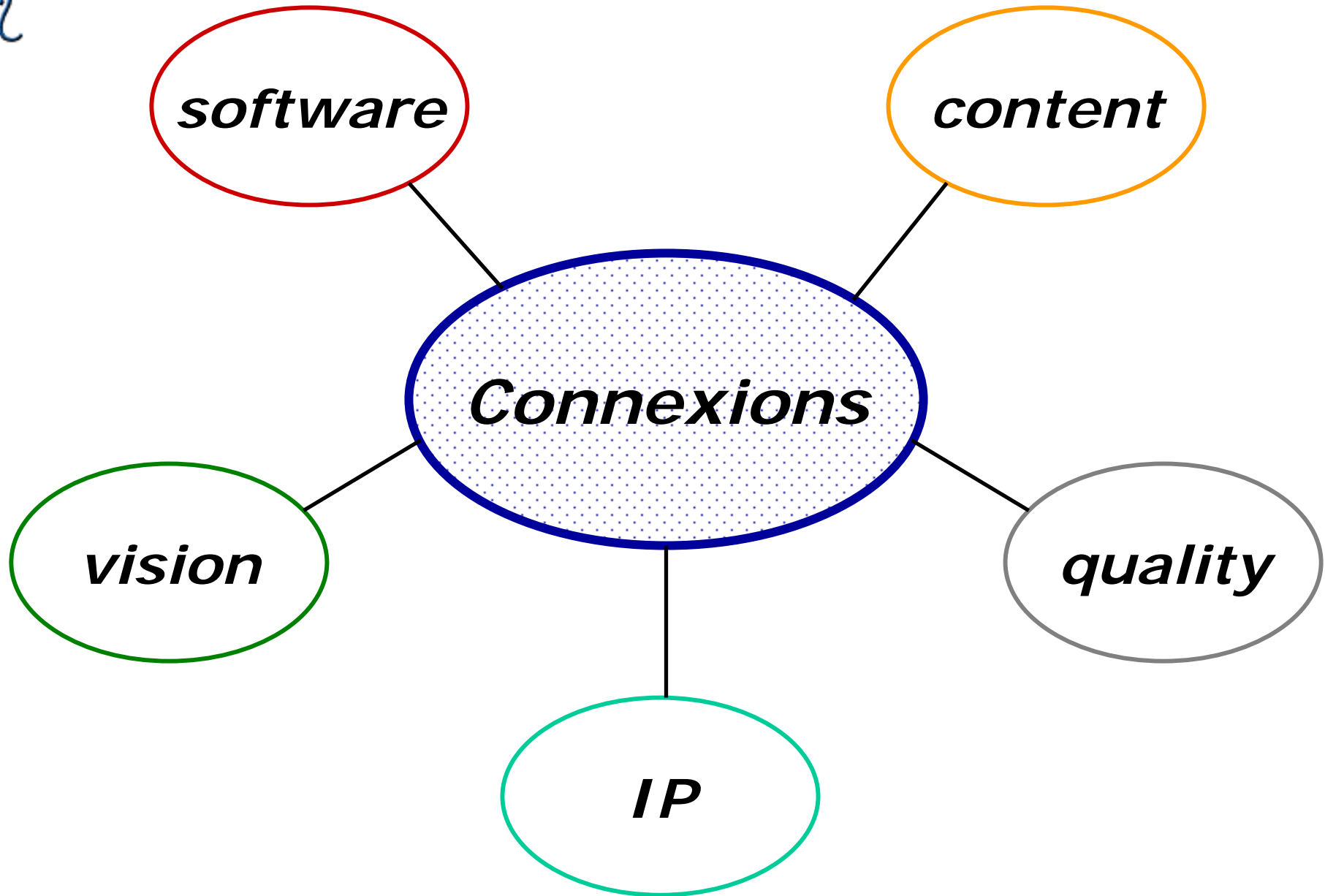
Module

*Content  
commons*

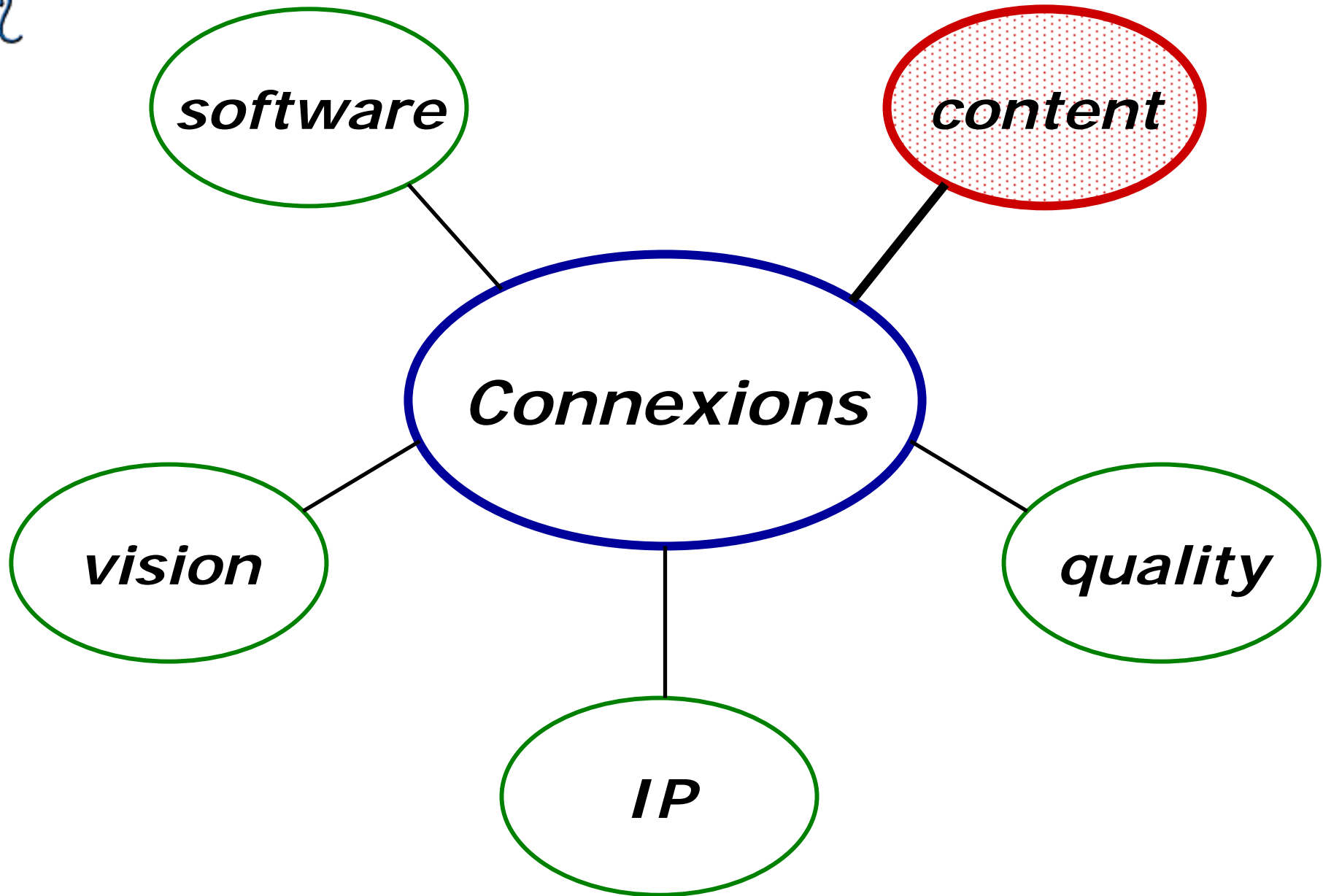
Students



Courses









# Content Commons

**If** content freely available to  
*read, copy, modify, redistribute*

**Then** global *communities* of authors can continuously  
*create, expand, revise, and maintain*  
materials

Models from *open-source, community-developed software*  
*GNU/Linux, Apache, Netscape/Mozilla/Firefox/Thunderbird, ...*



# Some Benefits

- Potentially *efficient* development
  - leverages efforts of a global community
  - *modular* materials *reusable* in new contexts
  - holistic, *evolutionary curriculum development*
- *Breaks down barriers* to entering author *community*
  - potential to drastically *reduce author time commitment*
  - authors write about what excites them
  - broader impact for teaching materials
  - teachers/students can become authors



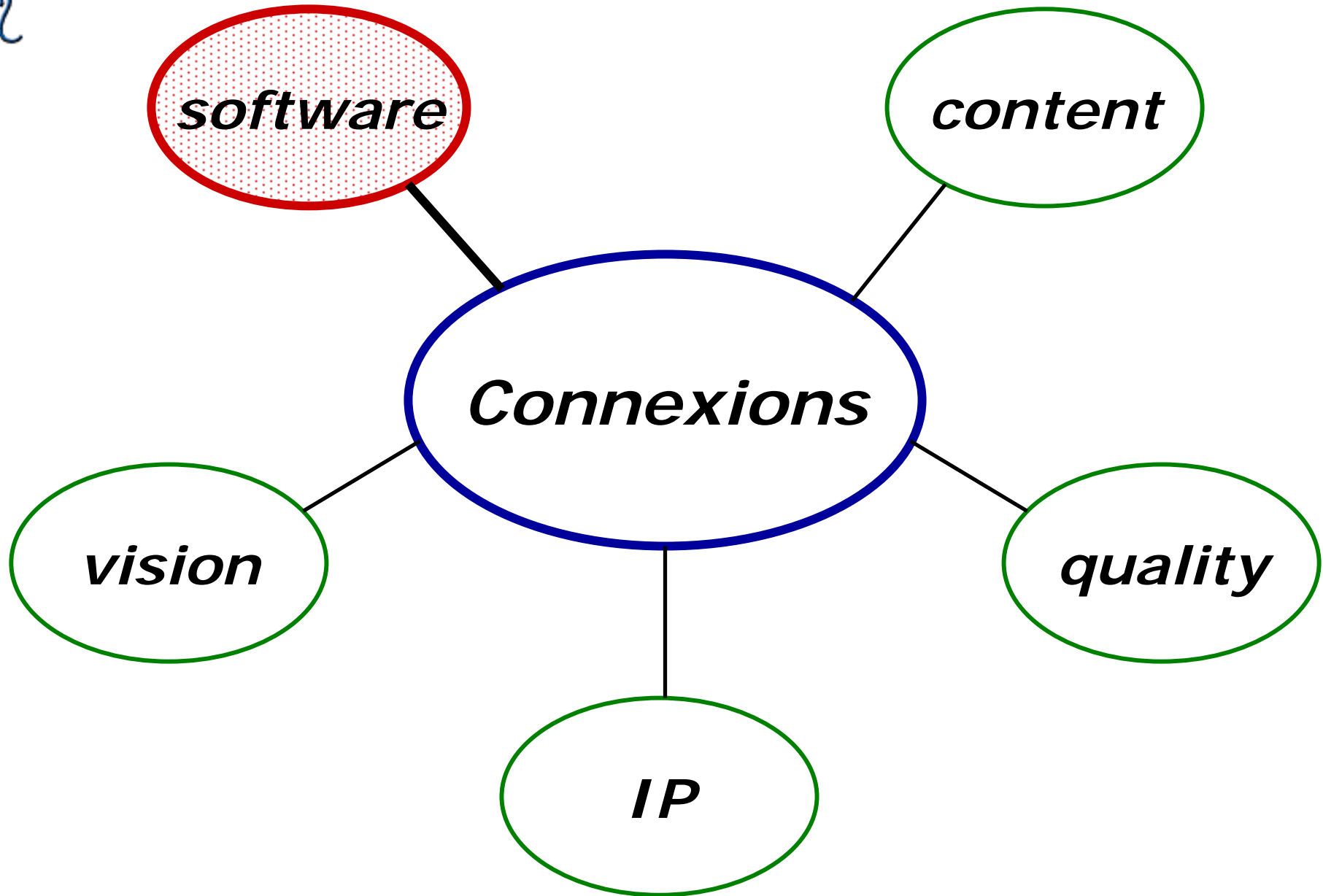
# Some Benefits

- *Connectivity*
  - students/instructors can see/explore  
*connexions between ideas*
  - enables *cross-disciplinary education*
  - draw recent research results into educational process
  
- *Dynamic – iterative refinement – evolution*
  - “close the loop” in cycle of
    - *develop* learning materials
    - *use* them for learning
    - *assessment* feedback



# Enabling a Commons

1. Common cultural *vision, goals, norms*
  
2. Common *technology framework*
  - enable *reuse, sharing*
    - must integrate technology into content
    - modularity, semantic markup (XML), meta data, ...
  
  - support *connectivity*
    - hyperlinks, ...
  
  - *manage* modules and courses
  
- 3.





# Technology and Tools

- Connexions tools: "*operating system for sharing*"
- Architecture and tools *free* and *open source*
  
- Content *modules* encoded in *XML*
- *Database* to organize modules (eventually distributed)
- *Authoring tools and workgroups* to facilitate collaboration
- *Course Composer* to assemble modules into courses
- *Annotation* to personalize modules
- *Roadmap* to navigate and explore
- *Discussion forums* for feedback, communication (w/ USU)
- *Lenses* – multimodal peer review system (future)



## RELATED MATERIAL

### Example links

- [A page written in CNXML](#)
- [The CNXML language](#)
- [The MathML language](#)

### Supplemental links

- [XML.com](#)
- [Unicode](#)
- [The XML specification](#)

### Similar content

- [Editing CNXML with XMLSpy](#)
  - [Combining the DTDs of XML Languages](#)
  - [Combining XML Languages](#)
- [MORE SIMILAR CONTENT »](#)

### Courses using this content

- [CNXML Tutorial](#)
- [Connexions Tutorial and Reference](#)

## PERSONALIZE

## XML Basics

[\[PDF\]](#) [\[Edit\]](#)

By: [SARAH COPPIN](#), [BRENT HENDRICKS](#)

[Table of Contents](#) | [NEXT >>](#)

**Summary:** This module describes XML (eXtensible Markup Language) and the rules that govern its usage. It also explains what a well-formed and valid document is.

### What is XML?

The eXtensible Markup Language ( XML) is a **meta-markup language** defined by the [World Wide Web Consortium \(W3C\)](#). It is not strictly a markup language itself, but rather a set of rules for creating markup languages. For our purposes a **markup language** is any language (HTML, for example) that uses tags surrounding text to convey information such as content or format. [CNXML](#), the markup language used by the [Connexions Project](#) is an example of a language written in XML. There are many other examples at the W3C site. Here is an example of some markup in CNXML.

```
<para>
  This is a paragraph in <term>CNXML</term>. Notice that the markup
  contains tags that express the meaning of the text.
</para>
```

`<para>` and `</para>` are the tags that the enclose the text. In XML, tags are always marked by angle brackets (also known as





# Intellectual Property

## RELATED MATERIAL

### Supplemental links

- [Jefferson Manuscripts at the Library of Congress](#)
- [Manuscript of Jefferson Letter to McPherson, 1813](#)
- [Library of Congress Copyright Office](#)
- [United States Patent and Trademark Office](#)
- [Legal Information Institute: US Legal Code](#)
- [Copyright Law: Title 17](#)
- [Patent Law: Title 35](#)
- [Trademark Law \(Lanham Act\): Title 15, Chapter 22](#)

### Similar content

- [Harmony](#)
- [Sound Reasoning](#)

### Courses using this content

- [Text as Property/Property as Text](#)

## PERSONALIZE

### Choose a style

- [Summer Sky](#)

## A Primer in Modern Intellectual Property Law

[\[PDF\]](#) [\[Edit\]](#)

By: [CHRISTOPHER KELTY](#)

**Summary:** This is a very broad primer in intellectual property law from the perspective of its original justification, and the basic legal and institutional distinctions that accompany it in the modern period (roughly 1700-2000).

### The Role of Law in Modern Society

The importance of law in modern societies is hard to overestimate. The systems are complex, the institutions are diverse and range from small to mammoth, and the number of people involved, from para-legal to federal judge, can only be proof of its central role in society. And yet, for the most part, law and legal issues are left to lawyers, legal theorists and the occasional sociologist. For most people, the law is only reluctantly confronted during those signature events in life: marriage, paying taxes, immigrating, or suing the buttwipe in the SUV who smashed up your right-hand rear-view mirror. And so it should be.

Intellectual Property (IP) Law, however, seems to have broken this mold. For about twenty years, IP law has slowly become something more and more people confront. It is not only becoming easier to violate the law, due to changing technology, but it is also becoming much easier and more common for people to use the law to police their own intellectual property. In order to understand what this body of law consists of, where it came from, and what its original justification and current uses were and are, it's necessary to look more carefully at both the law, and the reasons for its existence.

### The origin of American Intellectual Property Law

Intellectual Property law stretches back at least to the 17th century, and depending on the definition, further. However, as with many modern government institutions, it was given a special place in the American constitution. It is interesting to note that the



# Children's Music

## RELATED MATERIAL

### Prerequisite links

- [Clef](#)

### Supplemental links

- [Octaves](#)
- [Key Signature](#)
- [Physics and Music](#)

### Similar content

- [Reading Music: Standard Notation](#)
- [What Kind of Music is That?](#)
- [A Parent's Guide to Music Lessons](#)

MORE SIMILAR CONTENT »

### Courses using this content

- [Reading Music: Standard Notation](#)

## PERSONALIZE

### Choose a style

- [Summer Sky](#)
- [Desert Scape](#)
- [Charcoal](#)

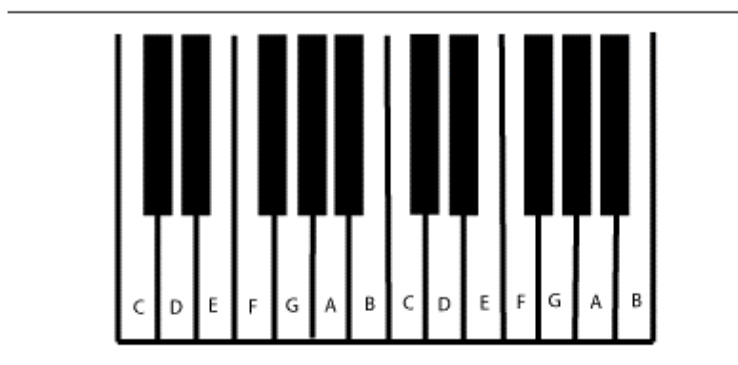
## Pitch: Sharp, Flat, and Natural Notes

[PDF] [Edit]

By: [CATHERINE SCHMIDT-JONES](#)

**Summary:** In standard notation, a sharp symbol raises the pitch of the natural note by a half-step; a flat symbol lowers it by a half-step.

The **pitch** of a note is how high or low it sounds. Pitch depends on the **FREQUENCY** of the **FUNDAMENTAL** sound wave of the note. The higher the frequency of a sound wave, and the shorter its **WAVELENGTH**, the higher its pitch sounds. But musicians usually don't want to talk about wavelengths and frequencies. Instead, they just give the different pitches different letter names: A, B, C, D, E, F, and G. These seven letters name all the **natural** notes (on a keyboard, that's all the white keys) within one octave. (When you get to the eighth natural note, you start the next **OCTAVE** on another A.)



**Figure 1:** The natural notes name the white keys on a keyboard.



# History



## Galileo's Telescope

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### links



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**Figure 1:** [Johannes Hevelius](#) observing with one of his telescopes. (Source: [Selenographia](#), 1647)

The telescope was one of the central instruments of what has been called the Scientific Revolution of the seventeenth century. It revealed hitherto unsuspected phenomena in the heavens and had a profound influence on the controversy between followers of the traditional **geocentric astronomy** and cosmology and those who favored the heliocentric **system of Copernicus**. It was the first extension of one of man's senses, and demonstrated that ordinary observers could see things that the great Aristotle had not dreamed of. It therefore helped shift authority in the observation of nature from men to instruments. In short, it was the prototype of modern scientific instruments. But the telescope was not the invention of scientists; rather, it was the product of craftsmen. For that reason, much of its origin is inaccessible to us since craftsmen were by and large illiterate and therefore historically often invisible.



# Biodiversity Data

**Images**

FL34 1x1x A.jpg

FL34 2x1x A.jpg

FL34 3x1x A.jpg

FL34 3x1x B.jpg

FL34 6x1x A.jpg

**links** style

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## Compsonera atopa

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Module Abstract

### Species Data

<b>Family</b>	Myristicaceae
<b>Species Name</b>	Compsonera atopa (A. C. Sm.) A. C. Sm
<b>Journal</b>	Amer. J. Bot. 43: 573. 1956.
<b>Synonym</b>	Virola atopa A. C. Sm., Cont. U. S. Natl. Herb. 29: 328. 1950.
<b>Type Specimen</b>	COLOMBIA. Valle del Cauca: Chocó <sup>3</sup> region, R�o Calima, La Trojita, 4��������N, 77��������W, 5���50 m, 19 Feb��10 Mar 1944, J. Cuatrecasas 16285 (HOLOTYPE: GH).

### Characters

**Latin Diagnosis** -

**Habit** - Trees to 25 cm DBH and 40 m tall.

**Bark** - unknown.

**Sap** - red when exuded from inner bark.

**Branches** - terete to subterete, 0.35-1.0 cm diam., ridged, rugose to longitudinally





# Mathematics via MathML

Continuous-Time Convolution - Mozilla

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Course... Annotations...

Signals and Systems

- Preface: Signals and Systems
- Signals
- Systems
- Time Domain Analysis of Continuous Ti...
  - CT Linear Systems and Differential ...
  - Continuous-Time Convolution**
    - Properties of Convolution
    - BIBO Stability
- Time Domain Analysis of Discrete Time ...
- Linear Algebra Overview
- Continuous Time Fourier Series
- Hilbert Spaces and Orthogonal Expans...
- Discrete Fourier Transform
- Fast Fourier Transform (FFT)
- Convergence
- Discrete Time Fourier Transform (DTFT)
- Continuous Time Fourier Transform (C...
- Sampling Theorem
- Laplace Transform and System Design
- Z-Transform and Digital Filtering
- Homework Sets

## Convolution Integral

As mentioned above, the convolution integral provides an easy mathematical way to express the output of an LTI system based on an arbitrary signal,  $x(t)$ , and the system's impulse response,  $h(t)$ . The **convolution integral** is expressed as

$$y(t) = \int_{-\infty}^{\infty} x(\tau)h(t-\tau)d\tau \quad (1)$$

Convolution is such an important tool that it is represented by the symbol  $*$  and can be written as

$$y(t) = x(t) * h(t) \quad (2)$$

By making a simple change of variables into the convolution integral,  $\tau = t - \tau$ , we can easily show that convolution is **commutative**:

$$x(t) * h(t) = h(t) * x(t) \quad (3)$$

For more information on the characteristics of the convolution integral, read about the [PROPERTIES OF CONVOLUTION](#).

We now present two distinct approaches for deriving the convolution integral. These derivations, along with a basic example, will help to build intuition about convolution.

## Derivation

The derivation making. In this

**Brief Overview**

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additivity
5. Now we re
6. Recogniz

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## Preface for U of I DSP Laboratory (Thai Version)

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Similar Content

**Summary:** The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

**Objectives:**

เอกสารฉบับนี้สร้างขึ้นจากการเรียนการสอนในการปฏิบัติการ (DSP) กว่า 14 ปี และ เป็นเวลา 10 กว่าปีของการร่วมมือในภาควิชา ECE 320 Processing Laboratory ) ซึ่งเป็นวิชาเลือก สองหน่วยกิต Champaign, และเป็นส่วนที่แสดงให้เห็นถึงจุดมุ่งหมายและได้จากการประสบความสำเร็จของเอกสารที่ได้ทำการเผยแพร่ในมหาวิทยาลัย Washington เป็นต้น

เอกสารชุดนี้สามารถนำไปประยุกต์ได้อย่างดีกับรูปแบบการเรียน

- วิชาที่มีการทำโครงการปฏิบัติการประมวลผลสัญญาณ
- วิชาที่ใช้เวลาครึ่งหรือเต็มหนึ่งภาคเรียนการศึกษา โดยมีกิจกรรมทำการทดลองเสริมที่เป็นส่วนหนึ่งของวิชาด้วยทฤษฎีสัญญาณดิจิทัล

วิชา ECE 320 ของ มหาวิทยาลัย Illinois นี้เป็นตัวอย่างแบบงานปฏิบัติการเป็นรายสัปดาห์แก่นักศึกษา ซึ่งรวมด้วย ความรู้ที่มีของ DSP, real-time FIR, IIR, และ multirate filtering communications transmitter) นักศึกษาจะทำการทดลองเป็นรายสัปดาห์ เนื้อหาของแต่ละสัปดาห์คือ semi-self-paced tutorial (Processing) การออกแบบหรือการฝึกหัดซึ่งใช้โปรแกรม MATLAB TMS320C549 ไมโครโพรเซสเซอร์. ภายหลังจากการผ่านส่วน และใช้เวลาที่เหลือของเทอมในการ ออกแบบ การจำลอง การพ

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**Summary:** The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

**Objectives:**

摘要:该DSP(数字信号处理)教程适合多种相关课程使用

该教程是建立在使用了14年以上的实验指导和历时10年伊利诺伊大学厄本那-香槟分校(the University of Illinois)本教程编排结构和教学目的都与其大致相同.本教程适合学.

该教程可用于多种不同的教学安排,包括:

- 一学期制的以课程设计为主(project-oriented)的D
- 半学期制或一学期制的并在每周有实验安排的DSP
- 信号处理理论课程的实验补充教材.

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Courses Containing this Module

**Summary:** The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

**Objectives:**

序文:

イリノイ大学デジタル信号処理実験

概要:

このデジタル信号処理実験の指導書は様々な講義構成に合った内容で、Connexionsはこの指導書の理想的な空間を提供している。

文面

このテキストは14年以上に渡るDSP実験指導と10年以上に及び実験教育資料の共同開発に基礎を置いています。その内容はイリノイ大学アーバンプランキャンベ校の選択科目であるデジタル信号処理実験(E320:4年次履修科目、2単位)の講義目的と構成を大いに反映し、共に発展してきましたが、他の様々な講義にも合うような内容となっています。また、資料の初期バージョンはワシントン大学及び様々なところで首尾良く使用されてきています。

このテキストは、下記の授業構成を含む様々な授業において効率良く使用することができます。

- 1学期単位で構成されるプロジェクト志向型DSP実験の授業
- 1学期単位で構成され、週毎の実験演習を基礎とするDSP実験の授業
- 信号処理理論の授業の一部としての実地実験補足
- DSPインプレメンテーションでの自習科目

イリノイ大学 E320 の授業構成は一番目のタイプに当てはまります。この授業は大まかに2パートから構成されています。まず第一に、週毎にあるテキサス・インスツルメンツ TMS320C549マイクロプロセッサ及びDSP開発環境入門や、リアルタイムFIR/IIR-マルチレートフィルタリング、FFTによるスペクトル解析、デジタルコミュニケーションシステム等の実験課題です。生徒は二人一組で それらの実験課題に取り組み、各週毎の実験課題終了後に、各自口頭テストを受けます。各週の資料は信号処理概念の復習と(主にMATLABベースの)デザインや習熟練習、及びTMS320C549マイクロプロセッサを使ったリアルタイムインプレメンテーションの課題という3つの主部を備えています。学期半は項にこれら共通のモジュールを終了させた後、生徒のチームは実際に、自由に選択したリアルタイムプロジェクトを考案し、残りの学期をそのプロジェクトのデザイン、シミュレーション、インプレメンテーション、テスト試行に費やします。生徒にPLL(phase-locked loop)やDLL(delay-locked loops)を含むデジタルコミュニケーション、適応フィルタリング、音声・オーディオ信号処理の基礎を紹介する補足モジュールは、生徒のこれらの分野におけるプロジェクトの進行を加速します。

信号処理アルゴリズムを強調する講座は、主なプロジェクトを控える代わりに、補足モジュールを週毎の実験課題完了のために使用しても良いでしょう。信号処理講義科目での1時間の実地実験補足を、学期を通して最初の数ユニットを延ばすことにより(例:スペクトル解析の期間)、生徒の信号処理理論やアルゴリズムの核心についての理解を強化・促進することも可能です。セルフペース、資料の個人指導的な性質により、生徒は興味を抱かせるリアルタイムDSPインプレメンテーションを独学で学べます。イリ

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## PREFACE FOR U OF I DSP LABORATORY

Version 2.12, 2003/08/01 11:01:44:894 GMT-5

Douglas Jones

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Abstract

The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

### Preface for U of I DSP Laboratory

This text builds on over fourteen years of DSP laboratory instruction and over ten years of collaborative development of instructional laboratory materials. The content has evolved in tandem with ECE 320: Digital Signal Processing Laboratory, a sense-level, two-credit-hour elective laboratory course at the University of Illinois at Urbana-Champaign, and to a large extent reflects its goals and structure. The material is nonetheless well suited for a variety of course organizations, and earlier versions of the material have been used with success at the University of Washington and elsewhere.

This text could be effectively used with several types of course structures, including:

- a semester-long project-oriented DSP laboratory,
- a quarter- or semester-long DSP laboratory structured around weekly laboratory exercises,
- a hands-on laboratory supplement as part of a signal processing theory course,
- a self-study course in DSP implementation.

ECE 320 at the University of Illinois represents the first type of course. It consists of roughly two equal parts: a series of weekly laboratory assignments, including introduction to the Texas Instruments TMS320C549 microprocessor and DSP development environment, real-time FIR, IIR, and multirate filtering, spectral analysis using the FFT, and a digital communications transmitter. Students work together in pairs on these laboratory

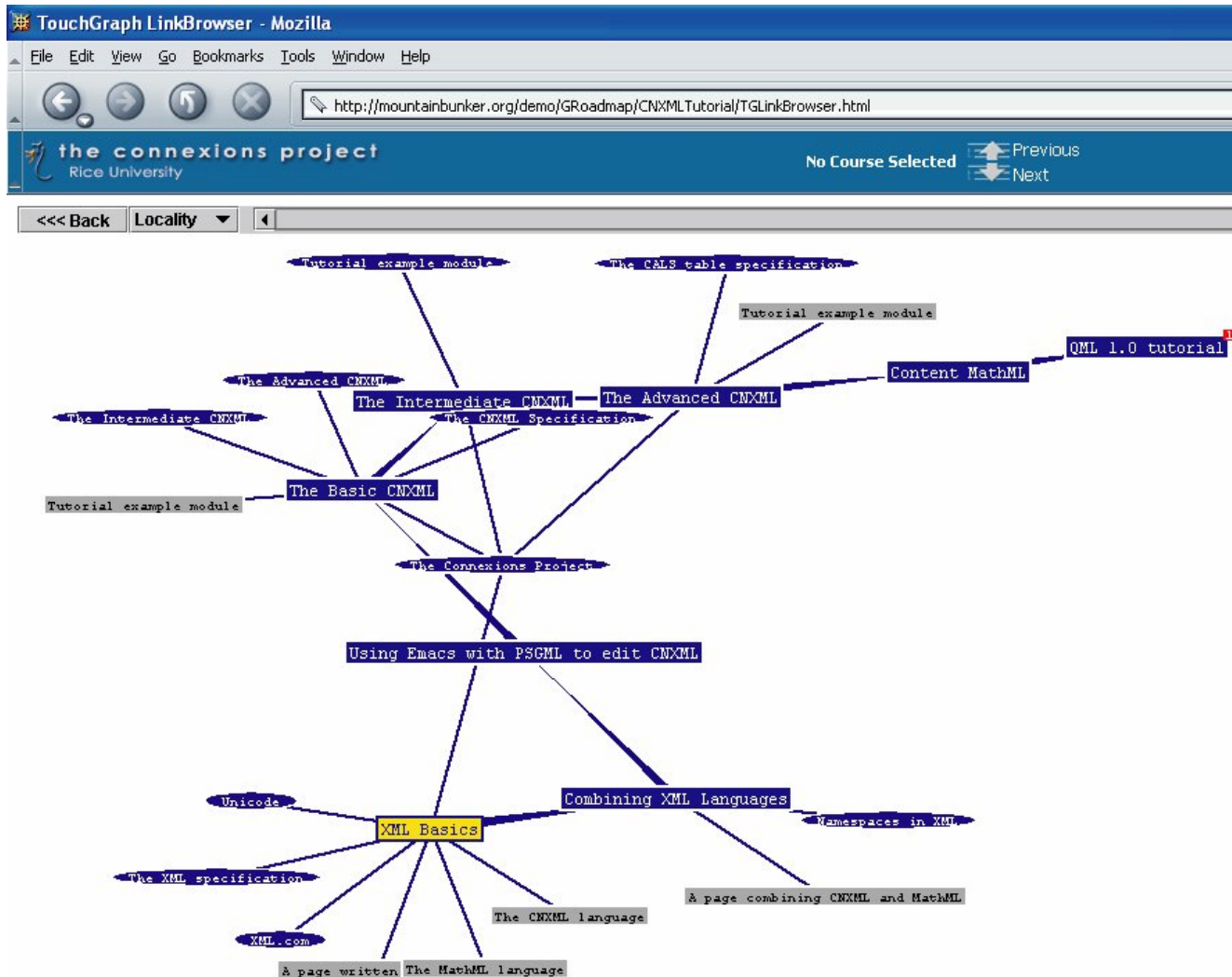
• Multi language

• Web, print, ...



# Concept Navigation

- Explore the interconnections between ideas





# Content Commons

>2100 modules

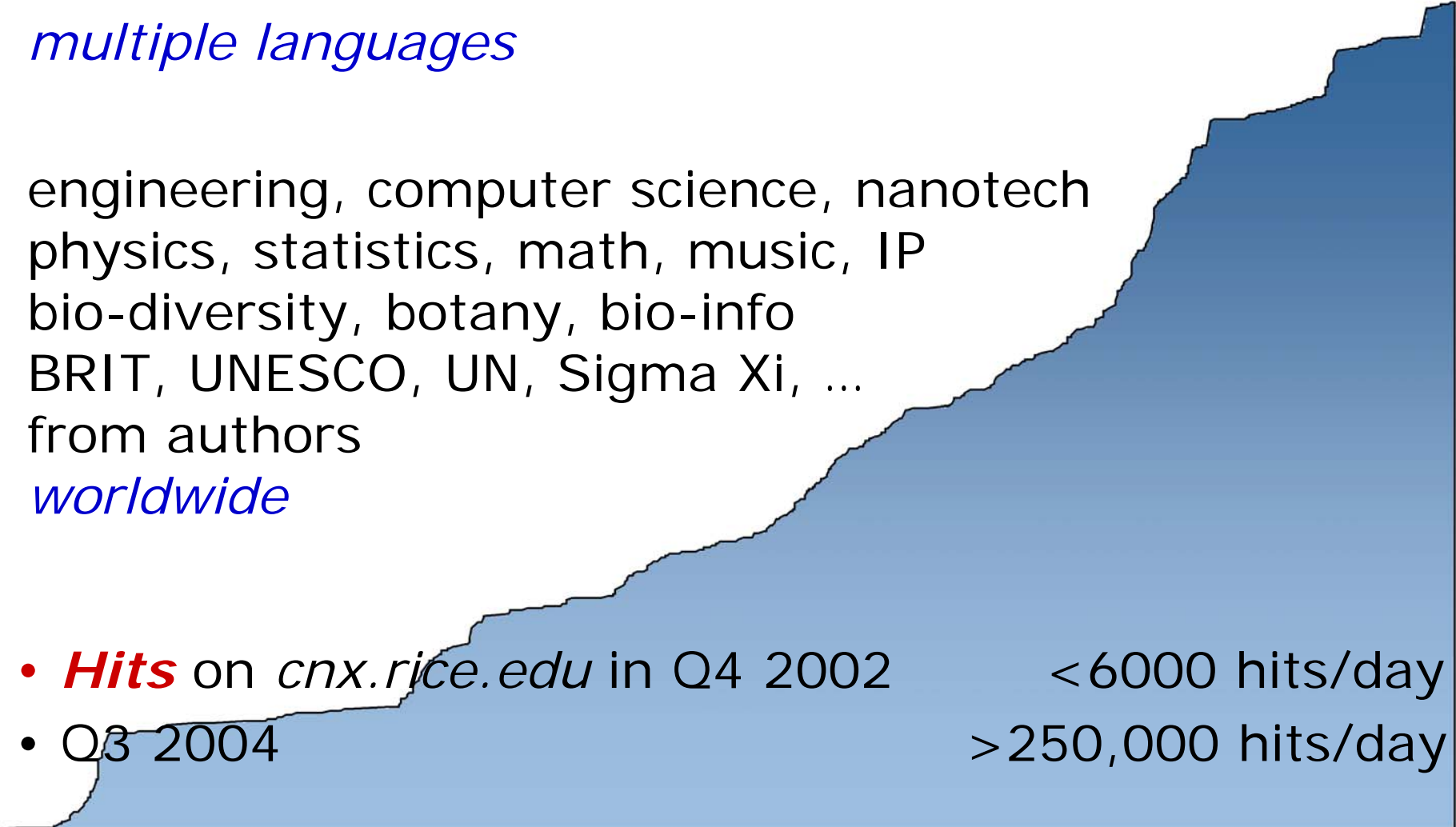
>45 courses (October 2004)

*multiple languages*

engineering, computer science, nanotech  
physics, statistics, math, music, IP  
bio-diversity, botany, bio-info  
BRIT, UNESCO, UN, Sigma Xi, ...  
from authors

*worldwide*

- **Hits** on *cnx.rice.edu* in Q4 2002 < 6000 hits/day
- Q3 2004 > 250,000 hits/day





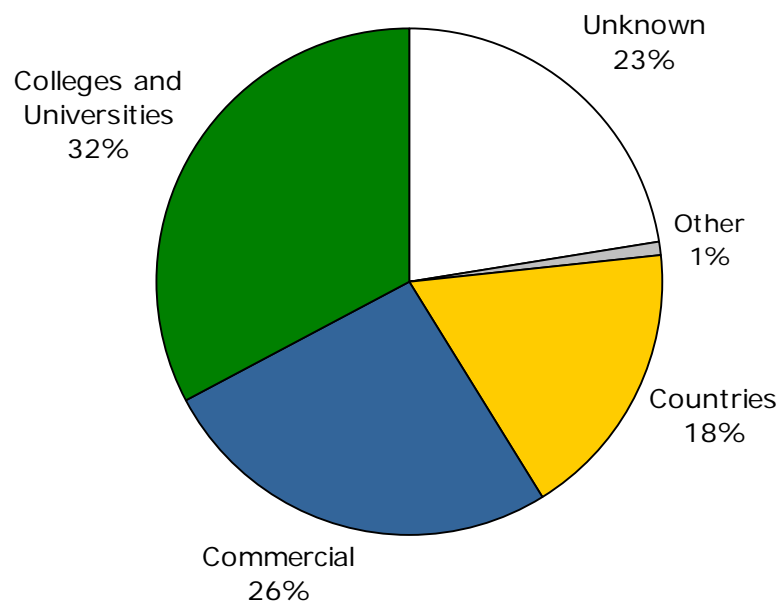


# Worldwide Participation

- Authors and instructors
  - 2000+ current author accounts
  - Illinois, Michigan, Ohio State, Wisconsin  
Georgia Tech, Polytechnic, UTEP, Rice  
Cambridge, Norway, Verona, ...
  - students are becoming authors



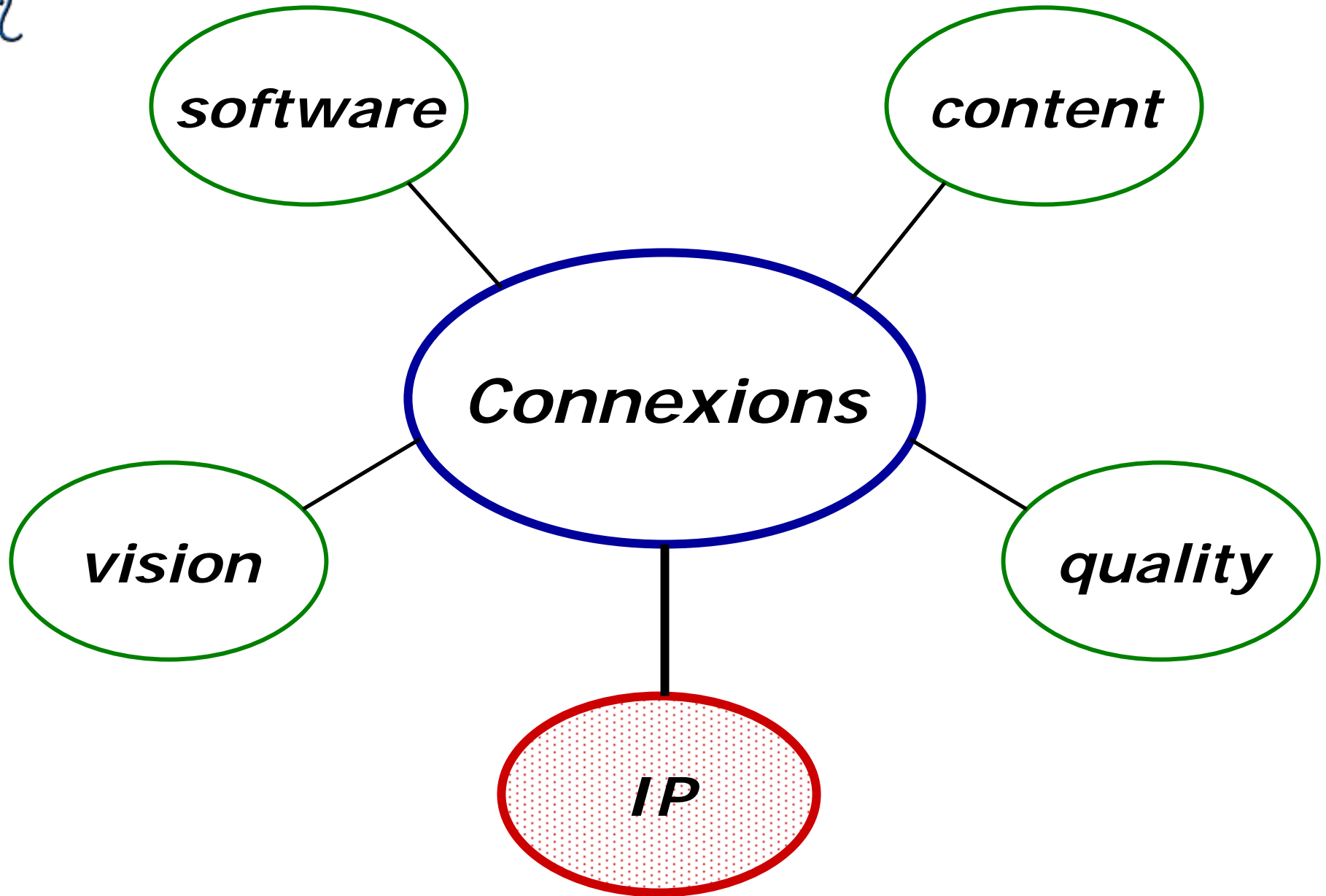
- Students and other users
  - 250,000+ hits per day
  - 450,000+ “users”
  - 96% outside Rice
- Industry
  - Cambridge University Press UK
  - National Instruments USA
  - Texas Instruments Japan





# Enabling a Commons

1. Common cultural *vision, goals, norms*
2. Common *technology* framework
3. Common *intellectual property* framework
  - role of instructor is to *interpret* and *re-contextualize* material
    - instructors continually “*remix*” materials (one-size-fits-all approach not very useful)
  - module *reuse* typically requires *modification*
  - busy faculty do not have time to chase down copyright holder (*not scalable*)
  - IP must be integrated into content





# Open Content Licensing

- Current IP regime *discourages sharing*
- *Creative Commons* Licenses
  - *common legal vocabulary* for sharing content
  - create a kind of “public domain” using licensing
  - collaborators since August 2002 (versions 1.0, 2.0)
  - license provisions:
    - *author retains copyright* on each module / course
    - *author licenses* material to the world at large
    - ✓ attribution
    - ✓ commercial use
    - ✓ derivative works (modification)
    - ✓ share alike (“copyleft”)



*creativecommons.org*



# Open Content Licensing

- Recent developments
  - Public Library of Science
  - Berlin Declaration (EU)
  - Peru, Brazil, Argentina, Mexico open-source initiatives
  - MIT OpenCourseWare
- Commercial collaborators
  - Kinkos, Cambridge University Press*
  - National Instruments*
- Sharing, (re)use: IP must be *integrated* into content
- *Author education* is key
  - fair-use, IP workshop with UPenn Annenberg School

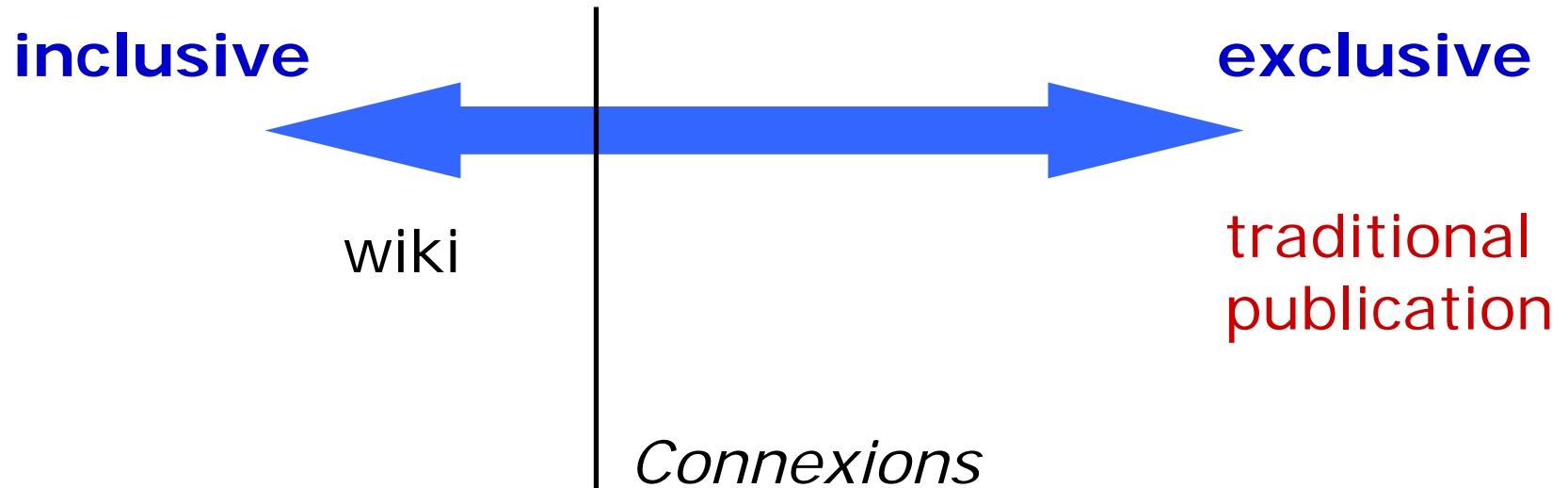


# Open Access Vision

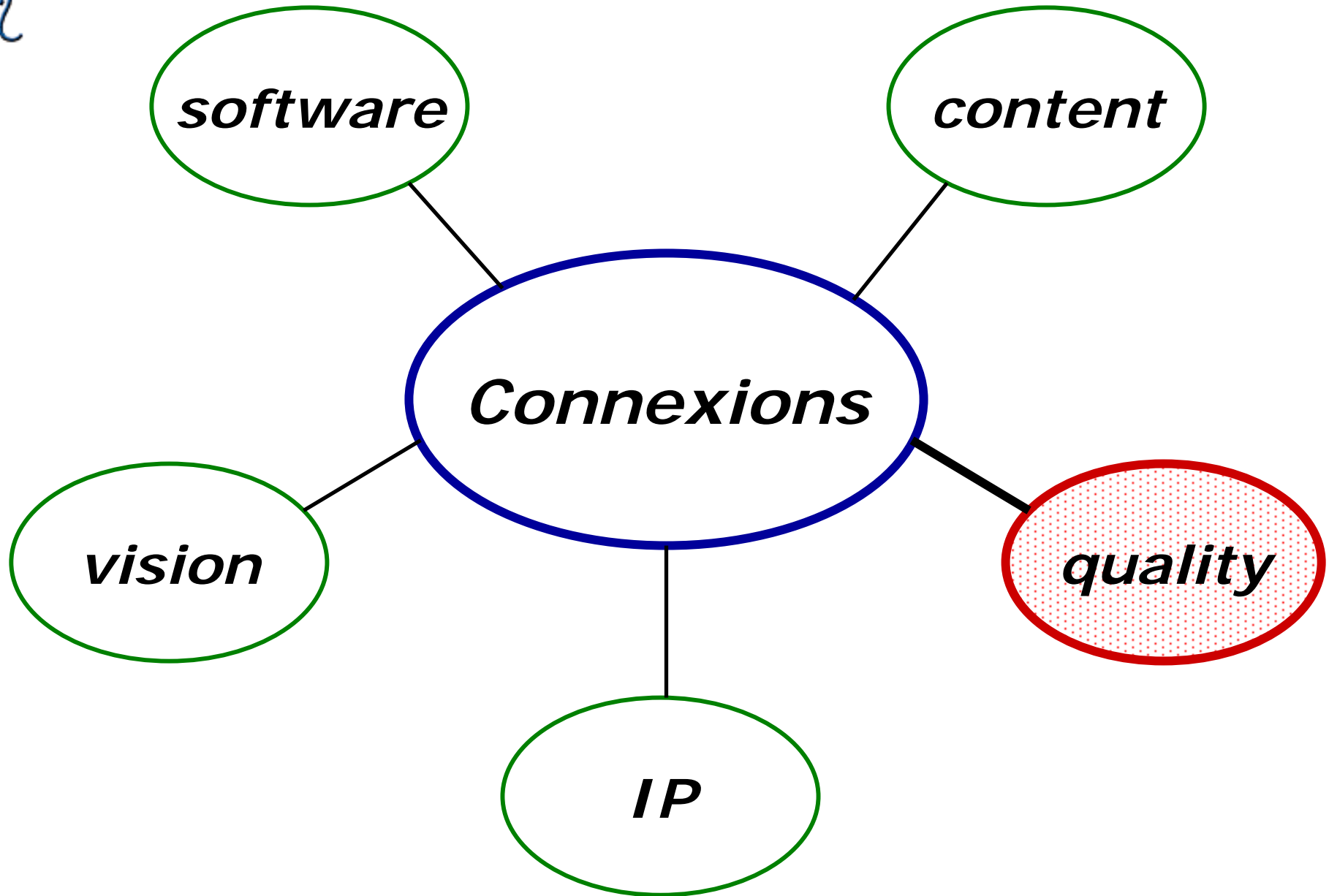
- Academics are accustomed to *sharing*
- Many authors comfortable trading *royalties* for *impact*
- But what about *control* over the content?



# Authorship Continuum



- author
- copyright holder
- maintainer
- co-author
- forking (derived copy)







# Quality Assessment

- Requirements:
  - *evaluate* and *credential* modules and courses
  - *direct* users to high-quality materials
- Standard approach: *pre publication peer review*
  - suitable when publication medium is scarce
  - costly and slow
  - exclusive rather than inclusive
  - *not scalable* to evolutionary development
  - does not support evaluation based on actual student learning in the field



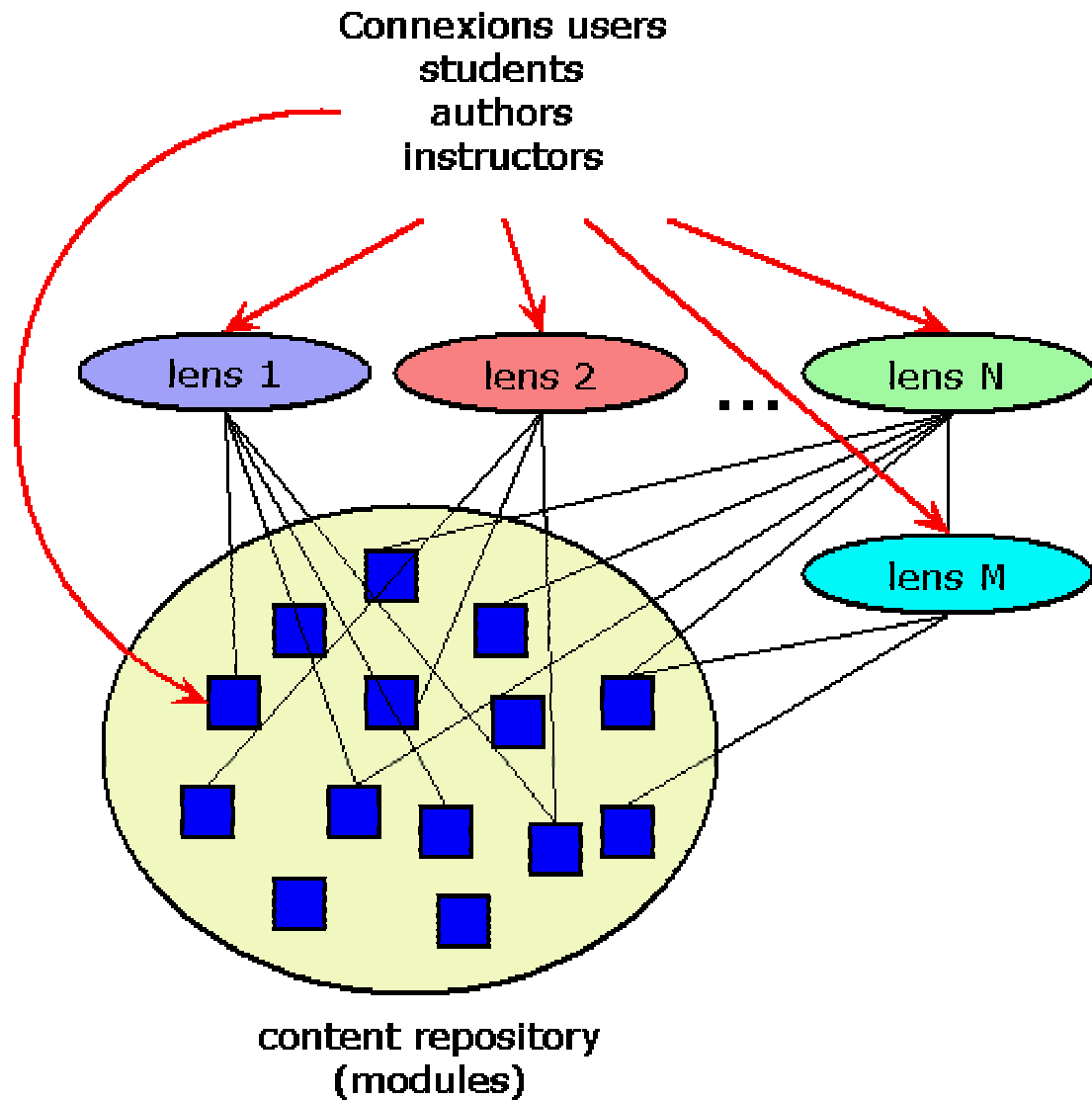
# Post-publication Review: *Lenses*

- *Distributed* peer review
- View modules/courses through ***lenses*** (filters)
- Each lens has its own *focus*
- Lenses provided by *3<sup>rd</sup> parties*

professional society  
 university, school board  
 publisher, colleagues

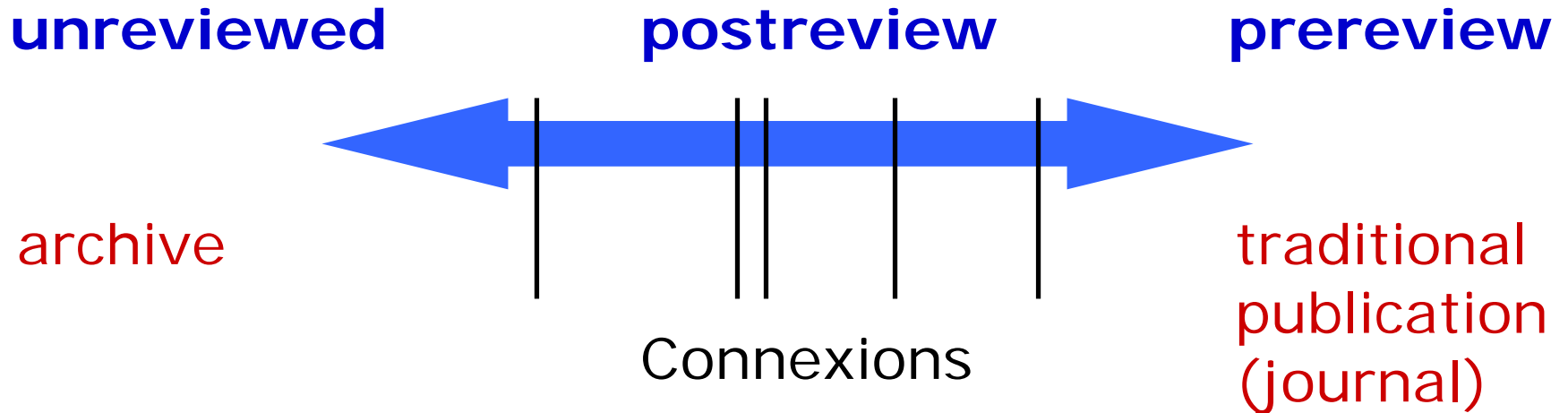
most popular, linked  
 collaborative filtering  
 user rating, blogs

learning assessment rating

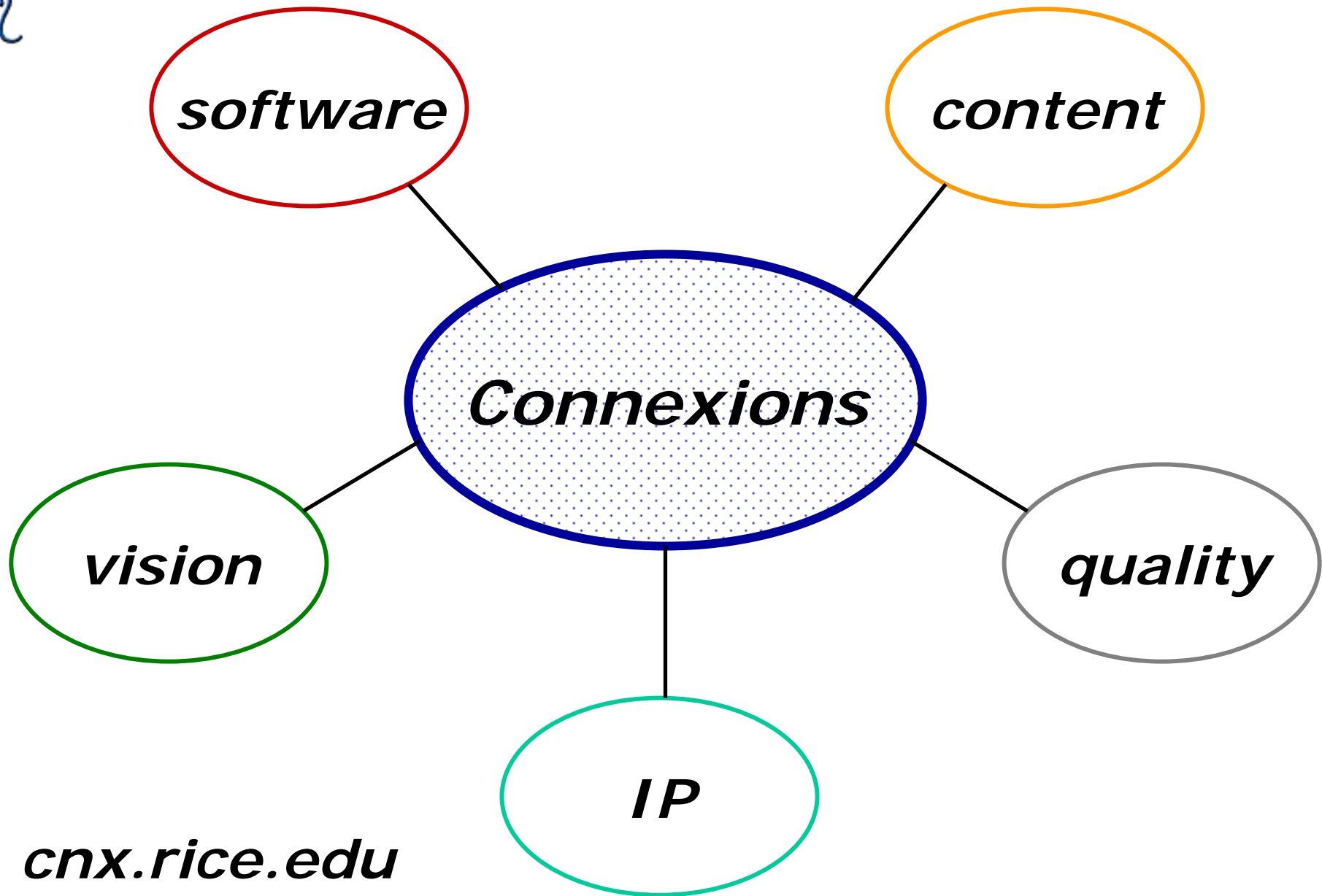




# Review Continuum



- Can operate at *multiple points* on the continuum
  - trade off feedback timescale, flexibility, labor, \$, ...
- Issues
  - *prestige* is what counts for promotion and tenure
  - new metrics of impact?



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# Summary – Opportunities

- Commons = Open access + Open contribution
  - anyone can contribute (students, K-12 teachers, public, ...)
  - avoid content fragmentation after reuse
- Leverage and *extend academic culture* and enterprise globally
  - new opportunities to *interact*
  - diversity, innovation, dynamism, feedback
- *Broader impact* for teaching materials
- Connect *content* with *context*
- Fully exploit multimedia content
- Support emergence of *new disciplines*
  - nanotechnology, bioinformatics, complex systems...



# Summary – Challenges

- *Community development*
  - thinking, writing modularly and collaboratively
  - conceptual barriers to reuse
- *Intellectual property*
  - protecting arguments, points of view while encouraging openness
- *Quality assessment and peer review*
  - how to scale up for large-scale, evolutionary development?
  - how to involve in promotion and tenure?
- *Tools*
  - must be open, easy to use, and intuitive
  - design cannot ignore social issues
  - *beware of the chasm!*



# Plan and Timeline

## Proof-of-Concept Phase

1999-2004

- Release 1.0 (February 2004)
  - robust, supported system in use worldwide
  - collaborative authoring, roadmap, annotation, publishing, ...

## Build-up Phase

2004-2007+

- expanded outreach, training to support *grassroots dev.*
- enhanced tools to promote *scaling*
- Release 2.0
  - open-source WYSIWYG XML editor; MS Word converter
  - additional IP license support
- Release 3.0
  - distributed data bases, more IP license options, increased language support, lenses, stronger functionality for specialized domains

## Sustainability Phase

2007+

- *support* infrastructure
- potential non-profit "*dot-org*"



Connexions is open to you!

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