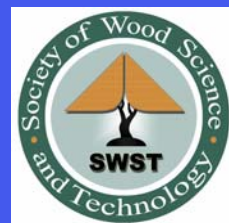


A Historical Assessment of Wood Science & Technology Education in North America

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Today's coverage includes:

- An overview of WST in the 19th & 20th centuries
- Current status of WST education in US/Canada
 - Programs
 - Enrollment/graduates
 - State of the art, recruitment
- Future challenges & opportunities
 - Strategic alliances/Partnerships/Networking
 - New pedagogies
 - Critical issues
 - Role of the professional society



Ontogeny of Wood Science & Technology

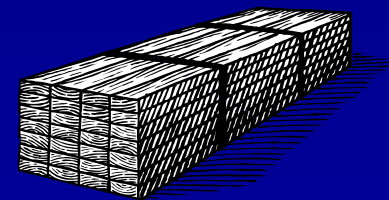
- Wood Science

... that body of knowledge applicable to wood as a material including its origin, properties, and characteristics



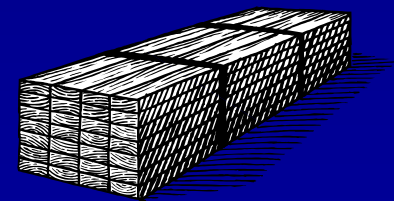
- Wood Technology

... follows as the application of knowledge in the conversion, processing, and use of wood



A Wood Technologist

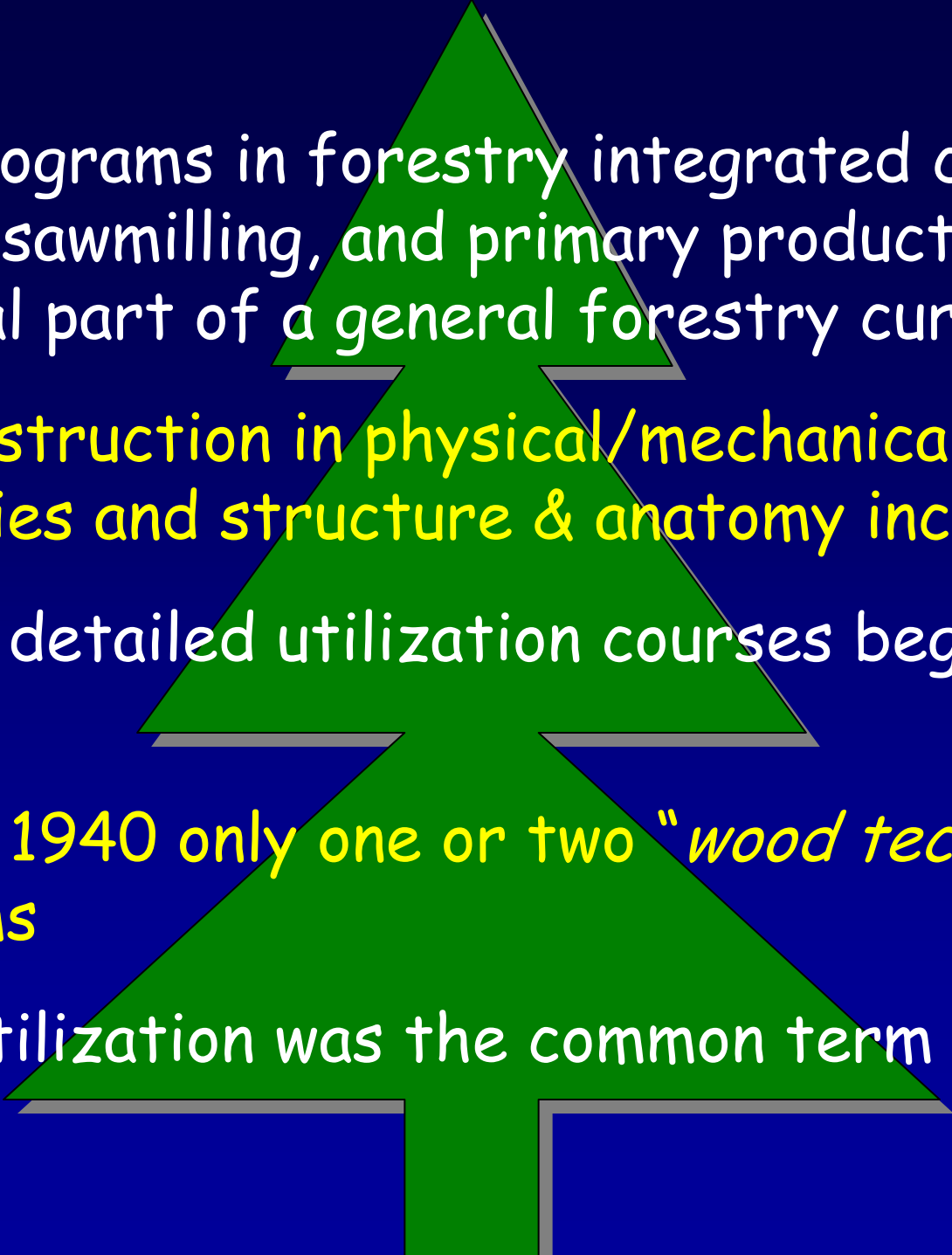
... Applies wood science & related knowledge in making wood more useful to man and requires not only an expert knowledge of wood science, but additionally, a sound understanding of industrial manufacturing equipment & methods &/or an understanding of the process by which products are conceived, designed, distributed, and sold.



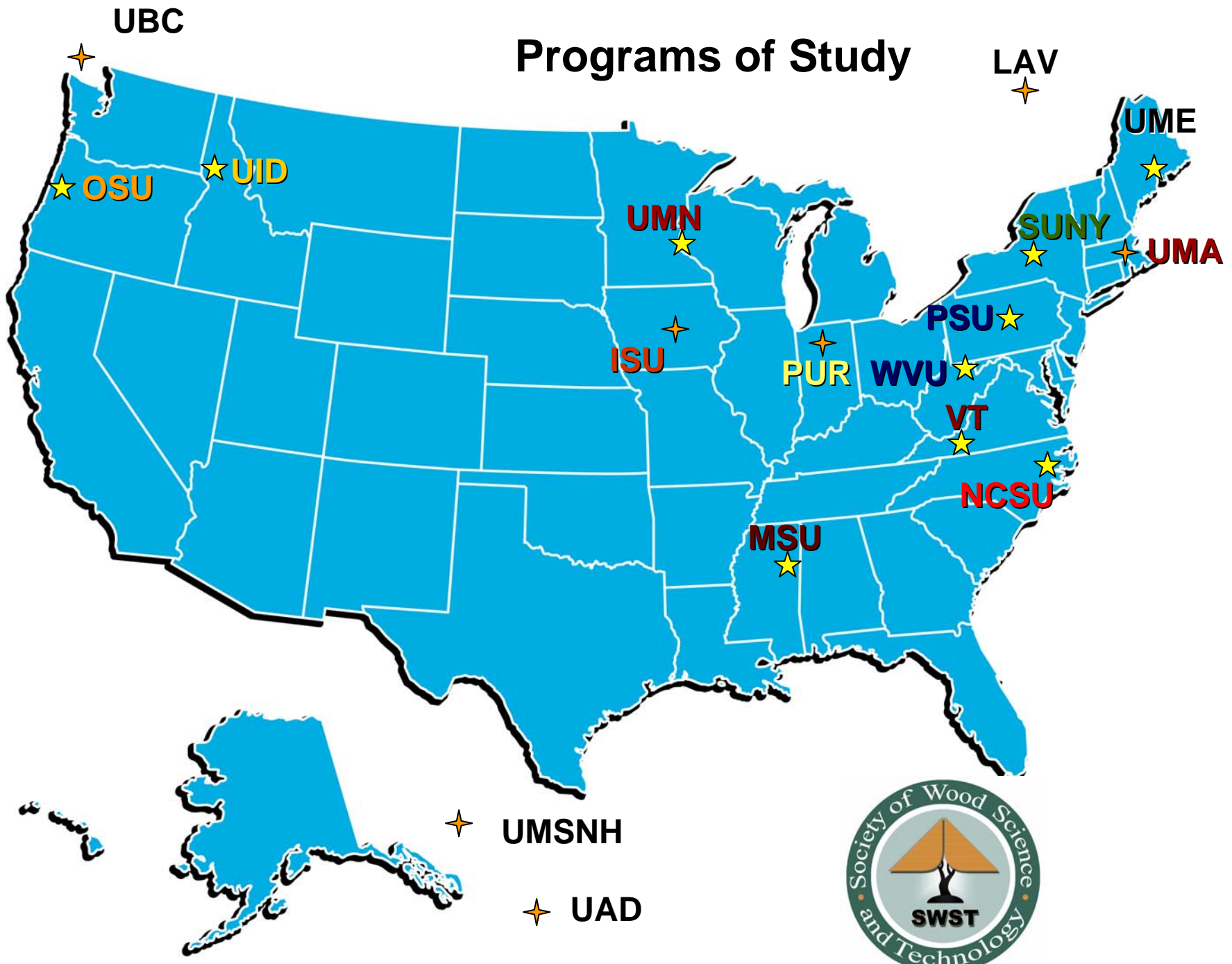


A little history:

1887	Forerunners of WST established; 1 st course on forestry, B E Fernow, U Wisc
1895	First textbook: F. Roth, <i>Timber: An elementary discussion of the characteristics & properties of wood</i> , Bulletin 10, USDA Division of Forestry
1898	First forestry school at Cornell; Closed in 1903
1898	Forestry instruction at Biltmore, NC by Dr. C A Schenck; abandoned in 1913
1900	First forestry BS degree
1900	Yale School of Forestry established
1931	U Mich curriculum in ' <i>Wood Technology</i> '

- 
- Early programs in forestry integrated courses in logging, sawmilling, and primary products as an essential part of a general forestry curriculum
 - Some instruction in physical/mechanical properties and structure & anatomy included
 - By 1910 detailed utilization courses began to appear
 - Prior to 1940 only one or two "*wood technology*" programs
 - Wood utilization was the common term

Programs of Study



¿What's in a name?

- Forest products
 - Wood science & engineering
 - Wood & paper science
- Wood science & forest products
 - Wood products engineering
 - Wood & forest science
- Wood science & technology
 - Bio-based products

Schools with accredited BS:

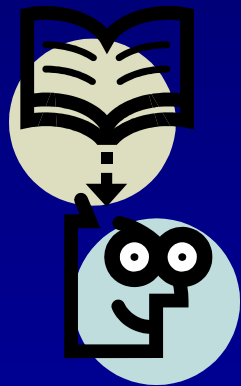
University (Yr accredited)-Yr initiated	Masters	Doctorate
Idaho (96) -1935	Y	Y
Maine (93) -1972	Y	Y
Minnesota (85) -1922	Y	Y
Mississippi State (87)* -1975	Y	Y
North Carolina State (84)-1949	Y	Y
Oregon State (90) -1927	Y	Y
Pennsylvania State (92) -1943	Y	Y
State University of New York ESF (??) -1924	Y	Y
Virginia Tech (85) -1965	Y	Y
West Virginia (89) -1947	Y	Y

* Option in Forestry

Schools with non-accredited BS:

University-Yr initiated	Masters	Doctorate
Iowa State-1939	Y	Y
Massachusetts-1965	Y	Y
Purdue-1997	Y	Y
British Columbia-1995	Y	Y
Laval-1984	Y	Y

Schools offering graduate studies* only:



University	Masters	Doctorate
Auburn	Y	Y
Clemson	Y	Y
Georgia	Y	Y
Illinois	Y	Y
Kentucky	Y	N
Louisiana State	Y	Y
Michigan State*	Y	Y
Missouri*	Y	Y
New Brunswick	Y	Y
Southern Illinois*	Y	N
Tennessee*	Y	Y
Toronto	Y	Y
Washington*	Y	Y
Washington State*	Y	Y
Wisconsin-Madison*	Y	Y
Wisconsin-Stevens Point	Y	N

Growth of Programs

Degree	1964	1979	1988	1998	2007	Change '64-'07
BS	18	25	25	13	15	-3 (-17)%
MS	23	27	na	na	31	+8 (35%)
PhD	10	25	na	na	28	+18 (180%)

WHY??

Additional North American institutions offering instruction

- University of Northern British Columbia
 - University of Alberta
 - University of Moncton
- Universidad Michocana de San Nicholas de Hidalgo
 - Universidad Autonoma de Chapingo

Survey of Programs

- Questionnaire to all schools listed on the SWST web site
 - Degree programs
 - Options/concentrations
 - Courses offered
 - Faculty distribution
 - Student enrollment by degree
 - No. of graduates
 - Recruiting approaches
 - Facilities/funding
- Returns = 21/32
- Combined with literature data

Concentrations/Options include:

- Business Mgt
- FP Marketing
- Industries Mgt
- Biology/Chemistry
- Wood Science
- Wood Engineering
- FP Processing & Manufacturing
- Wood Construction & Design
- FP Technology
- Bio-based Composites
- Adhesion Science
- Packaging Science
- Building Materials & Wood Technology
- Industrial Environmental Ops
- Non-timber FP
- Production Planning & QC
- Forest Operations

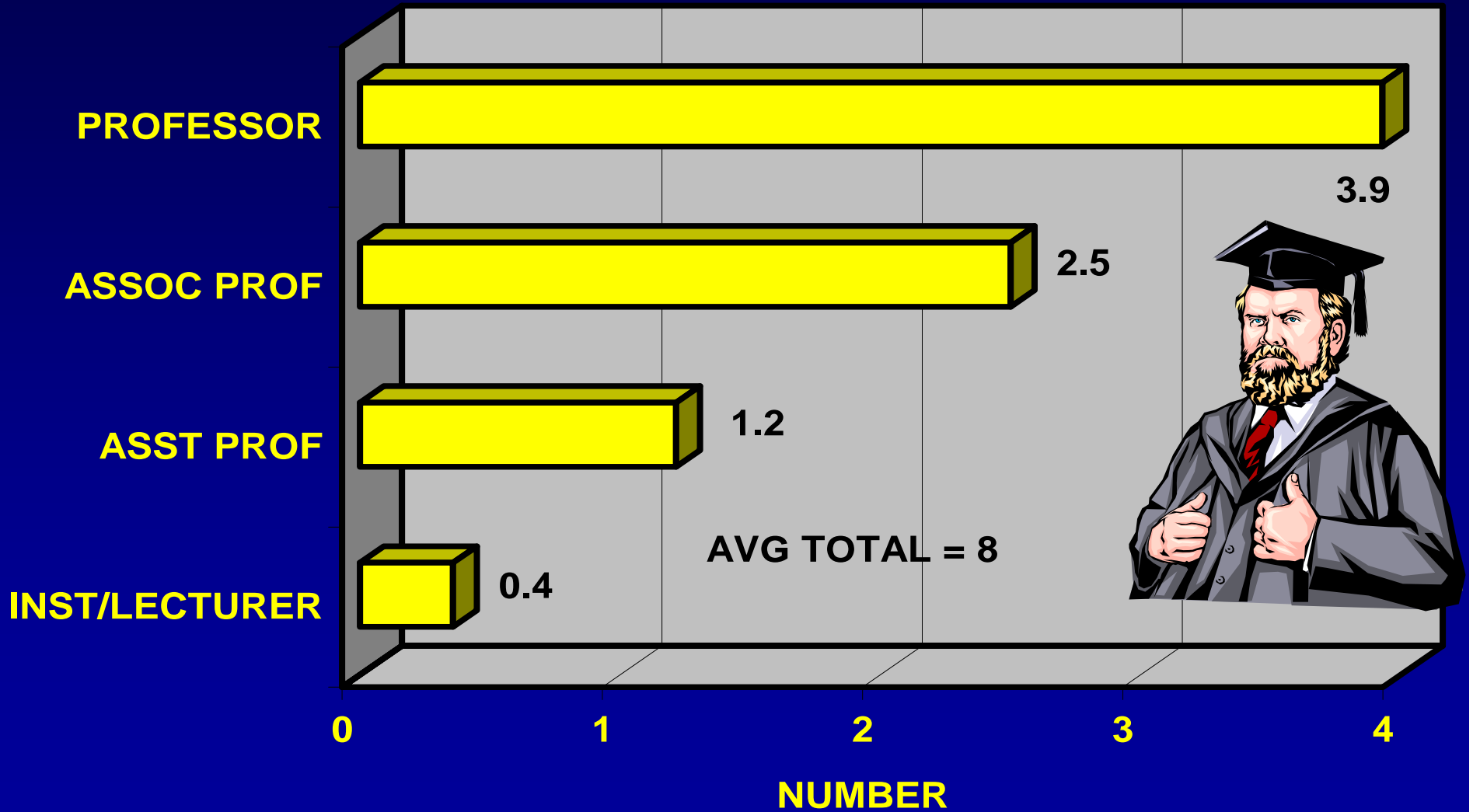
Topic	Credit Hours
ADHESIVES/FINISH	2
ANATOMY	3
CHEMISTRY	2
CONSTRUCTION/CAD	2
ENVIRONMENTAL	2
HARVESTING	2
MACHINING	1
MANAGEMENT	2
MARKETING	3
MECHANICAL PROP	3
OTHER	2
PHYSICAL PROP	3
PRESERVATION	2
PRIMARY PROCESSING	6
QC	1
SECONDARY PROCESSING	3
TOTAL FP/WST	39

Typical
WST
Course
Offerings
by BS
Programs

Subject Matter Breakdown

- Wood science
 - 11 SCH
- Wood technology/utilization
 - Processing: 21 SCH
 - Business: 5 SCH
 - Other: 2 SCH

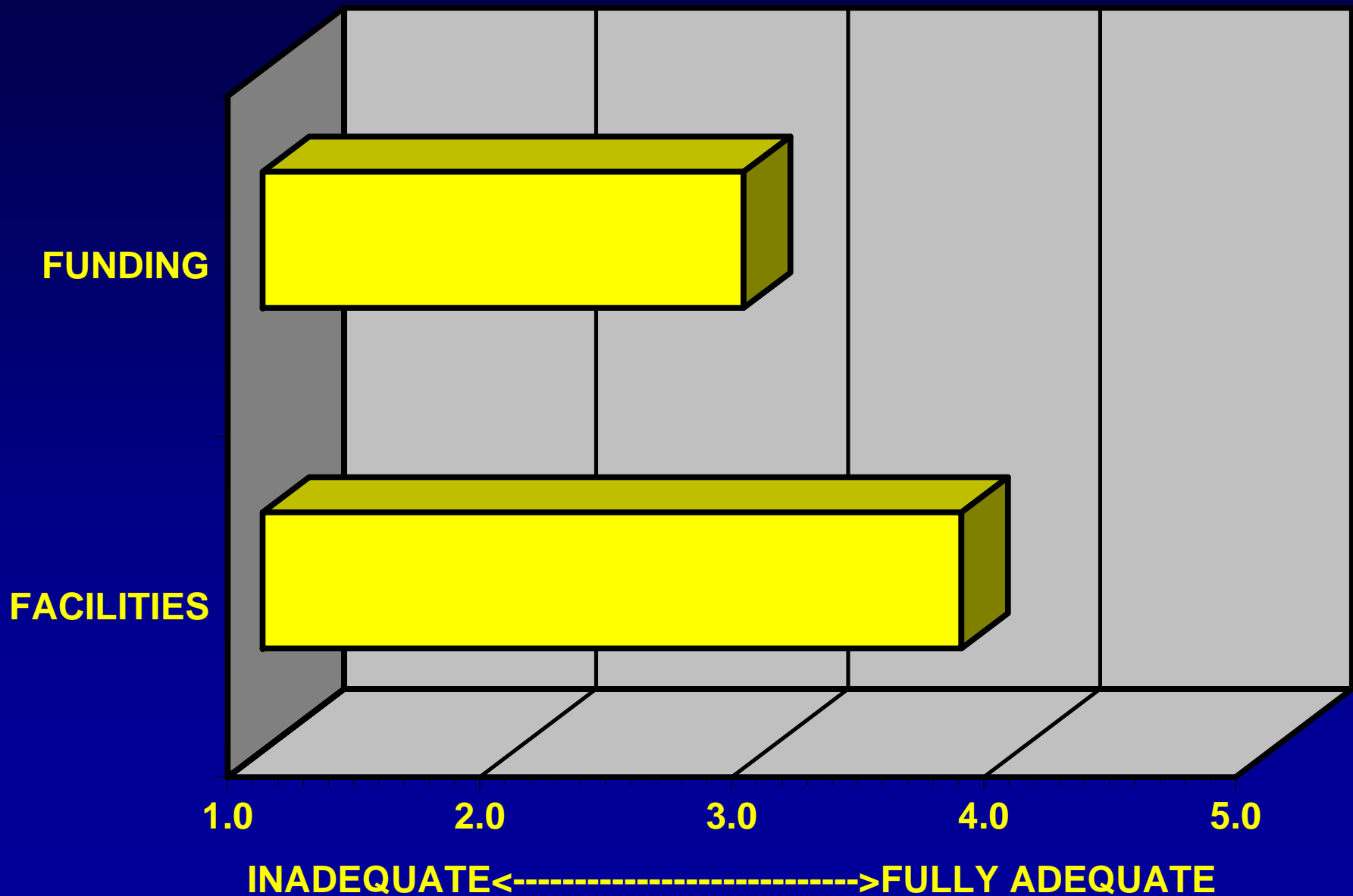
A typical faculty:



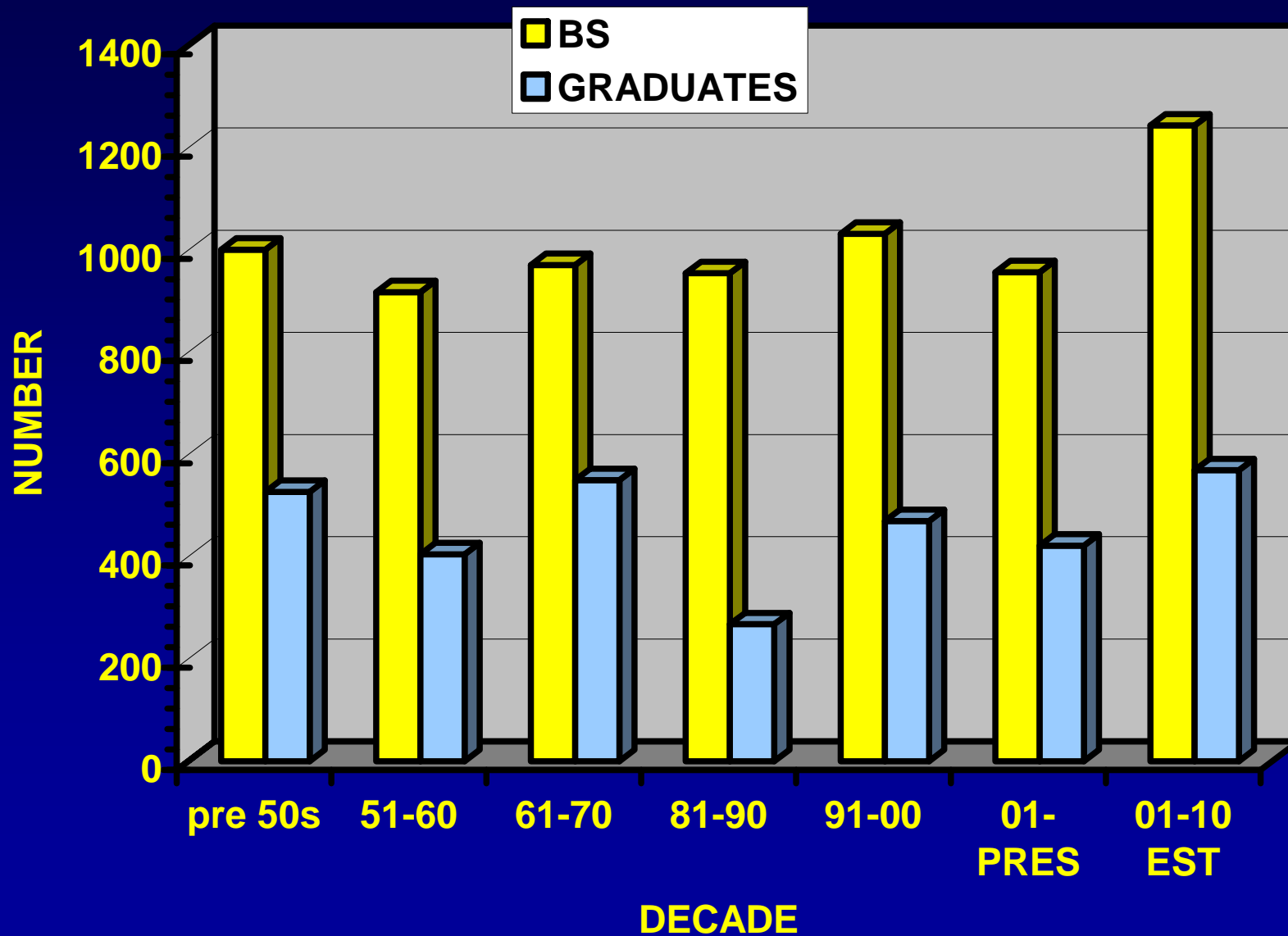
What does this tell us?

- Teaching:Research:Extension = 0.31:0.55:0.14
 - Senior, mature faculty
 - Retirements pose a real threat
 - Research vs Teaching

Characterize your teaching support:



Graduates of WST/FP programs



How are the students doing?

- Nearly 100% placement
- Competitive salaries (BS = US\$42k; MS = US\$50k; PhD = US\$57k)
- Acceptance by industry is extremely high

Graduate Programs

- 31 MS Institutions, 28 PhD
 - MS = 72%
 - PhD = 28% (~22/yr)
- *$\frac{1}{2}$ -2/3rds are foreign nationals = most will return home*
- Future Faculty: Will They Be There? - R. J. Thomas, 1999, WFS 31(4)
- WHY? More credit for PhDs; emphasis on graduate education away from undergrads

Recruitment

What's being done?

- On campus recruiting-mailings & majors fair booth, undecided
- Articulation agreements with CC
- Visits to high schools
- Web site
- Word of mouth
- Newsletter
- Campus visits
- Personal contact
- Emails to HS seniors
- Use of a general ed course
- Advertise
- Meet with HS students/advisors
- Transfer students
- Open houses
- Full time recruiter
- Scholarships

Recruitment

What's working best?

- Utilize a dedicated recruiter
- Students recruiting students
 - The Web—kids surf
 - Undecideds

"... societies, associations, industry, education, and government must cooperate and coordinate their efforts."—Jogensen & Lew, 1969, FPJ 19(5)

Recruitment

What's working best?

"... recruiting students is simple. You have to allocate resources ... and industry has to partner in this effort." — Lyon, 2006, WFS 38(4)

"... have the support of all levels of administration. ... it is crucial to have the philosophical support of the decision makers and career counselors." — Zink, 1997, WFS 29(2)

What about early education?

Teach the teachers

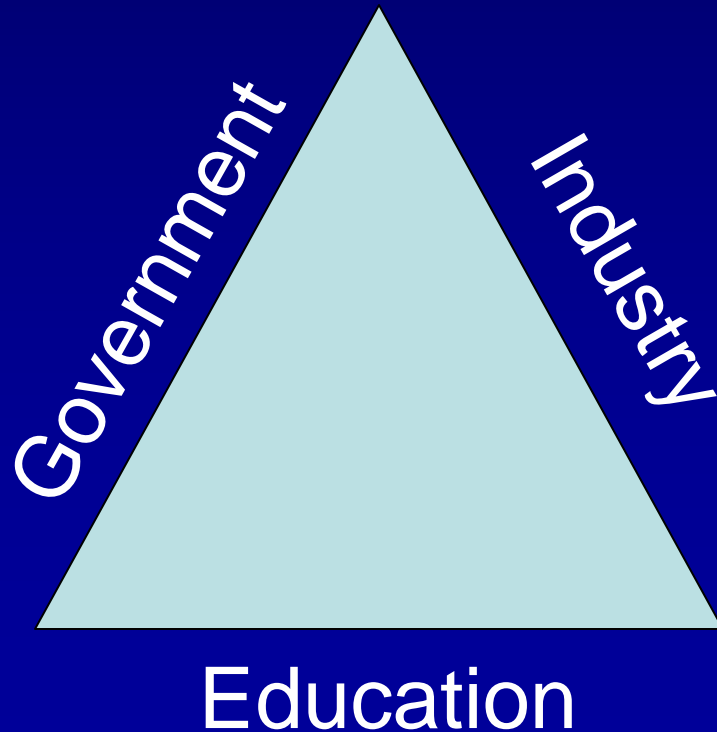
- Woods Walk—Woods Talk
 - Project Learning Tree

Teach the kids

- Wood Magic
- Forest Discovery Center

Strategic Alliances

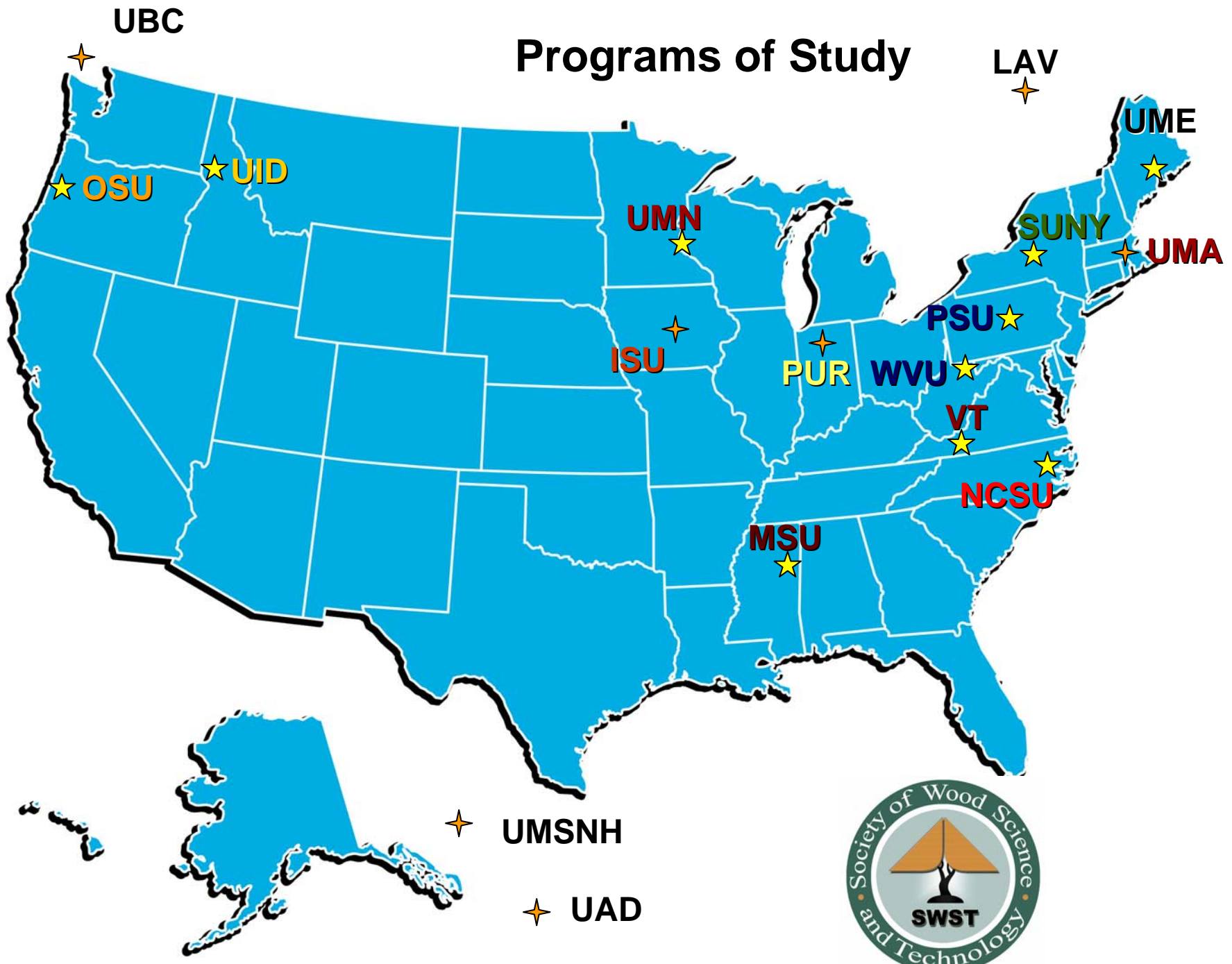
- With other associations (FPS, SAF, TAPPI, IUFRO, IAWS, etc)
- The triangle



New Pedagogies

- Distance Learning
 - Only 3 institutions indicated they use it
- Academic common market
- WebCT
- Consortium-based programs

Programs of Study



For the times they are a-changin'

Youngs, 2006, WFS 38(2), Youngs *et al.*, 2006, JF, Wallinger, JF 103(7), Friedman, 2005, Schuler *et al.*, 2005, Engineered Wood J. 8(2)

- Several years ago, SWST broadened its definition of wood technologist, ie. opened up the profession
- SWST has gone to performance-based accreditation
- US in a quandary as to what constitutes a wood scientist/technologist

For the times they are a-changin'

- Other professions have gone/are going through the change
- Agreed basics ---→ Changing environment & perception ---→ New direction or 'which way to morph?'
- Consider nanotech, metrology, ligno-cellulosics, bio-(pick one)
- Impact of globalization, character of the timber resource, etc.

For the times they are a-changin'

- So, what are we?
- Physical chemist-----→ Wood scientist
- What is SWST's role
 - Accreditation?
 - Licensing?
 - Recruiting?
 - ?????? What else?????

- New products & technologies
- Marriage of feedstocks

Logs

1-20 m

Lumber

1-20 cm

Veneer

Long Flakes

Chips

1-20 mm

Flakes

Excelsior

Particles

Fiber Bundles

Paper Fiber

1-20 mm

Wood Flour

Cellulose

< 1 nm



Courtesy: D. Kretchmann, USFPL
Based on Periodic Table of Wood
Elements by G. Marra

Critical Issues: How are we doing?

- Under-enrollment
 - Programs disappearing or 'dumbing down'
- Industry in-house technical base declining
- Declining number of extension specialists
 - FP/WST politically incorrect
 - Linked to forestry also in decline
 - Are curricula current?
 - Globalization
- Linking utilization to sustainable mgt

Thank you for your kind
attention

Any questions??

or better yet

Any answers??