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## Nanotechnology Skills and Training Survey Outcomes

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# Summary

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- ❑ Objectives and Scope
- ❑ Methodology
- ❑ Data Analysis
- ❑ Survey Outcomes – Roles and Recruitment
- ❑ Survey Outcomes – Skills and Training
- ❑ Concluding Remark



# Objectives

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- Identify *skills gaps and training needs*
- Identify *current and prospective roles*
- Identify *professional development needs*
- Inform course providers about *training needs*



# Scope of Respondents

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- Industry – R&D, Production, Technologist
- Industry - Risk Managers, Venture Capitalists, Patent Attorneys, Marketing
- Government – Research and Meterology, Regulatory bodies, Standardisation
- Education and training



# Methodology

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- Questionnaire Design
- Feedback on Questionnaire
- Circulation
- Qualitative Information gathering
- Analysis



# Data Analysis

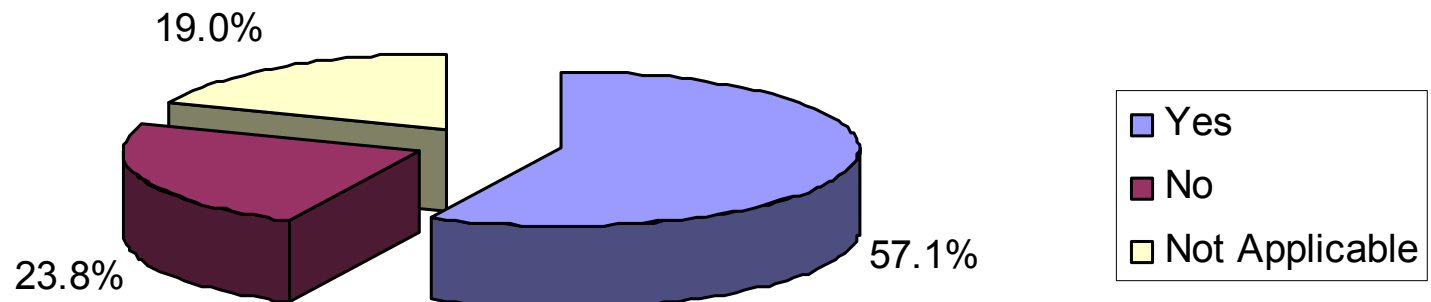
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<i>Type of Response</i>	<i>Number</i>	<i>Percentage</i>
Complete and Traceable	147	61.25%
Incomplete	32	13.33%
Invalid	61	25.4%
Total	240	

# Roles

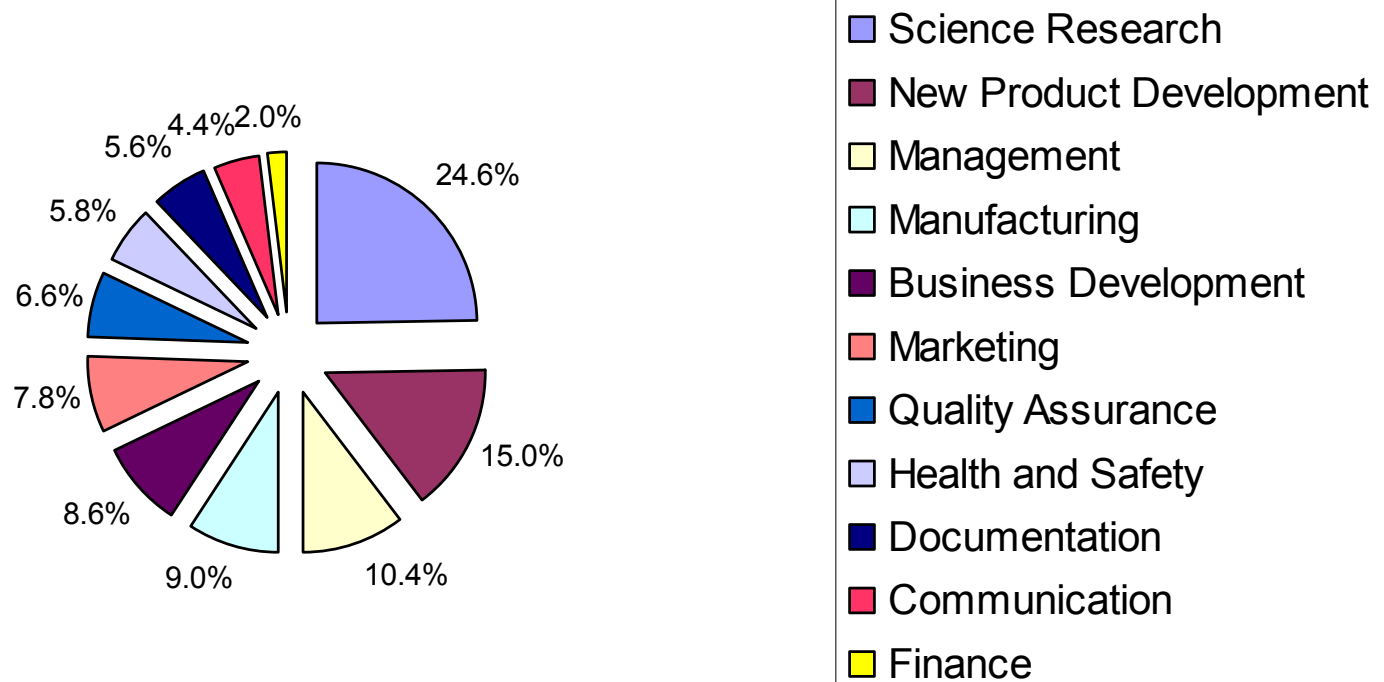
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## Employ Graduates and Post-graduates specifically for Nanotechnology Know-How



# Roles

**Roles of Graduate and Post-graduates in Organisations**



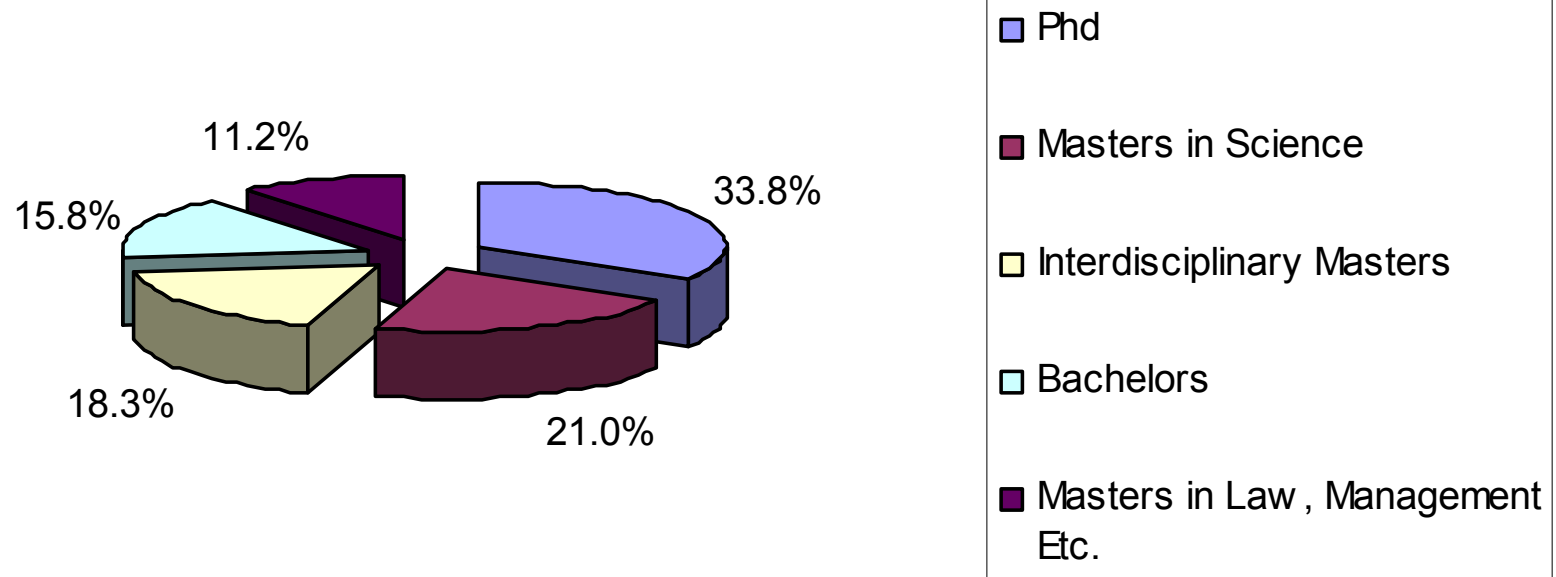
# Other Roles

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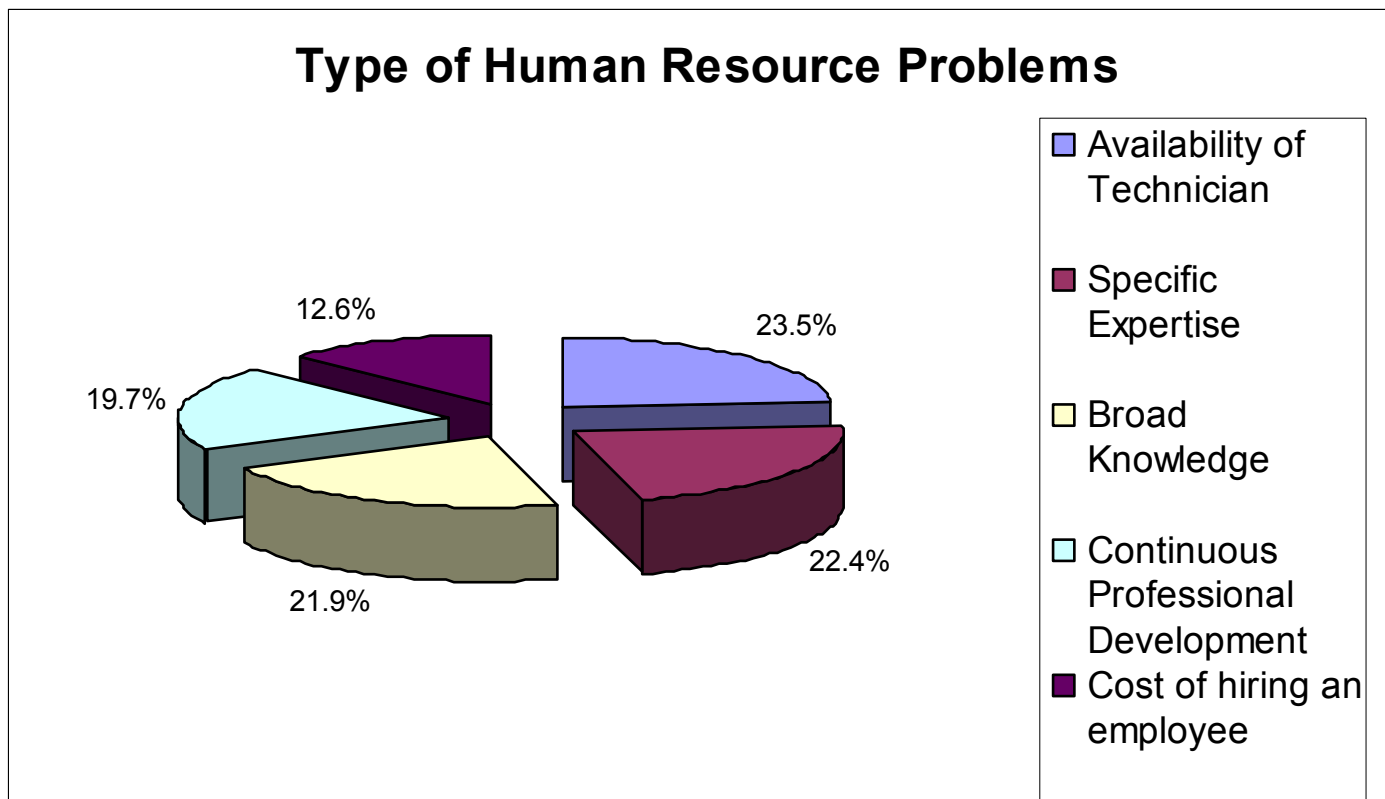


# Qualification Preference for Roles

**Qualification of Preference**



# Human Resource Problems for Organisations





# Specific Recruitment Issues

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*severe shortage of  
personnel with  
minimum skill level  
required*

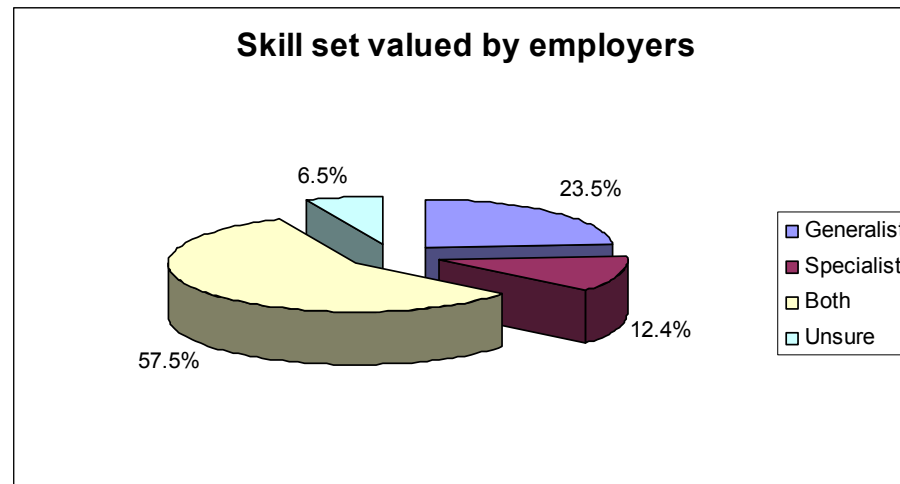
*difficulty in  
recruiting skilled  
technicians*

*need for more scientists  
to fill science to  
business transfer roles*

*recruitment criteria  
are not well defined  
and training needs not  
well identified*

*know-how of  
nanotechnology, along  
with sector knowledge can  
be very difficult*

# Valued Skill Set

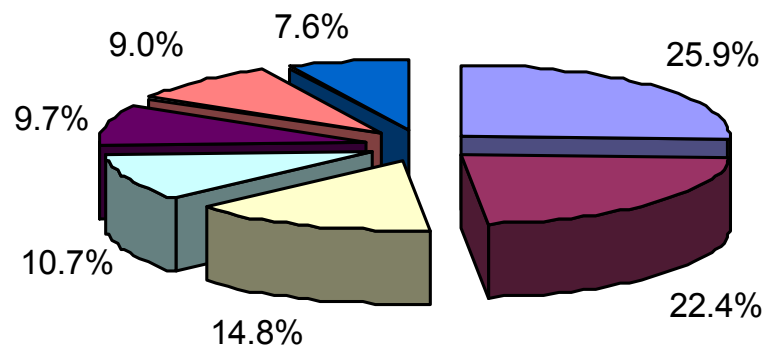


*need a strong education in one discipline combined with a masters course in interdisciplinary nanoscience and engineering.*

*a small market for generalists exists who can make the connection between different disciplines.*

# Preferred Training Method

**Preferred Training Method**



- On the job
- Continual Professional Development Programs
- One week short courses
- Online Courses- Masters
- Part time masters degree
- Evening Classes
- Sabbatical Leave

# Specific Training Issues

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*In industry we prefer to recruit young people with a good basic understanding*

*difficult to define a common skill set, better techniques, and the knowledge competencies*

*most important part of the training is recognizing the capabilities and limitations*

*training courses does not resolve the underlying problem of lack of knowledge.*

*developed an in house training programme, and when it is required external trainers are invited*



# Specific Training needs

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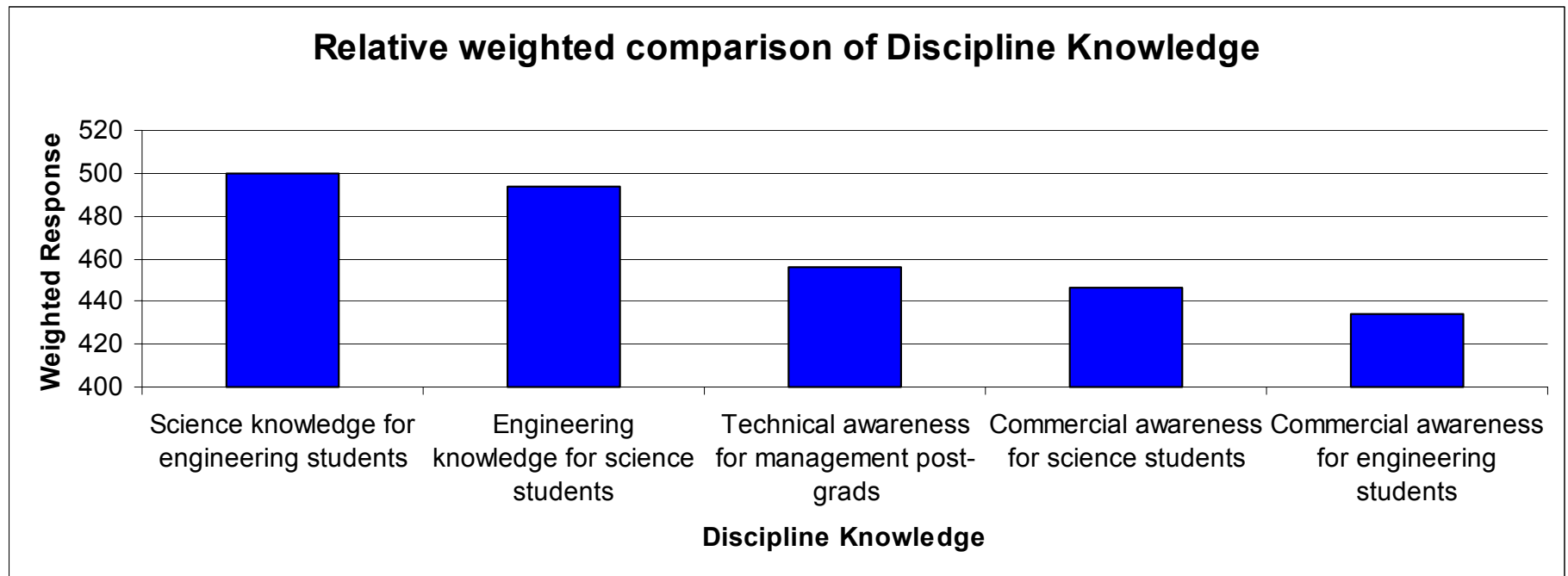
*'quality management' with  
a particular angle to  
research and innovation for  
Nano Science and  
Technology ought to be  
organized*

*short training session  
in health and safety on  
best practices*

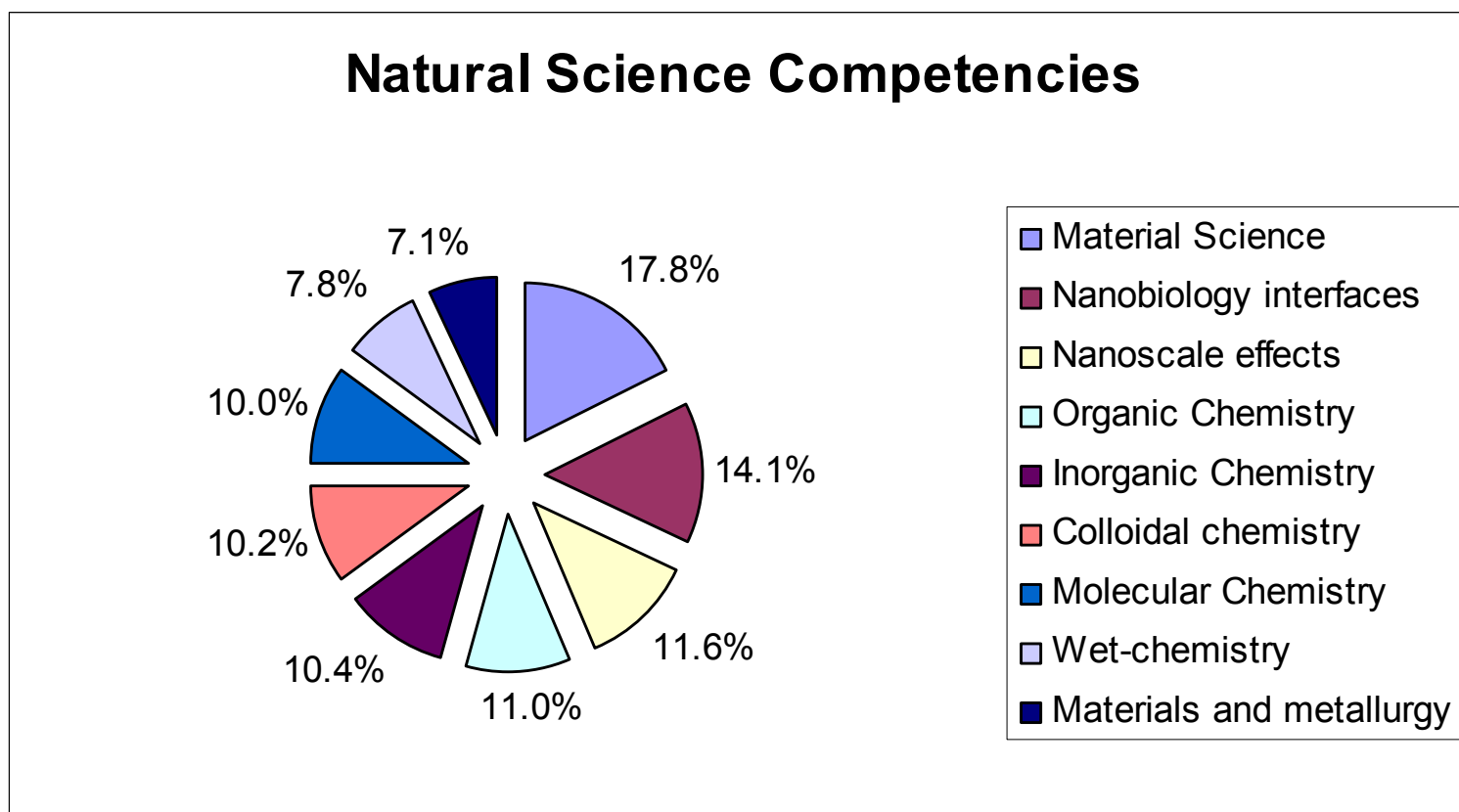
*specific training in  
intellectual property  
rights to researchers*

*Management and  
Policy related  
training*

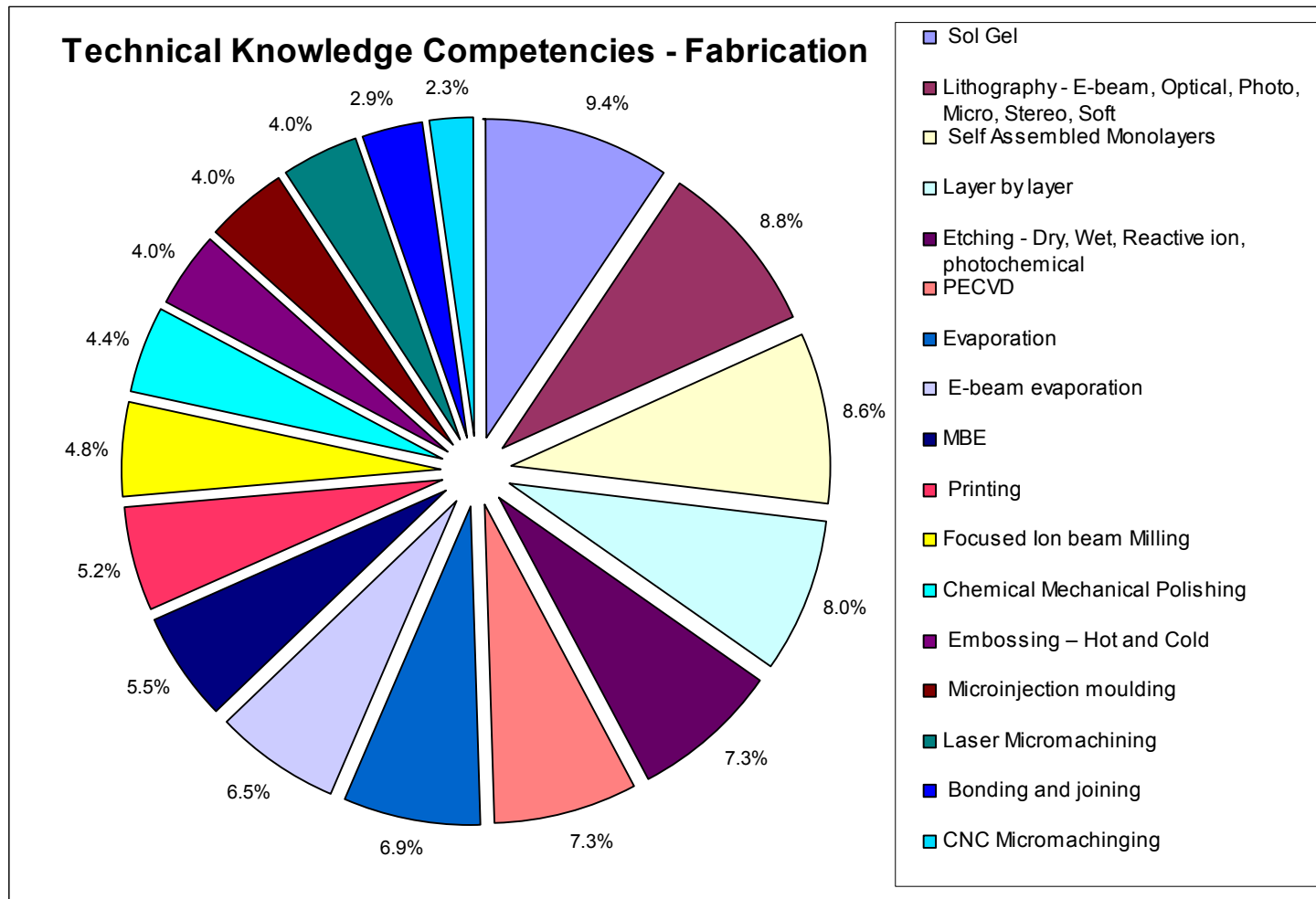
# Comparison of Discipline Knowledge



# Natural Science Competencies

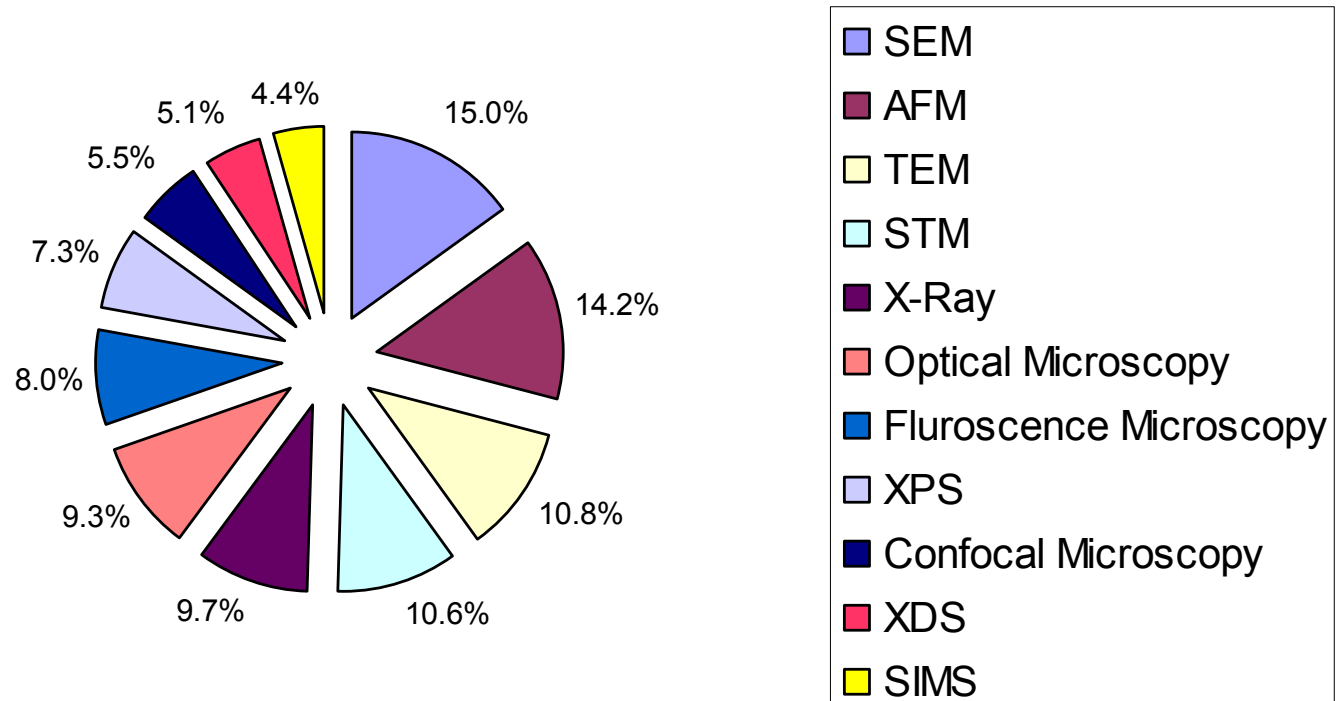


# Synthesis and Fabrication Competencies



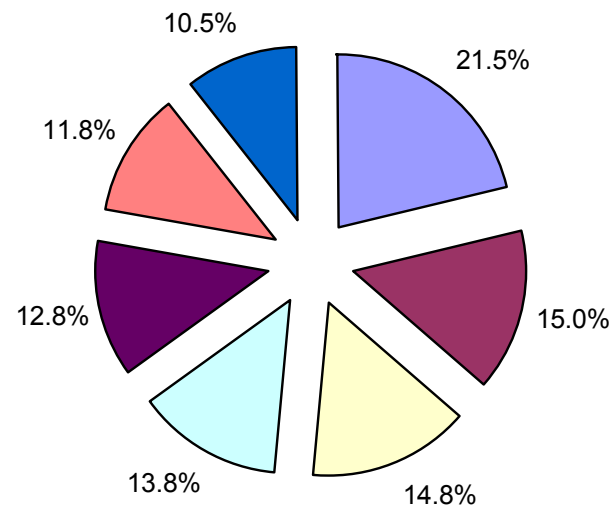
# Characterisation and Analysis Competencies

**Technical Knowledge Competencies -  
Characterisation and Analysis**



# Other technical competencies

## Technical Knowledge - Other competencies



- New Material Properties and selection
- Design Methodology and Product Development
- Technical communication
- Health and safety
- Computational modelling and simulation
- Near Nanoscale devices - Nanoelectronics
- Near Nanoscale devices - Photovoltaics



# Other Specific technical competencies

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*nanomedicine and  
drug delivery  
strategies*

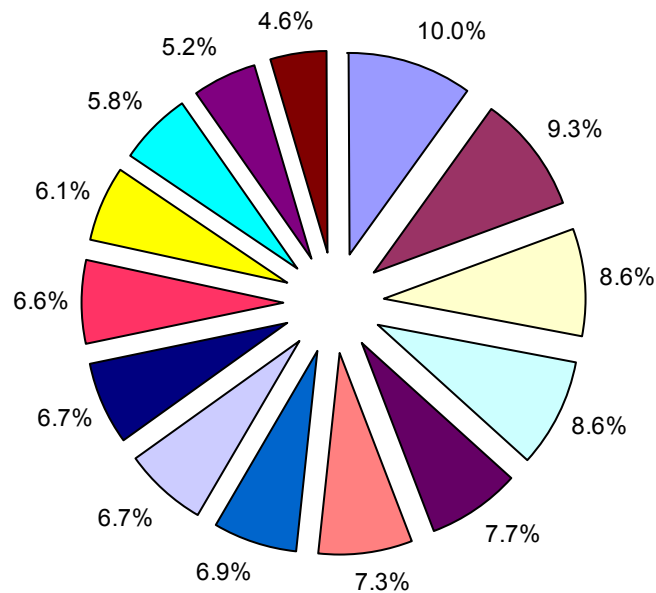
*nanotechnology  
competencies specific to  
sports industry, leather  
industry, textile,  
agriculture, medicine  
and other sectors should  
be developed*

*basic knowledge of  
toxicology and  
toxicological evaluation*

*technical knowledge coinciding  
with knowledge of application*

# Commercial Management and Societal Knowledge Competencies

**Commercial Management and Societal Knowledge Competencies**



- Research and Development Management
- Project Management
- New Product Innovation
- Technology Strategy
- Technology Marketing
- Intellectual Property
- Risk Assessment and Management
- Environment and Sustainability
- Ethics
- Entrepreneurship
- Public Communication
- Technology Policy
- Finance ( Venture and Corporate)
- Legislation



# Concluding Remark

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- Knowledge constantly evolving
- Education is a life long process
- Inculcating and sustaining a scientific temper
- Competencies change in fast moving global business
- Training focused on changing competencies