Universities and Industrial Research

Ewald Konecny
Medical University of Lübeck, Germany

Colin Quinn
Formerly Shell Research Ltd., UK

Kurt Sachs
Consultant, Stourbridge, UK

David Thompson
Consulting Chemist, Reading, UK
Contents

Chapter 1 Introduction
1 The Mutual Interaction between Science and Technology 1
2 How the Book was Assembled 4
3 Interactions between Industry and Universities 5
4 Promoting Collaboration 7
5 Promoting Innovation in Advanced Nations 8
6 Definitions 9

Chapter 2 The Differences between Academic Research and Industrial R & D
1 About Technology 10
2 Technical Service 12
3 Development 13
4 Research 16
5 Activities Compared 18
6 The Scope for Collaboration 20
7 Conclusions 21

Chapter 3 Education and Training
1 Introduction 23
2 University Curriculum 24
3 Continuous Education 26
4 Mobility of Students between Countries 31
5 Scarce Skills 33
6 Recruitment Procedures 35
7 Conclusions 39

Chapter 4 Window on Science
1 Introduction 40
2 University Consultants 41
3 Conferences 45
4 University Liaison Programmes and Liaison Offices 47
5 Conclusions 50
Chapter 5  Upstream Research  
1 Introduction  
2 Government Influence on Upstream Research  
   Europe  
   North America  
   Japan  
3 Industrial Guidance for Upstream Research  
   Europe  
   North America  
   China  
4 Basic Research in Industry and Research Institutes  
5 Private Funding of Upstream Research in Universities  
6 Conclusions  

Chapter 6  Co-operative and Contract Research  
1 Introduction  
2 Research Appropriate for Co-operative or Contract Arrangements  
3 Practical Considerations  
   Contracts  
   Confidentiality  
   Intellectual Property Rights  
   Flexibility and Different Appreciations of Time  
   Project Management  
4 Research Institutes for Applied Research  
5 Research Clubs  
6 University-run Development Companies  
7 Conclusions  

Chapter 7  University and Industry Personnel  
1 Introduction  
2 University/Industry Staff Interchange  
3 Visiting Professor Schemes. Dual Part-time Appointments, Direct Exchange of Staff, and Joint Laboratories  
4 Industrial Training Periods for Students  
5 The UK Teaching Company Scheme  
6 Technology Transfer  
7 Conclusions  

Chapter 8  Small and Medium Enterprises  
1 Introduction
## Contents

2 Why are SMEs Important? 102  
3 The Role of Technology and Innovation in the Success and Growth of SMEs 104  
4 Science Parks 106  
5 Different Forms of Contact with Universities 111  
      Teaching Companies 111  
      LINK 111  
      Upstream Research 111  
      Contract Research 112  
      University Entrepreneurs 113  
6 SMEs, University, and the Economy 114  
7 Conclusions 116

### Chapter 9 The Role of Government 118

1 Introduction 118  
2 Side-effects of the Economic Climate 119  
3 Academic Research 120  
      Basic Research 120  
      Science and Culture 124  
      Upstream Research 125  
      Getting the Balance Right 126  
4 Academic Careers 127  
5 Education and Recruitment 129  
      Education and Formation 129  
      Recruitment 131  
6 Conclusions 131

### Appendices

A1 EC Funding Programmes 133  
A1.1 Introduction 133  
A1.2 List of EC-programmes 134  
A1.3 Description of some EC Programmes Relevant to University-Industry Relations 138

A2 University Systems in Europe 142  
A2.1 Introduction 142  
A2.2 Degree Courses 143  
A2.3 Academic Staff 143  
A2.4 Funding of University Research 144  
A2.5 Description of Systems of Higher Education in European Countries 144

A3 Innovation in Small and Medium Enterprises 159  
A3.1 Small is Beautiful 159  
      Finance 159
Contents

Speed of Response 161
Efficiency 161
Competition 161
The Product Champion 162
A3.2 Innovation 162

A4 Some Abbreviations and Acronyms 167
A5 EIRMA — The European Industrial Research Management Association 170

Subject Index 171