THE EUROPEAN UNION SERIES

General Editors: Neill Nugent, William E. Paterson, Vincent Wright

The European Union series is designed to provide an authoritative library on the European Union ranging from general introductory texts to definitive assessments of key institutions and actors, policies and policy processes, and the role of member states.

Books in the series are written by leading scholars in their fields and reflect the most up-to-date research and debate. Particular attention is paid to accessibility and clear presentation for a wide audience of students, practitioners and interested general readers.

The series consists of four major strands:

- general textbooks
- the major institutions and actors
- the main areas of policy
- the member states and the Union

Published titles

Michelle Cini and Lee McGowan

Competition Policy in the European Union

Renaud Dehousse

The European Court of Justice

Desmond Dinan

Ever Closer Union? An Introduction to the European Community

Wyn Grant

The Common Agricultural Policy

Justin Greenwood

Representing Interests in the European Union

Alain Guyomarch, Howard Machin and Ella Ritchie

France in the European Union

Fiona Hayes-Renshaw and Helen Wallace

The Council of Ministers

Simon Hix and Christopher Lord

Political Parties in the European Union

Brigid Laffan

The Finances of the European Union

Janne Haaland Matláy

Energy Policy in the European Union

Neill Nugent

The Government and Politics of the European Union (Third Edition)

John Peterson and Margaret Sharp

Technology Policy in the European Union

European Union Series

Series Standing Order

ISBN 978-0-333-71695-3 hardcover

ISBN 978-0-333-69352-0 paperback

(outside North America only)

You can receive future titles in this series as they are published by placing a standing order. Please contact your bookseller or, in the case of difficulty, write to us at the address below with your name and address, the title of the series and the ISBN quoted above.

Customer Services Department, Macmillan Distribution Ltd
Houndmills, Basingstoke, Hampshire RG21 6XS, England

Forthcoming

Simon Bulmer and Drew Scott
European Union Economics Policy and Politics

Simon Hix
The Political System of the European Union

John Peterson and Elizabeth Bomberg
Decision-Making in the European Union

Ben Rosamond
Theories of European Integration

Richard Sinnott
Understanding European Integration

• • •
Simon Bulmer and Wolfgang Wessels
The European Council (Second Edn)

David Earnshaw and David Judge
The European Parliament

Neill Nugent
The European Commission

Anne Stevens
The Administration of the European Union

• • • •
David Allen and Geoffrey Edwards
The External Economic Relations of the European Union

Laura Cram
Social Policy in the European Union

Wyn Grant, Duncan Matthews and Peter Newell
The Greening of the European Union?

Martin Holland
The European Union and the Third World

Malcolm Levitt and Christopher Lord
The Political Economy of Monetary Union

Anand Menon
Defence Policy and the European Union

James Mitchell and Paul McAleavey
Regionalism and Regional Policy in the European Union

Jörg Monar
Justice and Home Affairs in the European Union

Hazel Smith
The Foreign Policy of the European Union

Mark Thatcher
The Politics of European High Technology

Rüdiger Wurzel
Environmental Policy in the European Union

• • • •
Simon Bulmer and William E. Paterson
Germany and the European Union

Phil Daniels and Ella Ritchie
Britain and the European Union

Other titles planned include

European Union: A Brief Introduction
The History of the European Union
The European Union Source Book
The European Union Reader
The Political Economy of the European Union

• • • •

Political Union
The USA and the European Union

• • • •

The European Union and its Member States
Reshaping the States of the Union
Italy and the European Union
Spain and the European Union

Technology Policy in the European Union

**John Peterson
and
Margaret Sharp**

© John Peterson and Margaret Sharp 1998

All rights reserved. No reproduction, copy or transmission of this publication may be made without written permission.

No paragraph of this publication may be reproduced, copied or transmitted save with written permission or in accordance with the provisions of the Copyright, Designs and Patents Act 1988, or under the terms of any licence permitting limited copying issued by the Copyright Licensing Agency, 90 Tottenham Court Road, London W1P 9HE.

Any person who does any unauthorised act in relation to this publication may be liable to criminal prosecution and civil claims for damages.

The authors have asserted their rights to be identified as the authors of this work in accordance with the Copyright, Designs and Patents Act 1988.

First published 1998 by
MACMILLAN PRESS LTD
Houndmills, Basingstoke, Hampshire RG21 6XS
and London
Companies and representatives throughout the world

ISBN 978-0-333-65643-3 ISBN 978-1-349-27000-2 (eBook)
DOI 10.1007/978-1-349-27000-2

A catalogue record for this book is available from the British Library.

This book is printed on paper suitable for recycling and made from fully managed and sustained forest sources

10	9	8	7	6	5	4	3	2	1
07	06	05	04	03	02	01	00	99	98

Published in the United States of America 1998 by
ST. MARTIN'S PRESS, INC.,
Scholarly and Reference Division,
175 Fifth Avenue, New York, N.Y. 10010

ISBN 978-0-312-21641-2

To Calum for being such a good boy
and to Tom for being so patient

Contents

<i>List of Exhibits, Tables and Figures</i>	x
<i>Preface</i>	xiii
<i>List of Abbreviations</i>	xv
1 Introduction	1
What This Book Is About	2
The Essential Background	4
The Size and Shape of EU Programmes	9
The Changing Political Economy of RTD	16
Policy Dilemmas for the EU	20
The Plan of the Book	24
2 The Historical Backdrop	26
The Exigencies of Big Science	26
The Role of the European Community	28
The Nuclear Sector	32
The Aviation Sector	36
The Space Sector	39
The Lessons Learned	41
3 Competition, Collaboration and Integration	45
The Economics of Technology Policy	46
Markets, Networks and Collaboration	51
Explaining the Politics of European Technology Policy	55
Conclusion	65
4 Davignon, Esprit and the Single European Act	67
The 'New' Technology Gap	68
ESPRIT	70
RACE	73
BRITE-EURAM	78

Biotechnology	79
The Framework Programme	80
Competition and Collaboration – An Agenda for the 1990s	83
5 EUREKA!	89
What is EUREKA?	90
Reagan, Narjes, Mitterrand and the Legacy of 1985	95
EUREKA and the Politics of a Wider Europe	101
EUREKA Grows Up: 1985–97	106
Conclusion	110
6 Maastricht and Framework IV	113
The SEA and Maastricht: Legitimising Technology Policy	114
<i>Research after Maastricht</i>	117
RTD and Other Policies: Towards a Strategy?	122
Growth, Competitiveness and (Un)Employment	126
Conclusion	131
7 A European Technology Community?	136
Trends in Framework Programme Expenditure	137
Which Member States Get How Much?	139
Linkages and Participations	146
The ‘New’ Innovation Debate: Towards Framework V	153
Conclusion	160
8 Decision-Making: Who Gets What and Why?	163
The High Politics of RTD Policy	164
The Systemic Level: Why RTD Policy Is Different	172
The ‘Sub-Systemic’ Level: Incest and Corporatism?	177
Conclusion	185
9 What Has Been Achieved?	188
National Impact Studies	189
Industry-Based Evaluations	195
Evaluating EUREKA	199
Towards the Davignon Assessments	202
Europe’s Technological Performance	205
Conclusion: Multiple Objectives = Mixed Results	207

10 Conclusion	211
Technology Policy – An Engine for Growth?	211
Technology Policy – An Engine for Integration?	215
Europe and Globalisation	223
What Next for European Technology Policy?	226
Conclusion	233
<i>Guide to Further Reading</i>	235
<i>Bibliography</i>	239
<i>Index</i>	251

List of Exhibits, Tables and Figures

Exhibits

7.1	Types of EU funding for R&D	138
7.2	The Joint Research Centre	139
7.3	Regional disparities and EU programmes	146
7.4	The problems of SMEs	151
7.5	The Task Forces	154
9.1	The UK Impact Study	191

Tables

1.1	The 'Big 12' Roundtable of Industrialists (1982)	6
1.2	RTD priorities and the Framework programmes	10
1.3	EU Commitment to RTD 1984–98	11
1.4	European performance in technology-intensive sectors	13
1.5	R&D indicators for the Triad	14
1.6	R&D scientists and engineers	15
4.1	Main community RTD programmes (1984–94)	74
4.2	The Framework II programme (1987–91)	82
4.3	The Framework III programme (1990–4)	84
5.1	Evolution of EUREKA'S project list – 1985–97	91
5.2	EUREKA projects by sector (1997)	94
5.3	Total investment by member states in ongoing EUREKA projects by sector (1997)	96
5.4	National contributions to EUREKA (ongoing projects 1997)	104
6.1	The Framework IV programme (1994–98)	120
6.2	EU research in Objective 1 regions	125

6.3	The Bangemann High-Level Group on European information infrastructures	131
7.1	Programmes under the Framework IV programme (1994–8)	140
7.2	Framework IV commitments compared with expenditures under same heads of activity 1991–5	141
7.3	EU RTD payments made to member states 1995	142
7.4	Framework IV compared with Framework V proposals	161
8.1	Levels of analysis in EU decision-making	164
8.2	The post-Maastricht decision-making process for RTD policy	174
8.3	Division of ICT activities under Framework IV	176
8.4	National receipts from EU RTD: Spain	180
9.1	Major benefits from involvement in EU R&D contracts (Framework II impact studies)	190
9.2	Expected outcomes from EU-supported projects	191
9.3	Benefits of participation in BRITE-EURAM direct and indirect payoffs	198
9.4	Effects of public funding by country in EUREKA	201
9.5	Specialisation in high-, medium- and low-tech industries	206
10.1	European firms: most effective use of technology (1996)	217
10.2	Average R&D – sales ratios (% 1996)	221

Figures

1.1	The place of EU programmes and EUREKA in relation to other joint European science and technology initiatives	3
3.1	The linear model of innovation and the chain-link model	47
7.1	Distribution of funding in Framework programmes II and III per capita and per R&D employee	144
7.2	Number of participants in Framework programmes II, III and IV	147
7.3a	Framework II funding by type of participant	148
7.3b	Framework III funding by type of participant	148
7.4	Distribution of funding by research performers in Framework programmes II and III	149
7.5	Share of partnerships with Greece, Ireland, Portugal and Spain in general research programmes	150

xii *List of Exhibits, Tables and Figures*

7.6a	Thematic programmes and horizontal actions suggested for Framework V	159
7.6b	Unpacking thematic programme I: Quality of Life and Management of Living Resources	160
9.1	Comparison of British collaborations with US and other EU researchers (1981–94)	192

Preface

Many authors begin their prefaces with a statement about how the book took much longer to write than it should have. We really mean it! We have been fortunate to have had such a patient publisher, the equanimity to put up with each other's (often sharp) criticisms, and the sheer will not to give up on several occasions when that seemed the logical thing to do.

John Peterson's contribution to this book draws heavily on interviews and other materials collected as part of an ESRC-funded study of EU decision-making (R000235829). His collaborator on that study (and on much else), Elizabeth Bomberg, provided crucial support to the work that ultimately yielded this book. Margaret Sharp's contribution has been funded throughout by the ESRC STEEP Centre at the Science Policy Research Unit, University of Sussex. We also have received able and much-appreciated assistance on this project from Janet French and Ricardo Gomez.

Throughout the book, we have drawn on our earlier published work. Chapter 2 and parts of Chapter 4 expand and update Sharp and Shearman (1987). Parts of Chapter 5 are based on Peterson (1993b: Chapter 3; 1997a). Early sections of Chapter 6 draw heavily on (while also updating) Peterson (1995b).

We owe a very large debt to the EU and national officials and MEPs we interviewed in connection with this study. At the same time, we feel it necessary to note that Margaret Sharp's participation on a major European Commission (1996a) study into research policy and cohesion meant that we had access to rich and interesting data on national receipts from EU-funded research. However, most of our requests to use this data in this book were refused by the Commission. It is difficult not to feel disappointed and frustrated that we cannot tell our readers all we know. Nonetheless, we hope that we have provided a fair picture of who gets what from European technology policy.

We are in considerable debt to colleagues who read earlier versions of some or all of this book, including Luca Guzzetti, Wayne Sandholtz, Nicholas Ziegler, and John Zysman. Our publisher Steven Kennedy was gentle but persistent in prodding us along, and we are grateful to him for not giving up on us. The series editors gave us useful feedback on our original proposal and Vincent Wright offered very astute comments on the manuscript itself. Of course, we are fully responsible for any errors or omissions.

Finally, our own partnership has not always been easy, but ultimately it has been enormously pleasurable and always productive. This book probably would never have been completed if either of us had set out to write it by ourselves. Thus, our biggest debt is owed to each other.

JOHN PETERSON
MARGARET SHARP

List of Abbreviations

ABB	Asea Boveri Brown
AIR	Agro-Industrial Research
AT&T	American Telephone & Telegraph
B Ae	British Aerospace
BAP	Biotechnology Action Programme
BEP	Biomolecular Engineering Programme
BRIDGE	Biotechnology Research for Innovation, Development and Growth in Europe
BRITE	Basic Research in Industrial Technologies for Europe
BSE	bovine spongiform encephalopathy
CAD/CAM	Computer-Aided Design/Computer-Aided Manufacturing
CAP	Common Agricultural Policy
CEPT	Conference of European Post and Telecommunications administrations
CERD	European Research and Development Committee
CERN	Centre Européen Recherche Nucléaire
CGCT	Compagnie General des Communications Téléphoniques
CGE	Compagnie Generale d'Electricité
CII	Compagnie Internationale d'Information
COST	Co-operation in Scientific and Technology
CRAFT	Cooperative Research Action for Technology
CREST	Comité de la Recherche Scientifique et Technique
CSCE	Conference on Security and Co-operation in Europe
CUBE	Concertation Unit for Biotechnology in Europe
DEBENE	DEutschland-BELgium-NEtherlands
DG	Directorate-General (European Commission)
DRAM	Dynamic Random Access Memory
DTI	Department of Trade and Industry (United Kingdom)

EC	European Community
ECLAIR	European Collaborative Linkage of Agriculture and Industry Research
ECSC	European Coal and Steel Community
ECU	European Currency Unit
EEC	European Economic Community
EFA	European Fighter Aircraft
EFTA	European Free Trade Association
ELDO	European Launcher Development Organization
EMBO	European Molecular Biology Organisation
EMU	Economic and Monetary Union
EP	European Parliament
ERDA	European Research and Development Agency
ESA	European Space Agency
ESF	European Science Foundation
ESPRIT	European Strategic Programme in Information Technologies
ESRO	European Space Research Organization
ESTA	European Science and Technology Assembly
ETSI	European Telecommunications Standards Institute
EU	European Union
EURAM	European Research in Advanced Materials
EUREKA	European Research Co-ordinating Agency
EUROTRAC	European Experiment on Transport and Transformation of Environmentally Relevant Trace Constituents in the Troposphere over Europe
FAMOS	Flexible Automated Manufacturing
FAST	Forecasting and Assessment of Science and Technology
FDI	foreign direct investment
FLAIR	Food Linked Agro-Industrial Research
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GEC	General Electric Company (UK)
GNP	Gross National Product
HDTV	high-definition television
HEIs	higher education institutions
HLG	High-Level Group
IBM	International Business Machines

ICL	International Computers Limited
ICT	information and communications technology
IGC	intergovernmental conference
ILL	Institut Lave Langevin
IPTS	Institute for Prospective Technological Studies
IRDAC	Industrial Research and Development Advisory Committee
ISDN	integrated services digital networking
IT	information technology
ITER	International Thermo-Nuclear Reactor
ITT	International Telephone and Telegraph
ITTF	Information Technologies Task Force
JESSI	Joint European Silicon Structures Initiative
JOULE	Non-Nuclear Energies and Rational Use of Energy
JRC	Joint Research Centre
JET	Joint European Torus
MAC	Multiplexed Analogue Components
MEPs	members of the European Parliament
MITI	Ministry of International Trade and Industry (Japan)
MNCs	multinational corporations
MS-DOS	Microsoft Disc Operating System
NAFTA	North American Free Trade Area
NATO	North Atlantic Treaty Organization
NEC	Nippon Electric Corporation
NIP	National Information Points
NPCs	National Project Coordinators
OECD	Organization for Economic Cooperation and Development
ONP	Open Network Provision
OSI	Open Standards Interconnection
PAL	Phase Alternation by Line
PC	personal computer
PET	Planning Exercise in Telecommunications
PHARE	Poland and Hungary: Aid for the Restructuring of Economies
POST	Parliamentary Office of Science and Technology
PTT	Post, Telephone and Telecommunications
QMV	qualified majority voting
RACE	Research in Advanced Communications for Europe
RAM	random-access memory

RCA	Radio Company of America
R&D	research and development
RTD	research and technological development
SCIENCE	Stimulation des Coopérations Internationales et des Echanges Nécessaires aux Chercheurs en Europe
SDI	Strategic Defense Initiative
SEA	Single European Act
SEPSU	Science and Engineering Policy Studies Unit (UK Royal Society and Fellowship of Engineering)
SME	small or medium-sized enterprise
SPAG	Standards Promotion and Application Group
SPES	Stimulation Programme for Economic Sciences
TABD	Transatlantic Business Dialogue
TENs	Trans-European Networks
TMR	Training and Mobility of Researchers
TSER	targeted socio-economic research
UNICE	European Union of Employers' Confederations
VCR	videocassette recorder
VALUE	Valorisation and Utilisation for Europe
VLSI	Very Large-Scale Integration
WTO	World Trade Organization