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Recurrent themes and developments in the history of the Ergonomics Society

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This paper provides an outline of the main historical developments and recurrent themes that have taken place in the history of the Ergonomics Society (ES) over 50 years. Alongside a chronology of significant events during the period 1949–1999, a set of issues raised by interviews with prominent members of the ES and other historical materials, we focus specifically on seven main areas: the growth and influence of the ES (e.g. internationalization, membership changes); external relations (e.g. press and public relations); publications (e.g. Society journals and key texts); key individuals and institutions; influence on government and other bodies (e.g. participation in committees and inquiries); and image and identity (e.g. changes to the image of the ES over time). We conclude the paper with a summary and discussion of the key developments in the history, as well as the outstanding challenges for the future.

Keywords: Ergonomics history; UK Ergonomics Society history

1. Introduction

In 1999 the Ergonomics Society (ES)¹ celebrated its 50th anniversary with a number of events including a highly successful exhibition at the Science Museum in London along with a range of other activities including lectures and talks for the general public. At the 1999 Annual Conference, Professor Nigel Corlett also gave the Society Lecture, which covered the theme of the growth of the Society over the last 50 years (Corlett and Stapleton 2001). The aim of the current paper is to expand upon the work of Corlett and Stapleton, and to provide an assessment of the main trends and developments in the history of the ES as they follow on from previous accounts, for example, the official history written by Edholm and Murrell and published in 1973, as well as other historical material (see Appendix A-1). In particular, we present an outline chronology of the most significant events that have taken place within the Society since it began in July 1949. Based upon this chronology, and other research, including a set of interviews with

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¹Please note that we use the abbreviation ES throughout the paper, strictly speaking the Society was known as the Ergonomics Research Society (ERS) up until the mid 1970s. In quoting from some historical material (e.g. Council minutes) prior to the mid-1970s we have used the abbreviation ES for the sake of simplicity and to avoid confusion.

prominent members of the ES (section 3), we have attempted to identify a set of historical developments and recurrent themes that aim to summarize the history of the Society. The aim of this work has been partly to reflect upon the past and at the same time identify key lessons learnt and future concerns and priorities within the workings of the Society.

We should say at the outset that the writing of any history inevitably reflects the interests of the authors and is subject to considerable interpretation.² Wherever possible we have attempted to avoid being biased in our assessment of the Society. The paper, therefore, aims to present neither an overly positive nor an unfairly critical account of the development and changes that have taken place within the Society over time. Instead, our aim has been to strike a balance as much as possible and to stick to the facts, as they are described, wherever possible. Needless to say, the commentary that we make about historical developments is very much our own and we take full responsibility for any errors that may have crept into our account.

1.1. Organization of the paper

Section 1.2 of the paper lists the sources of information and materials that were used to chart the development and progress of the Society. Section 2 is an outline chronology of the Society dating from its beginnings in 1949 up until the year 1999. Section 3 is a summary of the main themes to emerge from interviews and discussions with past and current members of the ES. In sections 4 and 5 we discuss some of the main historical developments and recurrent themes based upon these interviews and discussions, as well as materials gathered in forming the history and elements of the chronology. We end the paper with a summary of the main themes and point the way forward to issues that are most likely to concern the Society in the future (section 5). The paper also contains an extended bibliography (Appendix A), which we have included in order to provide others, interested in the history of ergonomics, with a basis to carry out further research beyond the present scope of this paper. Further information can be provided on the details of the history of the ES by contacting the authors, or by accessing the internet home page of the ES, which contains further materials of historical interest (<http://www.ergonomics.org.uk>).

1.2. Sources of information

The paper is based upon a number of sources of information, these include:

- ES Council minutes (abbreviated as c.min month/year) and reports (e.g. Annual General Meeting Reports) dating from 1959;³

²One of the most frequent questions we have been asked during the preparation of this paper is whether we are writing a history of the ES, the history of ergonomics, or both? Our view is that it is almost impossible to separate the history of the ES from the history of ergonomics. Developments in the wider world of ergonomics are bound to have an impact upon the ES, just as decisions made by the ES change the nature of ergonomics, albeit perhaps less directly. We have, therefore, opted to describe events in the history of the ES, whilst at the same time making references to wider changes and developments in the history of the subject.

³It should be pointed out that we have chosen to cover the period from 1959 onwards in more depth. This is largely due to the fact that Edholm and Murrell's earlier history (1973) provides a very comprehensive summary of the formation and early stages of the Society's history up until the 1960s. Other summaries of the early years and origins of the subject are also available (Appendix A-1). Records of Council Minutes and various other materials are currently held in the Department of Human Sciences at Loughborough University. In some cases it proved difficult to locate records of Council minutes (e.g. the 1950s), in this case we have based the paper upon other sources of information wherever possible.

- Discussions with members of the Society both past and present – a list of those contacted is shown in Appendix B;
- Analysis and consultation of other documentation including books, unpublished reports, journals (e.g. *Ergonomics* and *Applied Ergonomics*) and Society newsletters and circulars (e.g. *ERS News*, *The Ergonomist* – Appendix A);
- Materials held in various locations (e.g. The British Library; the Society offices in Loughborough; Ergonomics Information Analysis Centre, University of Birmingham);
- Other informal discussions with, and comments received from, individuals who were contacted during the preparation of the paper and who provided us with feedback and suggestions for improvement (e.g. at the 2002 Annual Conference, Waterson and Sell 2002; feedback received via the ES website).

2. An outline chronology of the Ergonomics Society 1949–1999

The history of the ES inevitably comprises a set of events and occurrences that can be catalogued according to various criteria and points of reference. These include changes brought about to the ES through developments in the wider environment and the society itself (e.g. industrial/technological changes, legislation, as well as international developments). Likewise, the ES has undergone a series of internal changes that have covered a wide range of issues, including changes to membership, rules and procedures and the general conduct of its affairs. Attempting to catalogue all of these changes presents some difficulties, not least in terms of selecting from the many events that have occurred over the last half-century.⁴ In order to cope with these difficulties of writing an historical account of the Society, we have opted for the choice of providing an outline chronology of the ES rather than an in-depth historical analysis (see, for example, the work of Hearnshaw (1964) on the early history of British psychology). Perhaps, at some time in the future, this may be possible and we hope that the chronology may prove a useful beginning. In putting together the chronology we were influenced by other histories of learned societies, which have adopted a similar strategy (see, for example, Mollon 1996, Bunn 2002). Tables 1–3 outline our attempts at a chronology of the ES from 1949–1999.

Needless to say, the chronology goes only so far in describing the range of activities that have preoccupied the ES over the last half-century. For example, the chronology does not do justice to the amount of work and effort put in by Council and other ES members over the years. It should also be noted that the vast majority of this work has been on a voluntary basis, and it is largely due to the efforts of ES members that the Society has achieved its current prominence within the world of ergonomics. Hopefully, however, the chronology does give some indication of the main workings of the ES over the period. In the following section of the paper we summarize the main themes that emerged during interviews and discussions with past and current members of the Society.

3. Summary of recollections of past and current members of the Ergonomics Society

A total of 19 people were contacted and represent members of the ES who have either been active in the early days of the Society (e.g. founder member – W.F. Floyd) or in more recent times (e.g. present day members of Council). These individuals were interviewed about their involvement with the ES and their recollections of significant events and developments over their period of involvement. In many cases, the individuals

⁴This has been pointed out to us on more than one occasion, both Stockbridge (1989) and Edholm and Murrell (1973) make similar comments.

Table 1. Outline chronology of the Ergonomics Society (ES) 1949–1959.

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- 1949** July 1949 – ‘Ten scientists of differing background, but all interested in the study of human work, decided to form a group to enable research workers in different disciplines to meet and exchange ideas. They called themselves the *Human Research Society*’ (K.F.H. Murrell, *BPS Bulletin*, No. 22, January 1954)
 Autumn 1949 – meeting held in Oxford, which decided to turn the group into a Society
 Summer 1949 – ‘Ergonomics’ defined by Murrell after consultation with Greek and Latin scholars as, ‘the study of the relationship between man and his working environment’
 27th September 1949 – Ergonomics Research Society (ERS) formed, Queen Anne Mansions, Admiralty, London
- 1950** April 1950 – Rules drawn up for the first Annual General Meeting
 Council first considers the possibility of papers and symposia
- 1951** April 1951 – Three day Symposium on the *Human Factor in Equipment Design* held at the University of Birmingham (Floyd and Welford 1954)
 AGM elects first overseas members (members from Holland, Sweden and USA)
- 1952** Symposium on *Fatigue* – Cranfield, (Floyd and Welford 1953)
 First Ergonomics department in industry set up under Murrell at Tube Investments Limited
- 1953** European Productivity Agency (EPA) Meeting
 AGM: eligibility for ordinary membership is extended to include those who worked within the field of ergonomics, as well as those who were engaged in research
- 1954** Office of Chair of Ergonomics Society Council instituted
 Proposal by the EPA that an international conference should be held in order to promote the application of ergonomics in industry (later took place in Zurich, 1959)
- 1955** Attendance of ES members (Edholm/Welford/Maule/Jones) at Parliamentary and Scientific Committee
- 1956** Autumn 1956, EPA sponsored mission to the USA, 5 September to 3 November (attended by Murrell, Bonjer, Metz, Shackel and Singleton) – later published as Murrell (1958b, *Fitting the Job to the Worker*)
 Alan Welford and Harry Maule meet with representatives of Taylor and Francis to discuss setting up a journal for the Society (*Ergonomics*)
- 1957** *Ergonomics* journal starts in November, editors report that there are many submissions to the journal right from the beginning; A.T. Welford is first editor
 Council agrees in February to help overseas groups to form their own societies. Shortly afterward an international steering committee, consisting largely of Society members, was established to consider the desirability of organizing human work scientists on an international basis. These developments led later on to the establishment of the International Ergonomics Association (IEA) (Cooke 1980)
 Council for Scientific and Industrial Research establishes a permanent Human Sciences Committee to advise on ergonomics issues relevant to the Department of Science and Industrial Research (DSIR)
 Technical Seminar organized by EPA in Leyden, 29 March–3 April (Murrell 1958b)
- 1958** First Ergonomics film produced (British Productivity Council – *Fitting the Job to the Worker*)
 Meeting held with DSIR to discuss the future training of ergonomists, Council considers the issue but notes that there are problems in trying to define ergonomics, particularly in terms of requirements for both the psychological and physiological aspects of the subject (c.min 01/58)
 Council agrees that membership should not exceed 200, due to limitations in terms of secretarial and administrative support (this barrier was later lifted in 1959), (c.min 4/58)
 Suggestion in Council that an annual Society Lecture be instigated at the conference (c.min 4/58)
 Council notes that most subscribers to the journal are from abroad (USA and Canada) and that, ‘... there is relatively poor support for the journal from members of the ERS’ (c.min 11/58)
 1958 AGM notes that two problems concerned Council at the time: (1) ‘training in ergonomics’; (2) ‘the provision of expert advice on ergonomic problems.’
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(continued)

Table 1. (Continued).

	Proposal in Council that the number of Society members be increased from 200 to 250 (1958 AGM report)
1959	EPA Tripartite International Conference held in Zürich, 2–6 March (later published as Metz 1960). Conference was attended by employers, trade unionists and specialists in various disciplines and techniques from 13 countries, together with representatives from the International Labour Organization
	First undergraduate Ergonomics course set up at Loughborough University
1959	Annual Conference held in Oxford – celebrations of the first decade of the Society. A report of the conference is published by Alec Rodger in the journal <i>Nature</i> (Rodger 1959). The report mentions, amongst other things, disagreements that occurred between Work Study Engineers and Ergonomists, as well as problems in narrowing down what is actually meant by the term ‘ergonomics’. Rodger posed the following questions: ‘Has [ergonomics] any distinctive concepts or methods? Is it, perhaps, a convenient gathering place for people belonging to certain technological wings of certain human sciences, and their agents and users in industry.’
	First Chair in Ergonomics set up in Loughborough (W.F. Floyd – Professor of Ergonomics and Cybernetics)
	Assistant Society secretaries set up and appointed in order to ‘share the workload of the growing society’ (Shackel 1989)
	Constitution and rules of the IEA formally accepted within the Society
	Council considers a paper which outlines some of the challenges facing the Society, these include a concern that the Society should concentrate upon research and not necessarily on the application of findings within industry. In addition, there was a concern that the Society needed to closely monitor its overlaps with other societies (e.g. British Occupational Health Society)

provided materials such as books and papers that gave further details about the background history of the ES. It was agreed that the views and opinions of the interviewees would remain anonymous; therefore, where comments and quotes are used in the paper, they are not attributed to specific individuals. Where possible the interviews were taped and transcribed, and the transcriptions then summarized into a set of themes that characterize the issues, events and developments that were most frequently mentioned during the interviews. In total a set of 21 overlapping themes were identified from the interviews (see table 4).⁵

Further examination of key events and activities listed in tables 1–3 and the interviews (table 4) reveals that a number of themes recur over time. In some cases, these themes were not surprising, for example, we would have expected to see that the issues of the training and education of ergonomists would be regularly discussed and debated within the ES. Similarly, the issue of gaining a Royal Charter for the ES and raising its profile has a long history and as one person commented, ‘appears to regularly come round every few years’. In other cases, we found that there were some interesting themes and debates that have taken place that deserve to be commented upon in more detail (e.g. the image of the Society and discussions centred on the status of ergonomics). In the following section, we have attempted to collapse the material in tables 1–4 into a smaller set of recurrent themes, as well as elaborate upon their meaning in greater depth. Section 4 also draws upon information available from the other sources that were consulted during the preparation of this paper (see section 1.2).

⁵It is important to point out that in the heading ‘Significant individuals, personalities and institutions’ we have avoided, wherever possible, mentioning people still alive during the preparation of this history. This has been done in order to avoid claims of bias, favouritism or errors of omission. In many cases living persons were mentioned during the interviews. This comment also applies to Section 4.5 of the paper (Key individuals and institutions).

Table 2. Outline chronology of the Ergonomics Society (ES) 1960–1979.

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- 1960** Publication of first Ergonomics text book (Murrell 1960, *Ergonomics: Fitting the Job to the Worker*).
- Proposal by Council to extend the number of meetings within the Society to cover areas such as research, the military and industrial applications of ergonomics (c.min 7/60)
- 1960 AGM notes that there was widespread discussion within the Society concerning ‘the relative importance of research and the communication of results of research on the one hand, and the development and application of ergonomics in industry on the other.’ (*Ergonomics*, 3, 287)
- Proposal at AGM to include class of membership for fellows of the Society. First university department set up in Loughborough, College of Advanced Technology (Department of Ergonomics and Cybernetics)
- Department of Science and Industrial Research (DSIR) Conference *Ergonomics in Industry*. Conference is attended by employers, trade unionists and scientists, over 200 firms being represented, and a number of the exhibits displayed the work on ergonomics then being carried out in the DSIR’s research stations and elsewhere. Conference is opened by Lord Hailsham and includes papers on the foundations of ergonomics and its application in industry (published as Department of Science and Industrial Research 1961)
- 1961** International Ergonomics Association (IEA) formed
- First Triennial Meeting of the IEA (Stockholm), Edholm, Murrell and Welford are elected to the IEA committee
- International Ergonomics Association adopts *Ergonomics* journal as its official publication
- Postgraduate course in *Ergonomics and Cybernetics* set up at Loughborough College of Technology (now Loughborough University)
- Issue of growing numbers of consultants and how these could be accommodated within the Society is debated within Council (AGM Report, *Ergonomics*, 4, 287)
- Thomas Bedford gives first Society Lecture on Researches on Thermal Comfort
- Industrial Section of the Society formed alongside Group for Fitness and Training
- Widening internationalization of ergonomics – discussions in Council regarding the formation of ES overseas groups (c.min 10/62)
- Society rules changed to provide for two types of membership (Fellow and Ordinary Member)
- Growing evidence that there is a tension between the theory of ergonomics and its academic content and the practice: ‘... the Society had first to distinguish between research activities and the activities which would characterise and influence practitioners.’ (AGM report)
- Council discussions about changes to membership including categories for students and distinguishing between ordinary and associated members
- 1962** DSIR issues 12 Ergonomics booklets *Ergonomics in Industry (Applied Ergonomics Handbook – Shackel 1974)*. These books were circulated during 1962–1966, all but one of the booklets being written by members of the Society (Cooke 1980)
- Alan Welford and Will Floyd retire as Editors of *Ergonomics*. Harry Maule takes over as editor (c.min 11/62), J. Weiner becomes Associate Editor (Anatomy and Physiology)
- Growing evidence of Society members on influential committees (e.g. Research on Apparatus for the Disabled; Standards in Furniture; Parliamentary Scientific Standards Committee) (c.min 4/62)
- F.C. Bartlett gives the Society Lecture on The Future for Ergonomics, in the lecture he anticipates research on ageing, multi-skilling and training as important areas for future research
- Visit of a mission from the French government, visited EMI Labs., Loughborough and Oxford.
- Proposal that a French Ergonomics Society be set up
- AGM reports on plans to draw up a register of consultants, a small scale register with 35 names is set up and kept at the Warren Spring Laboratory
- 1963** MSc, Work Design and Ergonomics course, University of Birmingham begins (E.N. Corlett)
- UK National Productivity Year – number of talks given by ES members including Broadbent, Whitney and Shackel at British Institute of Management (c.min 01/63)
- Papers by the late Kenneth Craik are published in *Ergonomics* (Craik and Vince 1963a, 1963b). Craik is described as ‘one of the leading pioneers in the area of study which has come to be known as ergonomics’
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(continued)

Table 2. (Continued).

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- Ross. A. McFarland gives the Society Lecture, Experimental evidence of the relationship between ageing and oxygen want: In search of a theory of ageing
Council proposal to set up joint meetings with the British Occupational Health Society (c.min 04/63)
Council for Industrial Design approaches the Society asking for advice on the competence of Society members to give advice on design problems. At the time, the Society did not feel that it could undertake the task
- 1964** Growth of Ergonomics worldwide (e.g. Japanese Society formed 1 December 1964)
G.C.E. Burger gives Society Lecture, Permissible load and optimal adaptation
Report of the 1964 AGM notes that the Society is suffering a significant administrative load due to increases in membership and dealing with queries
Joint meeting with Dutch Ergonomics Society held in Leiden
Agreement between the Society and British Occupational Hygiene Society that they would exchange information and hold joint meetings where possible
Society gives evidence to the Committee on Social Studies (Heyworth Committee). The Society draws attentions *inter alia* to the lack of senior posts for ergonomists within Universities
- 1965** *Ergonomics: Man in his Working Environment* published (Murrell 1965)
The need to extend membership and widen the professional basis of ergonomics. P.T. Stone submits as paper to Council discussing the perceived need for a Professional register. '[Ergonomics] has moved from a quiet backwater of research to something of public importance'. (c.min n.d./65)
Significant number of ES meetings with other societies (including Royal Aeronautical Society, Conference of Advisory Councils on Occupational Health). Growing interaction and liaison of ES with other influential bodies. Proposal that Ergonomics should have more impact on engineering (e.g. 'man-machine coupling') (c.min 1/65)
Circulation of the journal reaches 1200 and is reported to be not short of material for publication (AGM Report 1965)
E.A. Muller gives the Society Lecture, Physiological methods of increasing human physical work capacity
- 1966** European Community for Coal and Steel initiates a programme for the 'application of existing knowledge to ergonomic problems in the coal and steel industry' (Bonjer 1971)
A.T. Welford gives the Society Lecture on: The ergonomic approach to social behaviour
Close cooperation between the Society and other bodies (Parliamentary and Scientific Committee, British Standards Institution, British Productivity Council and Trades Union Council). There was also significant liaison with the Human Factors Society in the USA (e.g. invitations to Society members to attend Human Factors conferences – AGM Report 1966)
Industrial Section holds 3 d conference on: The Human Operator in Complex Systems in July at University of Aston. (Proceedings from the conference were published in *Ergonomics*, 1967, 9 and as the book Singleton *et al.* 1967)
Council agrees to set up a sub-committee on education in ergonomics since: '... there is a lack of systematic data about current and future requirements of ergonomics and manpower.' (c.min 5/66)
- 1967** ES becomes an affiliated body of the IEA (Secretary is automatically a delegate *ex-officio*)
Definition of ergonomics requested for by British Standards Institute (BSI), Council provides the following definition: 'The study of the relation of the worker and the environment in which he works, particularly the application of anatomical, physiological and psychological problems arising therefrom.' (c.min 11/67)
Training Section formed
W.F. Floyd gives Society Lecture, Some problems of movement and posture in ergonomics
IEA Congress held in Birmingham under the patronage of HRH Prince Philip, Duke of Edinburgh
Request from Ministry of Technology that Department of Scientific and Industrial Research booklets be re-issued
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(continued)

Table 2. (Continued).

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- 1968** Joint meeting with Operational Research Society on: OR and the Behavioural Sciences
Paul Branton becomes the Society's first librarian, plans for a Society Library are mentioned at the AGM, a possible venue being the University of London Library at Senate House
Society Lecture given by Etienne Grandjean, Fatigue: its physiological and psychological significance
- 1969** Arrangements made with IPC Science and Technology Press Limited to publish the journal *Applied Ergonomics*
Death of two founder members of the Society (Frederic Bartlett 1886–1969, Charles Lovatt-Evans, 1884–1968)
ERS News (subsequently, *The Ergonomist*) newsletter formally begins to be circulated to members in November (Issue No. 1)
University College, London – MSc Ergonomics course starts under H. Maule
- 1970** Lord Robens opens joint meeting of the British Occupational Health Society, ES and Society of Occupational Medicine, (proceedings published in *Ergonomics*, 1970, **13**, 531–622)
Exhibition takes place at Annual Conference (Guildford) to mark first 21 years of the Society
Peter Davis becomes editor of *Ergonomics*
- 1971** F.H. Bonjer gives Society Lecture – the lecture places emphasis upon the need for evaluation within ergonomics
Council notes high involvement of Society members with Standards and attendance at BSI committees
Council considers involving a consultant in dealing with press and public relations, at the time this was rejected due to the expense
Quality of papers at the conference is criticized by Council
Council notes that the Conference had a high number of young people attending. Council points to the importance of moving the Society into a broader European context
- 1972** Society Lecture by Wisner credits the Floyd/Welford books with helping to unify the subject of Ergonomics in the early days
Discussions held with Design Council about the possibility of setting up awards for good designs. Society also help the Design Council with the content of Ergonomics design guides
Council discussions on the problems of incorporating ergonomics into the proposed 1974 Robens (Health and Safety at Work) Act
Considerable debate within Council about the aims and scope of Ergonomics, report from sub-committee set up to examine Society rules mentioned the ambivalent role of the Society: 'a learned society contrasting with one in which it is becoming involved in professional problems.'
- 1973** Conference at Loughborough (1–4 April) of IEA and BSI, increasing involvement of Society in the formation of Standards. A number of recommendations came out of this:
(1) formation of an ergonomics data book; (2) Increase in the number of ergonomics standards; (3) formation of an ergonomics committee to review and receive draft standards
IEA questionnaire on current international activity – UK at the time had nine university departments concerned with ergonomics and nine other institutes (e.g. Applied Psychology Unit, Cambridge; Institute of Aviation Medicine, Farnborough). This compares with the figure of 43 universities in the USA
O.G. Edholm and K.F.H. Murrell publish a history of the early days of the Society (Edholm and Murrell 1973)
Council discusses the idea of constituting an office for a President of the ES
- 1974** Health and Safety Parliamentary Act 1974 (came into use in April 1975). Council notes later on that there was little acknowledgement of the role of Ergonomics within the Act
- 1975** First Regional Groups set up (formally recognized by the Society in 1976)
Debates about the role of practitioners within the Society, some members saw this as a strength of the Society, others warned about the danger of moving away from a research bases (*ERS News*, No. 98 – letters section)
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(continued)

Table 2. (Continued).

	Ongoing discussions take place within Council regarding the possibility of Chartership Proposal that a Practitioner committee be set up by Council
	Ivan Brown becomes editor of <i>Ergonomics</i>
	Council discusses the issue of Chartership with the assumption that this would occur in 3–5 years time
1976	Schools syllabus on Ergonomics set up with Lothian Region (Clive Andrews)
	Special issue of <i>Ergonomics</i> contains articles from the 6th IEA Congress, one paper by Welford (Ergonomics: Where have we been and where are we going: I) notes that the term 'ergonomics' has always been regarded as ugly and incomprehensible and was adopted in 1950 in the face of 'grave misgivings'. Despite these initial reservations and concerns the term appears to have caught on and become highly successful
	A number of issues are suggested as editorial for <i>ERS News</i> and reflect topical issues: the role of practitioners and support from the ES; the speed at which the Society reacts to changes in the wider socio-political environment; Professionalism and Chartership
	Special General Meeting held in November to discuss the possibility of setting up a 'Division of Ergonomics Practitioners'
	Article in <i>New Scientist</i> magazine makes a number of criticisms of the ES, these include: the lack of general awareness of the Society; arguments that took place between members attending the meetings
1977	'Research' dropped from title of the Society (Ergonomics Society)
	<i>ERS News</i> changes its name to <i>The Ergonomist</i>
	Council notes that there are problems setting up a Division of Practitioners, these mainly relate to the criteria for membership
	Lothian study group receives £12K grant from Social Sciences Research Council (SSRC) to examine the introduction of an Ergonomics syllabus for schools
	Concern at the time that ES was not having an impact upon inputs to legislation for standards.
	Council expresses concern that ES has no formal representation on International Standard Organization committees
1978	Publicity Action Group for Ergonomics formed and constituted as a formal working party within the Society. The group was based in London and was set up at the time to improve the image of ergonomics and the ES. At the time the group caused some controversy within Council, particularly in terms of an advertisement for a new Society logo, which appeared in <i>The Ergonomist</i> . The group were eventually constituted as a working party within the ES. (c.min 11/78)
	Industrial committee reports that there are few vacancies for ergonomists within Industry. A number of companies (e.g. EMI, British Steel) were experiencing problems at the time (c.min 11/78)
1979	D.E. Broadbent gives the Society Lecture, Is a fatigue test now possible?

4. Historical developments and recurrent themes

During the process of drawing together the material in sections 2 and 3 (tables 1–4), it became clear that there were a number of overlapping developments and themes that regularly cropped up. In the light of their historical importance, many deserved further description as well as discussion, particularly when they recurred over time, or when significant changes had taken place between one time period and another. These developments and themes fall into seven main categories with associated sub-categories:

1. Growth and influence: internationalization; membership changes.
2. Education and training for ergonomists: early courses in ergonomics; ergonomics in the classroom; standardization and harmonization of ergonomics curricula.
3. External relations: press and public relations; collaboration and relationships.

Table 3. Outline chronology of the Ergonomics Society (ES) 1980–1999.

1980	Discussions within Council regarding the position of President Death of H.P. Ruffell-Smith (1911–1980) – founder member of the Society Rainer Goldsmith becomes editor of <i>Ergonomics</i> Council considers the possibility of obtaining a Royal Chartership (c.min 7/80). Reports from the Chartership Working Party
1981	International year of the Disabled – special issue in <i>Ergonomics</i> journal
1982	Set up of Ergonomics school course modules Implementation and evaluation of Ergonomics schools courses (Loughborough – Corrie 1984) Office of President of the Society constituted UK Information Technology Year – Working party established to promote ergonomics and raise awareness of human issues in technology design Death of J.S. Weiner (1915–1982), founder member of the Society <i>Behaviour and Information Technology</i> journal starts Representatives from ES participate in the Public Inquiry into the proposal for a PWR nuclear power station – Sizewell ‘B’
1984	21 January 1984 – Death of K.F.H. Murrell (1908–1984) First meeting of the Professional Affairs Board (PAB) takes place (23/7) Academic Division Working Party reports that: ‘After considerable discussion the members concluded that, within the present structure of the Society, an academic body is needed to maintain the balance of interests, but were apprehensive that creation of an academic division might lead to further unhealthy schism in the Society.’ (c.min 11/84)
1985	Professional qualifications for Ergonomists brought in ES becomes a registered company (incorporated into Companies House, 1985) Death of O.G. Edholm (1909–1985)
1986	200th issue of <i>The Ergonomist</i>
1987	Society applies for Chartership status but pulls out due to membership limitations, levels of qualification (c.min 6/94)
1989	40th anniversary of the Society Brian Shackel gives a lecture at the Annual Conference entitled ‘Ergonomics from Past to Future’ (Shackel 1989). In the lecture, Shackel points to a number of developments and changes to the Society over the years, these include the internationalization of Ergonomics and the growth of the Society. Amongst the issues he singles out as important for the future include steps toward gaining chartership and the contribution that the Society can make toward issues such as public safety and the operation of large scale systems
1990	Association of Professional Ergonomics Consultancies (APEC) group formed Death of Paul Branton (1916–1990)
1991	Society offices are officially opened in Loughborough (7 August) A report from a working party on the future of the Society identifies a number of challenges, these include: the need to simplify the membership structure (e.g. reduce the number of categories of member); identify a clear strategy for the future of the Society (e.g. balancing the needs of academics and practitioners); and consolidate and make the most of its available human and financial resources. The report also identifies some of the strengths of the Society, these include: the reputation of the ES; the spread of its membership (nearly 100 members, across 27 countries); and the continued dedication of its members and staff to the development of ergonomics (c.min 7/91) ES joins the Occupational Health and Safety Forum (grouping of professional organizations involved in Health and Safety). (Later reformed in 1998 as Professional Organisations in Occupational Health and Safety; POOSH) Proposals for a European registration model for Ergonomists (‘Harmonizing European Training Programmes for the Ergonomics Profession’ (HETPEP) are circulated within Council (c.min 7/91)
1992	Centre for Registration of European Ergonomists (CREE) formed

(continued)

Table 3. (Continued).

	HETPEP proposals causing some concern within Council. The proposals were felt at the time to be too prescriptive and the gaining expertise in all of the areas of competence was viewed as being particularly difficult. One outstanding problem was the difficulty in defining the boundaries of ergonomics. (c.min 11/92)
	Discussions within Council regarding the setting up of APEC, some members took the view that there were problems in reconciling APEC with the PAB structure, others regarded APEC as complimentary to the Society and not a threat (c.min 11/92)
	President's report identifies Work-related Upper Limb Disorders (WRULD) and Manual Handling as major areas of involvement for the Society over the past year
1993	Death of D.E. Broadbent (1926–1993), founder member of the Society APEC problems lead to resignation of ES Chair of Council. Plans are put in place to set up a working party to discuss the rules for APEC Possibility of an Ergonomics trade association discussed within Council (c.min 93) ES actively involved in the setting up of NVQs in Health and Safety 300th issue of <i>The Ergonomist</i> Richard Holman Prize set up
1994	Council reports that the first CREE members are beginning to be registered. Concerns that the original HETPEP proposals were too prescriptive were once again raised in Council, in particular relating to the fact that many ergonomics courses would not meet the requirements of HETPEP (c.min 1/94) British Psychological Society puts forward ideas for a special interest group in engineering psychology, view within Council is that such a body should be part of ES and not British Psychological Society
1995	Death of A.T. Welford (1914–1995), founder member of the Society Rob Stammers becomes editor of <i>Ergonomics</i> Discussions held with Higher Education Funding Council concerning problems in positioning ergonomics within the present structures for assessing research quality within universities Issue of chartership for the Society is discussed in Council Discussions take place concerning the future of the Society, these include a number of brainstorming sessions, which aimed to generate ideas concerning how to generate funds for the Society, provide better services to members and ways of promoting ergonomics and the Society itself (c.min 11/95)
1996	Death of Stephen Pheasant (1949–1996), author of <i>Bodyspace</i> and other influential publications in ergonomics Launch of the Society website
1997	Working party set up to plan for the 50th anniversary to be held in 1999
1999	50th Anniversary celebrations Science Museum Exhibition, The Human Factor

4. ES publications: society journals; key texts and other materials.
5. Key individuals and institutions.
6. Influence on government and other bodies: relations with government and industry; influence of the ES with committees and inquiries; contribution towards ergonomics standards and health and safety legislation.
7. Image and identity: early 'schisms'; psychologists vs physiologists; ergonomics and ergonomists; later 'schisms'; steps toward professionalization.

4.1. Growth and influence

4.1.1. Internationalization. Clearly, one of the most important points to raise within this paper is the influence that the ES has had upon the development and spread of

Table 4. Summary of themes from recollections of past and current members of the Ergonomics Society (ES) and example issues.

Significant individuals, personalities and institutions

- Hywel Murrell ('founding father' of the ES)
- Donald Broadbent
- Alan Welford
- Brian Shackel
- Pat Ruffell-Smith
- Otto Edholm
- Rainer Goldsmith
- Paul Branton
- Elwyn Edwards and Mary Edwards
- Hugh Stockbridge
- Bill Tideswell
- Influence of Birmingham groups upon teaching and general development of the subject
- Harry Maule
- J.S. Weiner
- Etienne Grandjean
- Steve Pheasant
- British Iron and Steel Research Association
- Applied Psychology Unit Cambridge
- Human Sciences and Advanced Technology Research Institute (HUSAT) research group at Loughborough

Status of ergonomics as a discipline

- Strength of the interdisciplinary nature of ergonomics
- Need for more careful consideration of cost/benefit analyses
- Need for a 'macro-ergonomics focus' bringing together physiology/psychology
- Importance of 'holistic' point of view

Current (and future) problems

- Influencing the 'powers that be' in industry
- Need to move away from 'volunteer culture'
- Pressure of publishing/teaching means that academics have limited time for ES work (relative to the past)

Humour and lighter side of the Ergonomics Society

- Hugh Stockbridge – eccentric behaviour, jazz playing at conferences
- Stephen Pheasant – sense of humour and playfulness
- Conferences as opportunities for humour as well as scientific discussion

Early days of the Ergonomics Society

- 'Pioneering spirit' – on the brink of the 'digital age'
- Recognition that more people from industry were needed
- Club of 'like minded individuals'
- Early splits between rival disciplines within the ES

Courses and teaching

- Aston course for inspectors
- Expansion of universities and rise of courses during the 1960s
- Recent decline in numbers of ergonomics courses
- Moving towards Continuous Professional Development (CPD) courses
- European developments (e.g. Council for the Registration of European Ergonomists)
- Need for accreditation of courses in the future

Legislation and standards

- Health and Safety Act, 1974
 - Construction, access to vehicles, manual handling legislation 1979
 - 1980s input into legislation on display screen equipment and musculoskeletal disorders
 - 1990s Influence of Ergonomics Section within the Health and Safety Executive (HSE) and links this made to legislation and general improvements to safety
-

(continued)

Table 4. (Continued).

-
- VDU regulations and other health and safety regulations (e.g. Six Pack regulations) stimulated the development of consultancies
 - MANPRINT standards and regulations within the Defence Industry (influence of ES members in deriving these standards)
 - Membership of the Occupational Health and Safety Advisory Committee (OHAC) since 1985

‘Missed opportunities’

- Influence within the Health and Safety Act 1974
- Kegworth Air Crash – lack of involvement
- Growth of research in HCI and IT in the late 1970s and early 1980s

Conferences

- Early conferences were much smaller, gave people a chance to exchange information with one another
- Variable quality of papers (past and present) at conferences
- Earlier conferences up until the beginning of the 1970s were characterized by a ‘everyone knows each other, cosy spirit’

Links with, and impact upon, industry

- Maintaining a balance between military, consumer and industrial ergonomics
- Machine tool industry, Motor Road Research Association, Production Engineering Research Association (PERA) – example of ergonomics successes within industry
- Influence on Sizewell B inquiry

Public view of ergonomics

- ‘there has never been a consistent (public) interpretation of ergonomics . . . largely the fault of scientists who do not see themselves as providing public relations support’
- Overwhelming need to ‘give ergonomics away’

Journals

- Expansion of *Ergonomics* and growth of the journal
- Expansion in number of ergonomics journals
- Possible bias towards physiology within *Ergonomics*
- New journals aimed at practitioners (*Applied Ergonomics*)
- Excellent relationship with Taylor and Francis

Professionalism and the growth of consultancies

- Movements in the late 1960s towards a professional basis for the ES
- Association of Professional Ergonomists (APEC) controversy
- Ergonomics as a business *vs* ergonomics as an academic subject
- 1980s as a turbulent period for the ES in terms of dealing with consultancies and changes to ES identity
- Dropping of ‘research’ within Society name – ‘a turning point in the history of the Society’

Membership and Council

- Changes to membership over the years – move toward practitioner basis within ES
- Drives to increase membership
- Changes in Council over the years (move from academic membership to practitioners)

Criticisms of the Ergonomics Society

- Committee mentality
- Reliance upon volunteers
- Bias towards academics, not doing enough for practitioners
- Stance over relationships and collaborations in South Africa (during the 1980s)
- ES had been too ‘reactive’ in the past and needs to be ‘proactive’

Funding for research

- Support in the early days from Department of Scientific and Industrial Research
 - Problems with research council recognition over the years
 - Ergonomics falling between ‘two (or more) stools’ (Albert Cherns)
 - Research funding and evaluation of university departments (e.g. Research Assessment Exercise) in the 1990s
-

(continued)

Table 4. (Continued).

Rivalry/threats to the Ergonomics Society

- Predation from other societies overlapping with ergonomics (e.g. British Psychological Society Engineering Psychology Special Interest Group (SIG))
- European Chapter of Human Factors and Ergonomics Society (HFES) (in the past, not the present)

Key publications

- Floyd and Welford publications (*Fatigue and Human Factors in Equipment Design*)
- *Applied Ergonomics Handbook* (based on the Department of Scientific and Industrial Research booklets) – (1969)
- Murrell's textbook *Ergonomics: Man in his Working Environment* (1965)
- Stephen Pheasant's *Bodyspace* (1986, 1st ed.)

Influence on government

- Committees – Membership of the Parliamentary Scientific Affairs Committee since the 1950s
- Attendance at inquiries and investigating
- Impact on legislation (e.g. Health and Safety at Work Act)
- Large-scale impact within the area of Health and Safety in general (though this impact has 'waxed and waned' over the years)
- Impact upon European legislation (e.g. Standards)
- Participation in government programmes (e.g. Foresight)

Chartership

- Overwhelming need to obtain chartered status
- Cost of obtaining Chartership is very high and a significant barrier

Challenges for the future

- Royal Charter
 - Increased visibility within the public domain
 - Greater influence within the universities
 - Professional status
 - Convincing the public and industry of the value of ergonomics
 - Improved marketing of ergonomics (in the past 'ergonomics have proved to be their own worst enemies' in terms of marketing)
 - 'Welding of academic and practitioners basis'
 - Greater influence on government and better routes towards lobbying government
 - Greater financial security for the Society
-

ergonomics throughout the world. Apart from the fact that the ES is the oldest society of its kind (predating, for example, the German Ergonomics Society by 4 years and in the USA the Human Factors and Ergonomics Society by 8 years), it has also had a significant role in stimulating the formation of other worldwide societies and bodies (Kuorinka 2000). One of the main aims of the ES early on was to spread its membership worldwide. For example, at the Oxford meeting held in September 1949, representatives from Norway and the USA were present (Edholm and Murrell 1973, p. 24). Likewise, minutes from a meeting of the ES Council in 1957 (c.min 2/57) record the need to extend links with European bodies such as the European Productivity Agency (EPA) and to widen the scope of the Society more generally to cover international needs and concerns. Other Council minutes from the late 1950s emphasize the need to reinforce international links. A paper on the future of the ES (drafted by Hywel Murrell in 1957), for example, notes that a third of the members at that time were from abroad and that overseas links were essential if the ES was to keep up with international trends and developments.

The ES played an important part in the various activities centred around the EPA, ES members such as Hywel Murrell and Tom Singleton were involved in the EPA tour of America (1956), the Leyden conference (1957) and the Zürich Tripartite conference held in 1959 (Murrell 1958b). Perhaps, the most important outcome from the 1950s was the

formation of the International Ergonomics Association (IEA) in 1961, a decision that had resulted partly on the basis of earlier discussions held at the 1959 ES symposium held in Oxford (Stansfield 1980, 1985). The precise extent to which the ES acted as the primary inspiration for the formation of the IEA is a matter of some controversy. K.U. Smith, for example, (as reported in a chapter in the history of the IEA co-authored with his son Thomas J. Smith – Smith and Smith 2000) maintained that the IEA grew out of the ‘body of theoretical and practical concepts associated with development of HF science in the US during World War II (WWII), and that the idea of “fitting the job to the worker” (the theme of EPA Project 335 mission to the US and of the Leyden Seminar) originated with the need for “fitting military equipment to combat personnel” during WWII’ (K.U. Smith 1988, quoted in Smith and Smith 2000, p. 84). Whilst it is very difficult, if not impossible, to exactly pin down the influence of either the ES or American human factors initiatives in the formation of the IEA, it seems fair to conclude that the ES played a significant role in helping to set up this body, as well as paving the way for its subsequent growth.⁶

Council minutes from the time record that the formation of the IEA caused some initial misgivings within the ES at the time. It was felt by some ES members that the IEA might well impinge upon the work of the Society;⁷ however, it became clear over time that the IEA was not a threat, but instead presented an opportunity to set up international meetings and congresses where the subject matter of ergonomics could be debated more widely (c.min 4/59).

The first list of members, produced in 1951 (Edholm and Murrell 1973, p. 11), lists a total of 88 members, 14 of whom were from outside the UK (i.e. approximately 16% of the total membership). The trend toward widening internationalization continued to gather pace throughout the following decades. By 2000 the number of international members had grown to a figure of around 250 members spread around the world (i.e. approximately 19% of the total membership). A better indication of the influence of the ES can be seen by the fact that, according to IEA statistics, the number of worldwide societies with an interest in ergonomics numbers around 40 (Konz 2000). Many of these societies were formed by people involved in the early days of the ES (e.g. Alan Welford’s part in helping to set up the present day Ergonomics Society of Australia); as well as others who are still currently closely involved despite being located in other parts of the world.

During the early 1960s the role that the ES played in internationalization shifted away from a concentration on publicizing ergonomics towards helping to set the agenda for international standards for the subject. The British Standards Institution (BSI), for example, were in contact with the ES in 1961 and encouraged the Society to get involved in setting up international standards (c.min 10/61). The ES, rather than deal with this issue alone, provided the newly formed IEA with support in developing items such as ergonomics checklists, which later formed the basis for standards. Similarly, the ES encouraged European countries to set up their own societies. In 1962, for example, a French government mission made visits to university departments including Oxford and Loughborough, as well as companies such as EMI and the British Iron and Steel Research Association (BISRA). At each of the establishments they met with representatives of the ES including Brian Shackel and W.F. Floyd. One outcome from the French mission was that it was decided to set up a French Ergonomics Society. Later on in 1967 a more permanent relationship was formed with IEA, when the ES became a

⁶We are grateful to Professor Rob Stammers for pointing us to sources related to this debate.

⁷Bonjer (2000), for example, records that some ES members felt that there was no need for a separate society other than the ES.

formal member, with a member of the ES Council acting as an official IEA delegate, a role that continues to exist today.

In the 1970s and 1980s wider developments such as the formation of the European Common Market and the International Standards Organization (ISO) led to even greater cooperation between the ES and IEA. Chapanis (1974), for example, noted that whilst ergonomics was still largely a Western European/American endeavour, there was growing evidence of its spread to other continents and countries. Much of this spread took place through the formation of ergonomics standards and ES – IEA collaboration regarding their content and operation. A number of successful events brought about this collaboration, these include the conference organized by Brian Shackel in Loughborough in 1973 (with the support of the IEA and BSI), which resulted in a number of recommendations including the need for ergonomics data books, as well as a committee who would be tasked with reviewing and drafting standards. A later IEA conference in 1976 (the Sixth IEA Congress) built on these earlier liaisons and partly led to the development of international standards in the area of Man (*sic*)-Machine Systems (including physical, physiological and social issues) within the ISO-TC 159 Section. Although these later proved to be problematic (due to various difficulties such as representation for ergonomists), they give some indication of the quality of cooperation between the ES and its international counterpart the IEA.

In more recent years, the ES has played a fundamental role within the wider international community, perhaps the most prominent of these being initiatives covering the education and training of ergonomists (see section 4.2 below). The ES has been at the heart of international developments within ergonomics, whether it be in terms of hosting IEA congresses and other meetings (e.g. 1967, 1979, 1985), or more indirectly through the influence of ES council members who have acted as delegates to the IEA. The international role of the ES is clearly one of its aspects that deserves to be highlighted: the ES helped to set up other international societies and bodies (Appendix A-2), and it also has maintained that level of support over the last 50 years.

4.1.2. Membership changes. In terms of the growth of members of the ES as a whole, this has tended, as one might expect, to show periods of increase followed by stability, as well as periods of growth (see figure 1). The backgrounds of members, their areas of competence and their application areas have been described in detail by Corlett and Stapleton (2001). For example, aside from the large growth of consultant ergonomists over the last few decades, they also point out that there has been a significant number of professional ergonomists working in the area of health and safety during the 1990s (section 4.6.3). It is important to note that discussions regarding membership have regularly cropped up within the ES and have taken many forms. Much of the time these discussions have focused on strategies for increasing membership.

In the early days of the ES, and throughout much of the 1950s, it appears that there was some discussion regarding how large the ES should be. Council minutes from the late 1950s record that it was felt that membership should be limited to a maximum of 200 people, mainly due to problems associated with the burden of administration associated with a larger number of members (c.min 4/58). The following year a decision was taken in Council to increase the membership beyond the 200 figure (c.min 4/59). During the 1960s, a number of debates occurred around the issue of how to increase membership and move the ES towards a practice-oriented focus and away from its exclusively academic origins. This is partly reflected in the establishment of new grades of membership (e.g. ordinary and associate grades), which came about at this time.

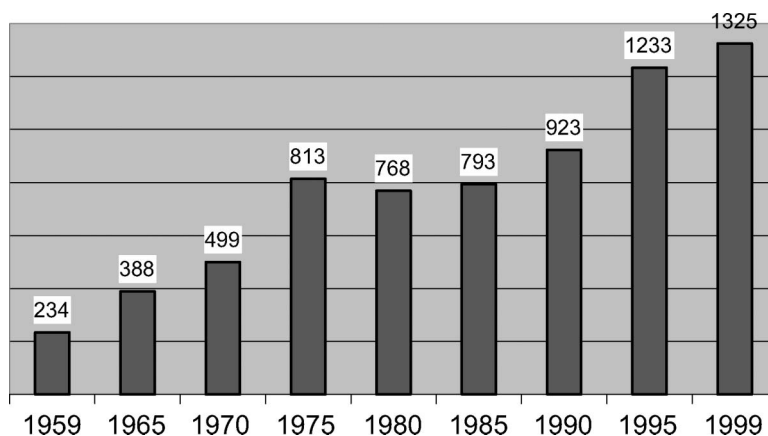


Figure 1. Ergonomics Society (ES) membership statistics 1959–1999.

Another reason for changing the membership structure was the fact that the number of meetings organized by the society was growing and these were attended by a variety of people drawn from both research and industry. There was some concern that the ES should widen its field of activity to take into account the needs of potential members drawn from industry, who did not have formal qualifications in ergonomics. A Council paper from 1962 records that the ES was very originally loosely organized around the needs of the founder members and that ‘the concept of pursuing research was probably uppermost in their minds, as distinct from being a group of practical practitioners’ (c.min 6/62). The same paper records that due to the growth in technology and wider changes in society at large, it was becoming clear that the application of ergonomics was of growing importance and that ‘[ergonomics] had moved from a quiet backwater of research to something of public importance’.

The 1960s witnessed rates of high growth amongst the membership base of the ES (figure 1), this growth continued up until the mid-1970s, when membership numbers steadied somewhat. During the 1970s many debates and discussions took place regarding how to expand membership. More and more people were involved in the subject area of ergonomics; however, a large percentage of these people were carrying out their work outside of the Society. It was clear at the time, and to some extent still is, that ergonomics generated considerable interest amongst the public and in government. Similar concerns have been raised over the years concerning the number of people who join the society and subsequently leave over time. Students in particular have regularly attended the annual conference and other ES meetings; however, quite a few either do not join the Society or leave soon after gaining employment (c.min 9/71, c.min 5/86). The difficulties involved in keeping hold of these people and encouraging them to remain with the Society is a recurrent theme from the 1970s onwards.

Another recurrent theme is how the Society could best serve the needs of members. In particular, the 1980s and 90s saw many discussions of what the ES could do for its members, one of the main concerns being that the needs of practitioners were not served well (section 4.7.3).

During this time, the application of ergonomics expanded considerably, reflecting both the impact of the ‘white heat of technology’ within the world of work in the 1960s, the

growth of consumerism and increased opportunities for leisure activities outside of work. In both the workplace, and the home, ergonomics came to be seen as a vital concern, spanning issues ranging from health and safety to good design and usability. At the same time, this period brought to the foreground issues that had been recognized much earlier, but now gained greater prominence. Foremost amongst these issues were concerns that the identity of the ES had changed from the views of its founders and that the image of the Society needed to reflect the wider concerns of practitioners (section 4.7).

4.2. Education and training for ergonomists

4.2.1. The first courses in ergonomics. When the ES was first formed, none of the founding members could have predicted how widespread would be the growth of ergonomics as a discipline and a practice. During the 1950s it became widely recognized that ergonomists were taking their place in industry alongside practitioners from other disciplines, such as work study and operational research. These developments raised the need for training and education for the newly established role of 'ergonomist' within industry.

Between 1959 and 1960 some of the first steps were taken towards providing educational courses on ergonomics. The first undergraduate course was set up in Loughborough under the direction of W.F. Floyd (also the holder of the first chair in Ergonomics). The trend toward setting up courses continued in line with the expansion of universities that began in the early 1960s following the Robbins Report; these courses were set up at the Universities of Birmingham, Aston, Surrey, London and Nottingham and some of these continue to provide a steady flow of ergonomists into both industry and academia. By 1973, an IEA questionnaire on ergonomics activities within the UK revealed that there were nine university departments and nine other institutes with major ergonomics interests (e.g. Medical Research Council (MRC) units, Institute of Aviation Medicine). In addition, a number of universities were offering short courses to managers and other groups covering ergonomics (e.g. at the University of Aston in Birmingham where courses for factory inspectors proved popular and successful). A Council paper of the same year on 'Education and training in ergonomics in the UK' also reflects the growth of graduate and postgraduate numbers during the 1960s and early 1970s (c.min 1/72). However, the paper goes on to note that this growth should be seen in the light of greater expansion in numbers in the USA, where some 43 universities offering courses in ergonomics existed at the time.

During the late 1950s there was also increasing interest from industry regarding the training of professional ergonomists. In January 1958, for example, the Department for Scientific and Industrial Research (DSIR) met with the ES to discuss training requirements for ergonomics as applied to industry. Council minutes from the time record that there were some problems in terms of providing a definition of ergonomics that could cover training requirements for both psychologists and physiologists. Debates concerning the content of curricula continued in the later 1960s and early 1970s. A variety of committees and working parties were set up, one problem that was mentioned was 'the lack of systematic data about current and future requirements of ergonomics and manpower' (c.min 5/66). These discussions ultimately led, much later, to attempts to standardize curricula and calls for harmonization between courses in the UK and Europe (a theme that is taken up further in section 4.2.3).

4.2.2. Ergonomics in schools. A survey of school teachers in 1971 concluded that whilst most had heard of ergonomics, less than half were aware of the existence of the ES. The

issue of how to include ergonomics within the school classroom took on further impetus during the late 1970s, when courses such as Advanced ('A')⁸ level Administration took on modules including ergonomics. Later courses (e.g. 'A' level Design and Technology) also include a substantial ergonomics content and partly resulted in a number of students going on to study the subject in higher education.⁹

An initiative led by Clive Andrews and others that began in 1976 in the Lothian region, helped to get ergonomics included in the syllabi of 'A' level courses and to institute awards for these qualifications (c.min 9/84). Although take-up of the courses was poor amongst schoolchildren (Corrie 1984), it proved to be a valiant and ambitious attempt to include ergonomics within the classroom.

Corlett and Stapleton (2001, p. 1275) report that the inclusion of ergonomics within school curricula had been considered as long ago as 1973 by Loughborough University. In the last few years, examination boards for the UK GCSE have also considered courses that include a significant ergonomics content. The ES has played a substantial role in all of these developments, particularly in terms of supporting and encouraging take-up of courses by school examination boards. Some indication of the most recent Society-led activities in this area can be seen in the form of the popularity of the Ergonomics4Schools initiative and the current use made of the resources available on its website (<http://ergonomics4schools.com>).

4.2.3. Standardization and harmonization of ergonomics curricula. In more recent years the focus of discussion regarding education has picked up on themes that can be traced back to at least the late 1960s and early 1970s. A report from 1973, based upon the findings from a working party, record that there were concerns that there were few regulations or standards concerning the teaching of ergonomics (c.min 2/73), both within schools and, more widely, within the universities. As a result of this lack of uniformity, there was a danger that the term 'ergonomics' was being misused and that some teachers were not competent in the subject. The report concludes with the statement: 'We found in general that no one was speaking up for ergonomics and making sure that adequate standards are being set' (c.min 2/73).

In subsequent years, issues that centred on the core competencies required of students, researchers and practitioners of ergonomics make up the bulk of discussions about education during the subsequent decades.

In the late 1980s the subject of education and training took on an international dimension. Council minutes from 1987, for example, show that the IEA and other European ergonomics bodies were considering setting up formal qualifications in ergonomics, alongside procedures for validating and vetting these qualifications (c.min 10/87). These discussions and debates eventually led to the formation of the Council for the Registration of European Ergonomists (CREE) and the working groups on the Harmonization of European Programmes for the Ergonomics Professions (HETPEP) in the early 1990s (c.min 1/90). It was around this time that concerns started to be raised about HETPEP, a common view being that the proposals were too prescriptive and would be difficult, if not impossible, to implement. Some members of the ES felt that gaining expertise in all of the disciplines, as required by HETPEP, would be difficult to achieve and that this would go against the prevailing image of ergonomics as a developing subject with permeable boundaries (c.min 11/92). In July 1994, the first European members were registered

⁸An examination in the UK most usually taken by school students in the age group 16–18 years and widely used to gain entrance to university and further education.

⁹We are grateful to one of the reviewers of the paper for pointing this out to us.

within CREE; however, within the ES there were still some teething problems, not least the criteria for membership and how strictly these should be applied. By 1995, the situation had been clarified, and the ES had decided to link CREE membership with its associated activities, such as steps toward continuous professional development and the Professional Affairs Board (PAB; Wilson 1999, Harvey 2002).

During the 1990s, a second issue also preoccupied discussion within the ES, namely, the fit between the activities of academics working in ergonomics and the funding structures/assessment criteria used by the research councils. A meeting held in early 1996 between the ES and representatives of the main research councils (e.g. Engineering and Physical Sciences Research Council, Economic and Social Research Council, MRC) was held to discuss the problem of how to assess ergonomics in the light of the Research Assessment Exercise (RAE). The main problem at the time was seen as being that ergonomics fell between a number of different 'stools' within the RAE categories (e.g. Medicine, Psychology) and this made evaluation of the subject difficult. Interestingly, similar problems had occurred in 1968 in discussions with the research councils (c.min 5/68). When looking back at the subject of education and training, it is obvious that some of the recurrent issues in this area relate to the image of the Society and changes to this over time. In the next section we examine these changes in more detail.

4.3. External relations

In this section, we examine external relations including the sometimes difficult relationship the ES has had with the press and media, as well as its impact within wider public relations (section 4.3.1.) and relationship with other societies (section 4.3.2.).

4.3.1. Press and public relations. There are numerous reports of dealings with the press and media throughout the history of the ES. Many of the reports available in newspapers, magazines and, more recently, television programmes have done much to publicize ergonomics and help to gain it a great deal of currency amongst the general public. However, it should be noted that over the years the press and media have also contributed a good deal toward a degree of confusion regarding the Society, as well as usage of the term 'ergonomics'. Whether or not some of this blame can be placed on the ES is not something to be discussed here; however, it is perhaps a question worth posing.

One of the most well-known stories within the Society came about as a result of a paper given by K.F.H. Murrell to the British Association in 1952 and widely reported in newspapers at the time (e.g. *The Manchester Guardian*, 5 September 1952).¹⁰ Under the heading, 'The man who held the horses', one newspaper reported how Murrell had discovered that Army gunners always had an extra person standing at the rear of the gun and that this person took little part in its operation. As it turned out, the extra man was a throwback to earlier times when an extra gunner was needed to hold the horses. Sadly, in the years following Murrell's paper there are fewer reports that can match this one for its humour.

Edholm and Murrell (1973, p. 12) describe a much more common situation, namely, the press having some fun at the expense of the Society. The 1951 conference held in Birmingham resulted in a few reports in the press that made fun of the word 'ergonomics'. Similarly, at the 1953 Oxford meeting, reports in the newspapers tended to present a slightly 'lurid and patronising' account of the scientific papers presented

¹⁰It was also reported in *The Daily Telegraph* (no date) – this is based upon newspaper clippings found amongst Murrell's papers (now held in Loughborough).

(Edholm and Murrell 1973, p. 19). In general, the reporting of the annual conference has suffered from two main problems. First, much of the media coverage has been misleading; a common misunderstanding, for example, and one that has been frequently reported in the media is that ergonomics is the science of seating (Branton 1987). A second problem is that there has been a perception over the years that the quality of papers at the conference has frequently been poor and that little effort has been made to 'give away' the subject to journalists (c.min 9/71, c.min 7/87).

Other examples of either unfair reporting or lack of attention to the needs of the media can be found in reports of meetings from the 1970s. Articles published in *New Scientist* in 1976 and 1978, for example, are critical of the efforts made by ergonomists to communicate their material in a form convenient for the general public. The 1978 report, based on an ES meeting held in Nottingham to discuss the topic of Stress at Work is perhaps tongue-in-cheek, but nonetheless typical of the difficulties faced by journalists. The article concludes: 'There ought to be another Society working on stress at ES meetings . . . is there any need to say that in two contrasting work situations ambulatory monitoring techniques were used?' (*New Scientist*, Ariadne, 12 October 1978). These sorts of comments, combined with a general dissatisfaction with the coverage of ergonomics in the media, have prompted the ES on numerous occasions to reflect once more upon its public image and to try to seek to improve the situation. The setting up of the London-based Publicity Action Group for Ergonomics in the late 1970s, whilst initially causing some disquiet within Council (c.min 11/78), helped to speed up what was seen as delayed reaction of the ES in dealing with news issues that involved ergonomics (e.g. instances of human error involved in accidents). Part of the reason why the ES decided upon a Chair of Council, and later a President, for the Society was that the role would make it easier for the press to have a focus of attention for its inquiries (c.min 11/79). A related problem is that the ES was seen as not having a consistent identity (c.min 11/79, section 4.7).

A Council paper on *Ergonomics and public awareness* from 1987 identifies a number of shortcomings, many of which touch upon issues we have discussed earlier in the paper, these include: lack of public knowledge about the term 'ergonomics' and its misuse in advertisements (see also Simmons 1991); the diverse nature of ergonomics as it is practised; poor internal communication about activities in the public domain already undertaken by members; and lack of ES resources in order to tackle the issue properly (c.min 7/87). A later report in 1996 is more succinct in saying that the ES has to decide 'what it is really for' and only then can it market itself within the public domain (c.min 1/96).

Although press relations have been at times difficult and strained, this is not to imply that the ES has not made much effort to improve the situation. There are many examples in the 1950s/1960s, for example, where the Society has contacted the press and made them aware of newsworthy material (e.g. c.min 1/58).¹¹ In other cases, material has been written for trade and consumer magazines (e.g. *Which* magazine in the 1960s by Brian Shackel). Exhibitions, such as that held with the Design Council in 1983 (Fit for Human Use), and the more recent Science Museum exhibition in 1999 (The Human Factor), have also done much to publicize the subject and the Society.¹² Other efforts have been made over the years to improve the corporate identity of the ES (e.g. changes to the letterhead

¹¹In 1958, for example, Alan Welford wrote to *The Times* outlining the objectives of the ES and attempting to make journalists aware of the new journal, *Ergonomics*.

¹²The Science Museum exhibition proved to be especially successful and later was staged in Manchester and Lisbon. The exhibition also received extensive media coverage (e.g. Channel 4 television, BBC *Blue Peter* – a UK children's television programme).

and Society logo) and there have been numerous calls for improvements as well as the setting up of working parties to discuss public relations (PR) and media relations.

Problems with PR ultimately resulted in the ES employing an external consultancy in 1989 to undertake the task of identifying ways of improving its media relations and PR (c.min 1/90). In addition, other reports were commissioned that dealt with improvements to marketing and PR (c.min 6/94). Throughout the 1990s, more and more effort was put into improvements to PR, culminating most recently in the appointment of a PR officer within the Society offices.

4.3.2. Collaboration and relationships. Almost from the moment the ES began, it has maintained strong and amicable links with other learned societies. We have already described in section 4.1.1. the nature of international relationships, and in particular with the IEA. It is worth highlighting links with other bodies and discipline groups, since these have been one of the particular strengths of the ES over its history. For many years, the ES held joint meetings with the British Occupational Health Society (BOHS; c.min 2/57), similar collaborations have occurred over the years with groups from a diverse range of disciplines (e.g. the British Psychological Society, the Institute of Work Study Practitioners, Society of Occupational Medicine, Trades Union Congress). Table 5¹³ is an attempt to give some indication of these collaborations as they have taken place over the period 1957–1999.

It is perhaps true that because of the essentially interdisciplinary nature of ergonomics and its shifting identity over the years, the ES has had many overlaps with other related societies and this has facilitated cooperation and collaboration. Table 5, for example, reflects the outward looking stance of the Society and the fact that it has always been concerned to collaborate with closely related bodies and associations. Whilst this has proved to be a strength of the Society, it has also proved to be a source of weakness, and at times a ‘threat’ to the core identity of the Society. There are many indications that this has been explicitly recognized by Council members and led to some difficult discussions about the relationship of the ES to other bodies. Explicit mention of the dangers of losing ground to other societies or failing to take the initiative with issues considered to be the prerogative of ergonomics and the ES (and therefore allowing other bodies to do so earlier) are mentioned in the early and late 1960s (c.min 9/64, c.min 7/69), as well as the 1980s and 1990s (c.min 9/84, c.min 11/95). One key problem is that the fact that the ES is made up of individuals from many different discipline bases has meant that, in some cases, other groups have taken over the ground or ‘turf’ of the Society. For example, there were many debates in the late 1980s around the issue of the Human Factors of Information Technology (c.min 7/87). Around this time, other groups such as the British Computer Society’s (BCS) Human–Computer Interaction Special Interest Group became involved with this issue. The perception amongst some members of the Society in the later 1990s was that the BCS group, and other societies, had taken responsibility for human factors as applied to information technology, and that the ES had lost a vital opportunity to get involved in a topical area at that time. In other words, the interdisciplinary nature of the ES may have worked against it, particularly when applying ergonomics to topics that required a greater degree of specialization. Similar problems have also arisen in relation to areas such as health and safety (c.min 7/91).

¹³Table 5 represents a partial list of meetings and collaborations over the period 1957–1999, this is based upon the listings of meetings held in the journal *Ergonomics* up until the later 1960s, and later (less complete) records mentioned in Council minutes in the subsequent years up until 1999. The table is intended to give some indication of the range and extent of collaborations and not the exact number for each year.

Table 5. Sample of collaborations between the Ergonomics Society (ES) and other learned societies and representative bodies (1955–1999).

Date	Meeting	Purpose
1955	Joint meeting with MRC/DSIR	Scientific exchange and liaison with industrialists
31 March–3April	Joint Committee for Individual Efficiency, Cambridge	
1957	Joint meeting with BOHS	Scientific exchange
28 June	(London School of Hygiene and Tropical Medicine)	
1958		
9 January	Meeting with DSIR	Discussions regarding the training of ergonomists
27 June	Joint meeting with BOHS at (London School of Hygiene and Tropical Medicine)	Scientific exchange
1959		
9 June	Joint meeting with BOHS at (London School of Hygiene and Tropical Medicine)	Scientific exchange
1961		
16 November	Meeting between ES Industrial Section and Society of Industrial Artists	Scientific exchange
1962		
20 October	Meeting of ES Fitness and Training Section with British Association of Sport and Medicine	Scientific exchange
1963		
January	Meeting of ES Fitness and Training Section with Royal Geographical Society	Scientific exchange
April	Meeting with Occupational Health Society	Scientific exchange
11–13 June	Joint meeting with Nederlandse Vereniging Voor Ergonomie (Dutch Ergonomics Society), (Institute for Preventative Medicine, Leiden)	Scientific Exchange
19 October	Meeting of ES Fitness and Training Section with British Association of Sport and Medicine (London School of Hygiene and Tropical Medicine)	Scientific Exchange
1964		
1–3 January	Meeting with Biological Engineering Society (College of Technology, Loughborough)	Scientific exchange
5 June	Meeting with MRC (MRC APU Cambridge)	Scientific exchange
1965		
1–2 Jan	Biological Engineering Society (Royal College of Art) Royal Aeronautical Society	Scientific exchange
March	Meeting with Institute of Work	Scientific exchange
25 May	Study Practitioners	Scientific exchange
1967		
5–6 Jan	Joint meeting with Society of Occupational Medicine and BOHS	Scientific exchange on: The effects of abnormal physical working conditions
11 March	Meeting between ES Fitness and Training Section and British Association of Sport and Medicine	Scientific exchange on: The influence of exercise on obesity

(continued)

Table 5. (Continued).

Date	Meeting	Purpose
1969		
11–12 Jun	Joint meeting with Nederlandse Vereniging Voor Ergonomie (Dutch Ergonomics Society)	Scientific exchange
1970		
6–7 May	Meeting with BOHS and Society of Occupational Medicine (Zoological Society of London)	Scientific exchange on: Performance under suboptimal conditions
May	Meeting with Manpower Services Commission	
July	Joint Operational Research Society/ES/British Standards Authority group set up	
1972		
July	Meeting with Industrial Training Research Unit	Scientific exchange
September	Meeting with Design Council	Discussions regarding Ergonomics awards for good design
1973		
April	Conference (with IEA) held at Loughborough with British Standards Institute	Discussions regarding Ergonomics Standards
1974	Council minutes (c.min 1/74) notes collaboration with BOHS and Society for Occupational Medicine	Scientific exchange
1975	Council minutes (c.min12/75) mention extensive collaboration with BOHS and TUC	Scientific exchange Influence on policy
1976	BOHS asks ES to nominate an observer on its examining board	Mutual exchange with other societies
1978		
January	Two meetings held with Institute of Electrical Engineers (IEE): (i) Computer aids for designers, (ii) Real time control in transport management	Scientific exchange
1982	National Electronics Council sets up a working party on UK Information Technology Year (nine members from the ES)	Influence on policy
1984		
September	Joint conference with Applied Vision Association – Vision In Vehicles	Scientific exchange
November	Meetings with BCS HCI group	
1991	Joint conference with BOHS on Occupational Health (Sheffield)	Scientific exchange
1992	President's report (c.min 3/92) – joint meeting with Occupational Health Society and TUC	Discussions on Manual Handling guidelines and Work Related Upper Limb Disorders
1994	Chair of Council report (c.min 11/94) mentions meeting with Association of Management Sciences (TAMS)	
1995	Presidents report (c.min 1/95) Discussions with TUC	Proposal for joint activity on: Designing repetitive strain injury out of the workplace

(continued)

Table 5. (Continued).

Date	Meeting	Purpose
1996	Meetings with Institute of Occupational Safety and Health (IOSH) (c.min 1/95)	Scientific exchange
	Presidents report (c.min 1/96) Discussions with Centre for the Exploitation of Science	
	President's report (c.min 1/96) discussions with Design Council, BOHS, Royal Society For the Prevention of Accidents	Policy discussions (Foresight programme)
1997	Meetings with Association of Professional Physiotherapists	Preparation of guidelines for safer handling in care services
	Joint meetings held with (AcoPH) groups (c.min 1/97)	Scientific exchange
1999	ES responds to TUC-IOSH-CBI consultative document on safety standards	
	ES consultation with Department of Trade and Industry regarding Foresight Programme	Input into policy

MRC = Medical Research Council; APU = Applied Psychology Unit; DSIR = Department of Scientific and Industrial Research; BOHS = British Occupational Health Society; IEA = International Ergonomics Society; AcoPH = Association of Professional Physiotherapists; TUC = Trades Union Council; CBI = Confederation of British Industry.

One of the most important relationships that has developed and grown over time is that with the publishers Taylor and Francis (T&F). Edholm and Murrell (1973, p. 30) describe how, in April 1956, Alan Welford and Harry Maule visited the offices of T&F and made the arrangements for the publication of the journal *Ergonomics*, the first edition of which appeared in November 1957. Relations between the ES and the publishers have since then remained excellent and much of the publicity that the subject and the Society has received is due in no small part to the numerous books and journals published by T&F and the cooperation of people such as Dr Harry Bannister of T&F (for further details, see Lewis 1983, Brock and Meadows 1994). Moreover, the journal *Ergonomics* has proved to be one of the most popular journals published by T&F and also provides the largest proportion of the Society's annual revenue. The theme of publications is taken up in further detail in the next section.

4.4. Ergonomics Society publications

4.4.1. Society journals. Over the last 50 years there has been a significant growth in the numbers of journals publishing papers within the field of ergonomics (Corlett and Stapleton 2001, p. 1267). The journal *Ergonomics* began in 1957 and was followed later by *Ergonomics Abstracts* (1967), *Applied Ergonomics* (1969), *Behaviour and Information Technology* (1982), as well as other related T&F journals that publish papers in the area of ergonomics (e.g. *Work and Stress*). *Ergonomics* can claim to be the first journal wholly devoted to both the theoretical and applied aspects of the subject, whilst other journals (e.g. *Applied Ergonomics*) initially focused more specifically on themes such as ergonomics case studies and applications (Shackel 1969). Since the late 1950s and early 1960s, *Ergonomics* has also been the official journal of the ES, the IEA and, at one time, the Dutch Ergonomics Society. In addition to doing an enormous amount to promote the

subject, the journal has also maintained a high standard of scientific excellence throughout its existence, although there have been concerns over the years that it has tended to appeal to academic rather than practitioner audiences (c.min 11/58, c.min 4/96).

Ergonomics has expanded considerably in the last 30 years, partly reflecting the growth of the subject and the desire to publish in this highly regarded scientific journal. Ivan Brown, for example, (editor of the journal from 1975–1980) records that *Ergonomics* doubled in size between 1957–1980 (*Ergonomics*, **23**, 1–2). In 1977, a decision was made to publish the journal on a monthly basis in order to ‘parallel the development of the subject of ergonomics and the growth of the Society’ (c.min 3/77). Since 1990, the journal has also published ‘Festschriften’ for distinguished members (e.g. W. Rohmert in 1990, Nigel Corlett in 1994 and Tom Singleton in 1996). Special issues have become more common (e.g. on Cognitive ergonomics, Task analysis), as have commentaries on specific topics.

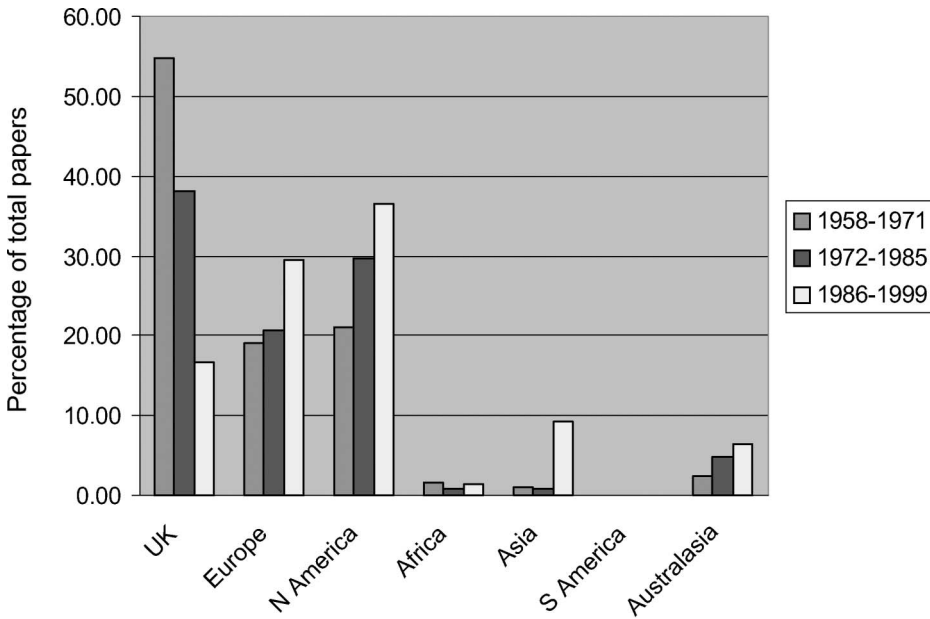
In the next section we describe a content analysis of the papers published in *Ergonomics*. One of the main purposes of examining the contents of the journal in more detail was to throw more light on some of the developments that have taken place within, and outside, the ES. For example, the analysis may provide some further indication of the growth of ergonomics internationally (section 4.1.1), the distribution of research carried on in industry and academia (section 4.1.2), as well as developments such as changes to the image and identity of the ES, which we discuss in more detail later on in the paper (section 4.7).

4.4.2. Content analysis of *Ergonomics* 1957–1999. Sections 4.4.2.1., 4.4.2.2. and 4.4.2.3. present the results of a content analysis that was carried out on the total number of papers published in *Ergonomics* in the period since its beginning up until 1999. In each case, the analysis reported is of the total percentage of papers that fall into different categories (e.g. countries of origin, type of study). Special issues and other editions given over to specific topics were excluded from the analysis in order to prevent biases in the results. Some of the content analysis (e.g. section 4.4.2.1.) is based upon the categorization scheme used by the journal *Ergonomics Abstracts*. This journal analyses papers published in the area of ergonomics and human factors into a number of different categories (e.g. General ergonomics, Human characteristics, Health and safety) and associated subcategories according to the specific subject matter that is covered in the paper.

The aim of the content analysis was to examine only the broad trends in the content of the journal over time. The analysis does not aim at a comprehensive account of the content of the journal; further details of the data and the analysis are available from the authors (Waterson). In carrying out the analysis, we were also influenced by similar work that has been based upon USA data (e.g. from the journal *Human Factors* – Meister 1996, 1999 Chapter 6).

4.4.2.1. Countries and continents of origin. Figure 2 shows a graph and table of the percentage number of papers that originated from seven countries/continents (UK, other European countries, North America, Africa, Asia, South America and Australasia) over three main time periods: 1957–1971; 1972–1985; and 1986–1999.

One of the most striking findings is that the number of papers originating from the UK has declined over the three time periods relative to the numbers from other countries. In particular, the number of papers from North America and Europe has increased substantially over time, papers from North America represent the majority of publications in the journal in the last few decades. In addition, the number of published papers that originate from Asia, Africa and Australasia has increased substantially over time. Papers originating from South America remain constant (i.e. zero or near zero) over



Time period	UK	Europe	North America	Africa
1958–1971	54.8	19	21	1.6
1972–1985	38.2	20.7	29.7	0.8
1986–1999	16.7	29.4	36.6	1.4

Time period	South America	Australasia
1958–1971	0	2.5
1972–1985	0	4.8
1986–1999	0.1	6.5

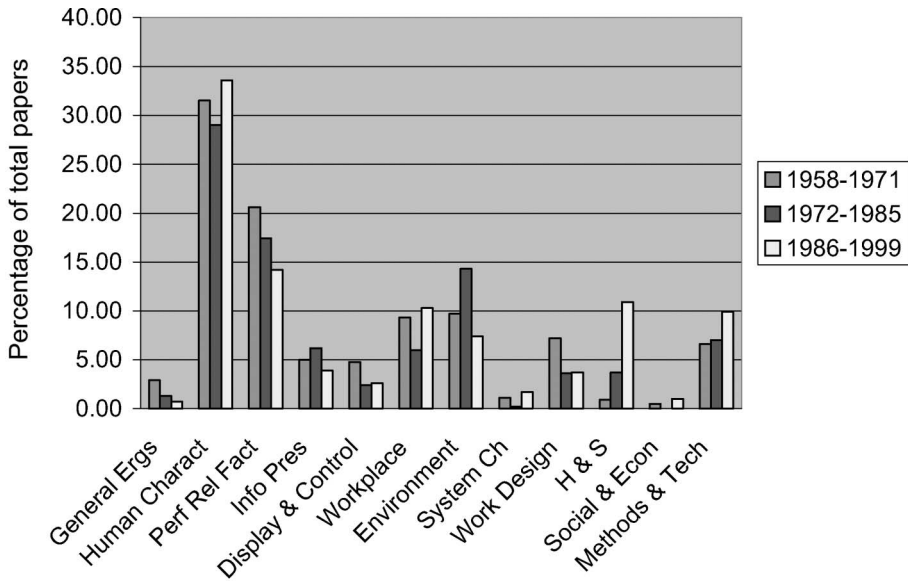
Figure 2. *Ergonomics* content analysis: Percentage number of papers – countries and continents of origin.

the three time periods. As we might have expected, these combined trends underline themes mentioned earlier in section 4.1.1, namely, the internationalization of the subject.

4.4.2.2. *Types of disciplines and subject matter represented in Ergonomics.* Figure 3 represents a graph and table of the types of disciplines and subjects within the journal that have been published over the three time periods. In this case, one of the categories used by *Ergonomics Abstracts* (Human characteristics) has been broken down into two sub-categories (Human characteristics – Psychology and human characteristics – physiology) in order to address the question of whether the journal has published more papers in Psychology or Physiology during the three time periods (figure 4).¹⁴

Comparing the main categories across the three time periods, it appears that there is a broad trend toward uniformity in the types of papers that have been published in the journal. Not surprisingly, papers in the category ‘Human characteristics’ make up the

¹⁴The question of the balance between psychology and physiology is mentioned elsewhere in the paper, particularly in terms of possible leanings within the Society over time (Section 4.7.1), see also Singleton (2001) for a discussion of these issues.



Time period	General ergonomics	Human characteristics	Performance related factors	Information presentation
1958–1971	2.9	31.5	20.6	5.0
1972–1985	1.3	29.0	17.4	6.2
1986–1999	0.7	33.6	14.2	3.9

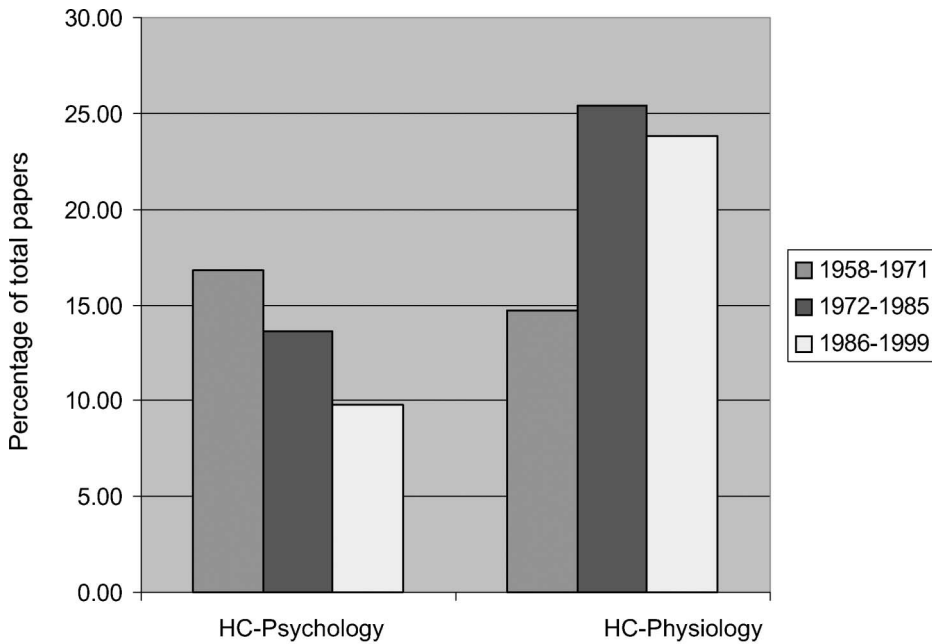
Time period	Display & control design	Workplace & equipment design	Environment	System characteristics
1958–1971	4.8	9.3	9.7	1.1
1972–1985	2.4	6.0	14.3	0.2
1986–1999	2.6	10.3	7.4	1.7

Time period	Work design & organization	Health & safety	Social & economic impact	Methods & techniques
1958–1971	7.2	0.9	0.5	6.6
1972–1985	3.6	2.7	0	7
1986–1999	3.7	10.9	1.0	9.9

Figure 3. *Ergonomics* content analysis: Percentage number of papers – types of disciplines and subject matter represented in the journal.

substantial bulk of papers published in the journal over the three time periods (approximately 30% of papers). One trend is the increase of papers in this category over the last two time periods, this may reflect movement towards psychology/physiology as the dominant types of studies published within the subject of ergonomics in the last 30 or so years (as compared to performance-related subject matter such as vigilance and fatigue).¹⁵

¹⁵We should also note (as a reviewer of the paper pointed out) that one of the influences upon the types of papers published by *Ergonomics* may also be the growth of other journals (e.g. *Applied Ergonomics*) and the particular types of papers they have published over the years.



Time period	HC-Psychology	HC-Physiology
1958-1971	16.8	14.7
1972-1985	13.6	25.4
1986-1999	9.8	23.8

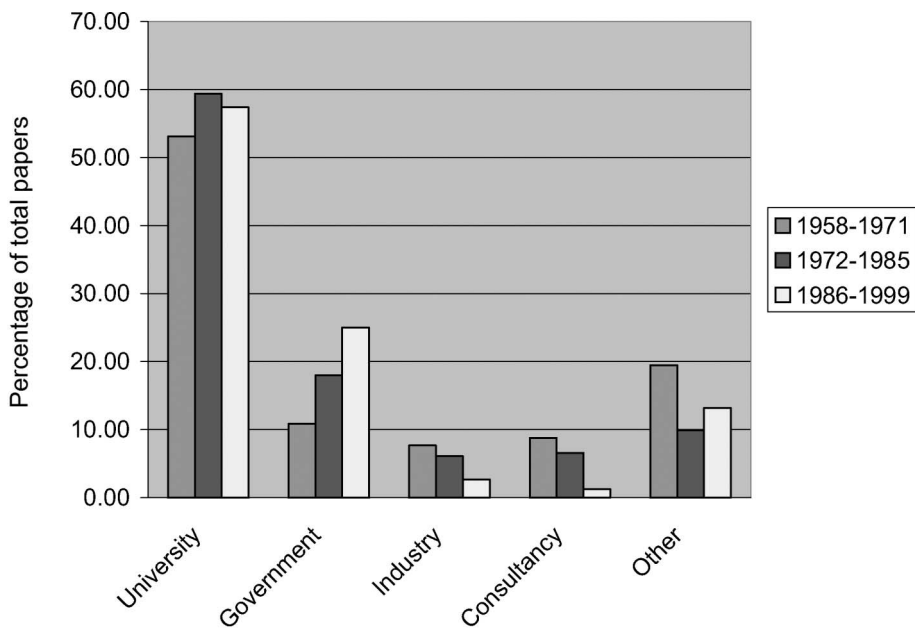
Figure 4. *Ergonomics* content analysis: Percentage number of papers falling into the category, Human characteristics (HC) – Psychology vs Physiology comparisons.

Papers in the category ‘Performance-related factors’ (covering: group factors – e.g. age, gender; individual differences – e.g. mental models, aptitude, physical fitness; task-related factors – e.g. mental workload, vigilance, task complexity; and psychophysiological factors – e.g. sleep, fatigue and nutrition) make up the second highest majority (20–25% of total) of the papers published in all of the three time periods. Similarly, the category ‘Environment’ (covering, for example – illumination, noise, whole body movement) makes up the second highest area published in both the first and second time periods in figure 3. However, it is significant to note that in the last time period, the category ‘Environment’ is relegated to fifth place in terms of most published subject areas (after ‘Health and safety’, ‘Work and equipment design’ and ‘Methods and techniques’). The growth of papers in health and safety during the last time period is in many respects what we would have expected given the changes to health and safety legislation and practice within the UK and elsewhere in the world during the 1970s and 1980s and hence materialize as research topics later on in these and subsequent decades. These trends also accord with changes to the membership bases of the ES (section 4.1.2), and the move toward a basis for ergonomics as a profession (of which health and safety is a staple area for consultancy, for example). It is also worthwhile taking note of the growth of papers published in the area of ‘Methods and techniques’ over the latter period of time.

A straightforward comparison between papers published in the areas of psychology and physiology is in reality difficult due to the fact that most of the categories overlap to a great extent and contain papers that are in one or both subject areas (e.g. papers in the category 'Information presentation and communication' often involve psychological investigation). Figure 4 represents a break down of the 'Human characteristics' category into papers in psychology and physiology.

Figure 4 shows that during the first time period, there were more papers published in the area of psychology as compared to physiology. In subsequent time periods this trend is reversed, physiological papers were published more in the second period, with a slight decline in this trend in the more recent period. We note that these findings should be treated with a degree of caution, not least because of the difficulties of carrying out the comparison as mentioned above.

4.4.2.3. *Types of institutions publishing papers.* The final content analysis examined trends in terms of the types of institutions that were represented in the papers published in the journal. Figure 5 shows the results of the analysis. The majority of papers published originate from academic institutions across all three time periods. This trend is



<i>Time period</i>	University	Government	Industry	Consultancy	Other
1958-1971	53.1	10.9	7.7	8.8	19.5
1972-1985	59.4	18.0	6.1	6.6	9.9
1986-1999	57.8	25.0	2.7	1.3	13.2

Figure 5. *Ergonomics* content analysis: Percentage number of papers – types of institutions publishing papers.

almost uniform across all of the three time periods with a slight rise during the middle period and a slight decline in the more recent period of time. The number of papers originating from government sources (e.g. research units, Defence establishments) has risen over time, whilst the number of papers from industry shows a decline over time. The number of papers from consultancies declines most steadily between the second and third periods of time.

These findings are similar to those of Meister (1996, 1999) in his analysis of US trends; however, they also differ in that more papers originated from industry and government relative to the universities earlier on as compared to in more recent times.

4.4.3. Summary of content analysis findings. The results from the content analysis are in many ways in agreement with the trends discussed in earlier sections of the paper. The spread of ergonomics and the growth of societies worldwide are reflected in the increased number of papers over time originating from outside the UK. This is especially the case in terms of papers from North America, Asia and Australasia. Likewise, changes to the core subject matter of ergonomics and expansion of research areas that are considered to be within the remit of ergonomics are reflected in the increase over time of the different types of papers that are published in the journal. In particular, the growth of papers in areas such as 'Workplace and equipment design', 'Health and safety' and 'Methods and techniques' are likely to be due to changes in the wider environment in which ergonomics takes place (e.g. changes to legislation, the growth of standards), as well as more theoretical and practical developments (e.g. new subjects such as 'Cognitive ergonomics' and 'Human-computer interaction', the need for purposefully designed methods in areas such as 'Task analysis' and 'Workload assessment').

Comparisons between the number of papers published in physiology as compared to those published in psychology show that physiological papers increase over time. On the face of it, this may support the claim that the journal has a distinct leaning toward physiology; however, this may be difficult to substantiate given the current analysis and the problems of dividing psychology/physiology into two discrete categories.¹⁶ Further comparisons between these two disciplines and their respective role within the early days of the ES are taken up later in section 4.7.1 of the paper.

Figure 5 demonstrates that the journal has consistently published work that originates mostly from within the universities. Work originating outside the universities is also represented; in particular, research from government agencies has increased over time. The emergence of other journals in which to publish practice-oriented papers (e.g. *Applied Ergonomics* and more recently *Ergonomics in Design*) might also explain the decline of papers originating from industry and the consultancies over time. We return to this theme in later sections of the paper as the balance between academia and industry is an important aspect of some of the changes that have taken place within the ES over time.

4.4.4. Other Ergonomics Society-related publications. Aside from the scientific journals and newsletters (e.g. *ERS News* from 1969, *The Ergonomist* in the 1990s) that are linked to the ES, there are also a number of other important publications that deserve to be mentioned in more detail. These include influential texts published by members of the Society, monographs and pamphlets that publicize ES activities, as well as audio-visual and web-based materials.

¹⁶However, we also note that one of the people we interviewed expressed the opinion that this was due to editorial bias (i.e. toward physiology)!

4.4.4.1. *Books.* One of the most influential texts published in the area of ergonomics is Hywel Murrell's (1965) *Ergonomics: Man in his Working Environment*. This book, by one of the most important figures in the history of the Society, was the standard text in the subject for many years and to this day is still widely cited and held in high regard. Before Murrell's text, few materials were available for students of the subject, or others wanting to find out more about research in ergonomics.¹⁷ Two other influential books published in the early 1950s were the texts jointly edited by W.F. Floyd and A.T. Welford (*Fatigue* – 1953, *Human Factors in Equipment Design* – 1954). Both books came about as the result of symposia organized on behalf of the ES and according to at least one source (Wisner 1972) did much to bring about unity within the newly formed subject of ergonomics.

Over the years the ES has also had a substantial role in supporting the publication of other books within ergonomics. For example, many of the meetings and collaborations listed in table 5 have resulted in edited proceedings (e.g. Sell and Shipley 1979, Stanton 1994). Moreover, the tradition of publishing influential texts authored or edited by prominent members of the ES continues to the present day, examples include texts by Pheasant (1996) and Wilson and Corlett (1995 and subsequent second and third editions). The proceedings of the annual conference of the ES (published in the series *Contemporary Ergonomics* from 1983 to the present) also provide an important source of up-to-date information on directions in ergonomics research and practice.

4.4.4.2. *Pamphlets and booklets.* The publications of pamphlets and other materials aimed at the general public has always been a key activity of the ES. Early examples include the ES pamphlet on the *Origins of Ergonomics* (1964), as well as the booklets published by the DSIR during the 1960s. The DSIR booklets, in particular, represent an important milestone in terms of attempts to apply research within industry. The 12 booklets covered a diverse range of topics including workspace layout, noise, inspection and instrumentation and were authored by many well-known figures in the ES (e.g. Singleton, Branton and Broadbent). The booklets also proved to be popular amongst the general public and were reprinted by the Ministry of Technology in the late 1960s (c.min 3/68), as well as being published in the journal *Applied Ergonomics* in 1969 and as a whole as the *Applied Ergonomics Handbook* (Shackel 1974, subsequently revised as Galer 1987). In more recent years the Society has published a range of pamphlets aimed at younger members (e.g. *A Creative Career in Ergonomics* and *Ergonomics Fit For Human Use* – 1984), as well as material for the general public.

4.4.4.3. *Audio-visual and web-based materials.* Over the years, a number of films have been made in order to promote the subject of ergonomics more widely (e.g. by the UK Health and Safety Executive (HSE)). One of the most important of these is the 1958 short film, *Fitting the Job to the Worker* (British Productivity Council 1958), which can perhaps claim to be the first piece of audio-visual material devoted to the subject of ergonomics. In more recent years the ES has benefited greatly by providing information on-line using its website (<http://www.ergonomics.org.uk>). The material available from the site provides information aimed at the general public on such topics as, *What is Ergonomics?*, as well as links to resources for schoolchildren (Ergonomics4Schools), alongside services aimed at ES members such as job vacancies.

¹⁷Within the UK at least, in the USA the Chapanis *et al.* (1949) text (*Applied Experimental Psychology*) was widely used.

4.5. Key individuals and institutions

Much of the success of the ES in the past, and to a great extent today, rests upon the activities of individuals who offer their services to the Society on a voluntary basis. Without the efforts of these individuals, the Society would never have started and would not be in existence today. In preparing this paper, we found that the names of some people cropped up regularly, in some cases this was in terms of the service they had provided to the ES, in others it related to the influence they had upon its development and direction of ergonomics in the UK. In this brief section we have decided to focus on a limited set of individuals and institutions from the past.¹⁸ In particular, we have opted to concentrate on only a few examples of the people and places mentioned in table 4. The extended bibliography section of the paper (Appendix A-1) provides further biographical details and background of individuals and institutions covered here.

By far the most prominent individual in the history of the ES is Hywel Murrell (1908–1984). Murrell's influence can be traced to virtually every aspect of the Society's development in the last 50 years. Aside from the fact that Murrell was the person who helped to define the word 'ergonomics', his influence extended to areas such as setting up the first industrial ergonomics unit that had the word in its title, as well as helping to establish the subject within the universities. Murrell's research work alone would be enough to justify the claim that he is amongst the most influential of the generation who formed the Society in the immediate period following the Second World War. Further details of Murrell's work are available in Murrell (1980b), Simpson (1984), Wallis (1984) and Stammers (2005).

Alongside the work of the other founder members of the Society,¹⁹ mention should also be made of the role of Alan Welford (1914–1995), and the part he played in setting up the journal *Ergonomics*. Welford also acted as the Society's first Chair of Council (Singleton 1995, 1997, Vickers 1995). The ES during its early and middle period history owes a great deal to the work of Welford, alongside such other illustrious names as Harry Maule, Joe Weiner, Otto Edholm, Paul Branton and many others. The combined efforts of these people helped to establish the subject within the UK and internationally. Needless to say, to this list could be added the names of many more perhaps less well-known figures who have contributed to the ES over the past 50 years.²⁰ In more recent years, the work of Stephen Pheasant (1949–1996) deserves mention, not least in terms of the contribution he made toward the education of future generations of ergonomists in his teaching at the Royal Free Hospital and University College, London (Buckle 1996). His name, and the names of many other prominent ergonomists from the past, lives on in the form of the annual awards, prizes and medals of the ES.²¹

A number of institutions can be singled out as playing a major role in the development of the Society and the subject matter of ergonomics in the last half century. These include

¹⁸Much more could be said of the role of the founding fathers, many of whom published important texts or were associated with other important publications in ergonomics. Likewise, space and other matters (see footnote 5) prevent us from going into details about the activities of living members of the Society.

¹⁹The full list of founder members is: Broadbent, Browne, Burns, Clements, Conrad, Darcus, Edholm, Floyd, Hick, Lovatt-Evans, Morant, Murch, Murrell, Renbourn, Ruffell-Smith, Stansfield, Taylor, Tideswell, Weiner, Welford and Whitney.

²⁰For example, Isabel Slade, the first female member of the Society (obituary, Murrell 1980a).

²¹The ES currently has 12 awards, prizes and medals, these include: ES Student Prize; Richard Clive Holman Memorial Award; Ulf Aberg Award; Hywel Murrell Award; Sir Frederic Bartlett Medal; President's Medal; Otto Edholm Medal; William Floyd Award; Paul Branton Award for meritorious service; Stephen Pheasant Memorial Award.

the pioneering work of the members of the MRC Applied Psychology Unit in Cambridge (Poulton 1964, Brown *et al.* 1970, Baddeley and May 1994); the work of the Human Sciences and Advanced Technology Research Institute (HUSAT) group at Loughborough; the industrial groups formed at EMI, BISRA and various defence establishments (e.g. Army Personnel Research Establishment (APRE)). A number of the people who were contacted during the preparation of the paper also wished to pay tribute to the contribution of the various university groups who were crucial in helping to establish educational ergonomics (e.g. Aston, Birmingham, Loughborough, University College London, Surrey and Nottingham amongst others).

We have only mentioned in passing a few people and institutions and it is well known that history is not simply a matter of prominent people or groups; however, it is enough to say that in the future a more lengthy account of the birth and subsequent development of ergonomics and its relationship to other applied work sciences deserves to examine these issues in more depth than we have in our account. Much remains to be said of how ergonomics developed out of the work of the interdisciplinary wartime committees (for example, Broadbent 1979, Bourke 2001).

4.6. Influence on government, industry and other bodies

The subject matter of ergonomics has a long history of involvement with government and industry, stretching back to times before the founding of the Society in 1949. Welford (1976), for example, describes how factory legislation and progress in industrial medicine and safety prior to, and during, World War II stimulated research within ergonomics. Much of this work was initiated under the auspices of bodies such as the MRC Industrial Fatigue and Industrial Health Research Boards. Laner (1961) also mentions that ergonomics had 'gained a foothold' within the British Iron and Steel Industry as early as 1946. In this section of the paper we examine in more detail three issues that are representative of the influence of the ES on government, industry and other bodies; these are: relations with government and industry; the influence of the ES within committees and inquiries; and the contribution the Society has made to legislation covering ergonomics standards and health and safety.

4.6.1. Relations with government and industry. It is quite clear that, in the early days of the Society, there was much enthusiasm and support from government and industry for the broad aims and research carried out by members of the ES. The annual symposium (with the title *The Scientific Study of Human Work in Industry*) held at Ashorne Hill in 1954, for example, was opened by the then Chief Inspector of Factories and was attended by almost 100 people, a third of whom were from industry (Edholm and Murrell 1973, p. 21). Likewise, the DSIR Conference on Ergonomics in Industry held in 1960 featured an opening address by Lord Hailsham (the then Minister for Science) and was attended by representatives from over 200 firms (Department of Scientific and Industrial Research 1961).

During the 1950s and early 1960s the Society enjoyed a good relationship with industry and did much to include industrialists in its activities. Members from industry were encouraged to join the editorial board of *Ergonomics* (c.min 2/57), and the Society received a great deal of support from DSIR in publicizing the subject and providing opportunities for meetings between ergonomists and industry. These developments ultimately led to the formation of the Industrial Section of the ES in the early 1960s (later to become the Industrial Committee in 1969 – c.min 5/69), the aim of which was to:

'provide a meeting ground for workers in industry, to disseminate information about ergonomic problems, to publicize ergonomics and to maintain official contacts with other organisations interested in industrial design and operation' (c.min 7/60). Moreover, membership of the Industrial Section was open to anyone and was not restricted to ES members. By 1962, roughly 17% of the total membership of the ES was drawn from industry (compared to 45% from the universities, 11% from military establishments and 10% from MRC units).

As one might expect, given the different viewpoints of academics and industrialists within the membership of the Society, there were also some difficulties and problems that cropped up during meetings involving both parties. A Council minute from 1958 mentions the 'need for a degree of self examination and self criticism of the possible role of ergonomics in industry' (c.min 10/58). Reports based upon the Oxford annual meeting (Rodger 1959), the Zürich conference (Fitting the Job to the Worker 1959) and the DSIR conference (1960) also show that there were at times many difficult interchanges between ES representatives and industry. In some cases, these concerned scepticism about the applicability of research findings (e.g. laboratory-based studies) within industry, in others it amounted to worries on the part of the trade unions that ergonomics might be seen to be about increasing production and not necessarily improvements to the health and safety of the worker (e.g. at the Zürich conference – c.min 4/59). On the whole, however, these problems were viewed by the ES as small compared to the more pressing need to train ergonomists so that they were prepared for work in industry (c.min 12/59).

To a large extent, the efforts that were put into training ergonomists for industry were successful (see also section 4.2). During the 1960s, a large number of ergonomists began to be employed in industry, whereas many of these ergonomists would have been working alongside work study practitioners in the 1950s, for example, they now found themselves working in separate departments devoted to ergonomics. The DSIR conference, for example, includes material written by ergonomists drawn from a diverse range of industrial contexts, including transport (the design of bus driving cabs for London Transport – Norman 1961), engineering (design and evaluation of production methods in Smiths Industries – Mann 1961) and the boot and shoe industry (sewing machine design – Singleton 1961). By 1968, a number of other important departments or industrial laboratories specializing in ergonomics had been set up; these include the group headed by Brian Shackel at EMI Ltd., and other groups at BISRA and Pilkington Ltd.

The 1970s brought about a number of problems in the relations between the ES and industry. Some of these problems were due to the impact of the worsening economic conditions during the decade and the subsequent closure, or scaling down, of established ergonomics departments within industry (e.g. EMI, British Steel). Within Council, there were many debates about worsening job opportunities for ergonomists, as well as the fact that when the companies had to make cuts they often targeted areas such as ergonomics first. Paul Branton summed up the feeling of many Council members in suggesting that many companies felt that ergonomics was not an 'essential part of their organisation' (c.min 11/78).

Although worsening economic conditions were, of course, beyond the control of the ES, there are also some indications that internal problems within the Society exacerbated the difficulties of maintaining and building upon the role of the ES within industry that had been established earlier. The mid-1970s, for example, was a period where the image and identity of the ES was debated on a number of occasions. These debates culminated in changes to the name of the Society and the dropping of the word 'Research' from the title. At the same time, there were problems in reconciling tensions between the academic

and practitioner communities within the ES. The schisms that existed within the ES at the time mainly centred around opinions, which on one side argued for the value of 'tough minded research' (*ERS News*, No. 63, September 1978), and on the other the need to move towards more practice-oriented orientation for the Society. Looking back, this period could be said to be one of the most difficult in the history of the Society and many of the debates that raged then continued on into the 1980s and arguably continue today. One of the outcomes was the disbanding of the Industrial Committee in 1979, one of the main reasons being the fact that a Practitioner Division had been set up and had largely taken over its functions.

By the time we reach the 1980s, it is clear that there had been many changes in the nature of the relationship of the ES with government and industry. It is difficult to explain exactly why these changes have come about; however, it is perhaps worthwhile highlighting three possible explanations. First, there would appear to have been less direct government support for ergonomics, for example, the support provided by DSIR in the 1950s and 1960s was not available in subsequent decades. Second, changes in the membership base of the Society meant that a larger proportion of people were working as consultants and practitioners outside of industry and fewer were working within industrial departments of ergonomics. Finally, the practice of ergonomics became more specialized, partly prompted by changes in legislation (e.g. changes to health and safety, consumer law) in the 1960s and 1970s, as well as changes to the nature of educational courses, which meant that it was increasingly difficult to have an all-round knowledge of all of the constituent parts of ergonomics as had been possible in previous generations. Some indication of the impact of these developments can be drawn by contrasting the popularity of ergonomics amongst industrialists in the early 1960s (as shown by the attendance at the DSIR conference) with the difficulties of attracting similar numbers of attendees at the 1977 Annual Conference Industry Day held at Aston University (c.min 6/77).

In more recent times, relationships with industry and government have become more focused on more specific issues, in the following sections we highlight the influence of the ES within committees and inquiries, as well as a subject that came to dominate developments in the 1970s and continues today, namely, the contribution of the ES towards ergonomics standards and health and safety.

4.6.2. Influence of the Ergonomics Society within committees and inquiries. One of the main ways in which the ES can be said to have had a direct route into government is through its membership of the Parliamentary Scientific Affairs Committee. The ES has a long history of involvement with this committee, stretching back to 1955 when Murrell, amongst others, acted as a representative of the Society. Membership of the committee has meant that many issues relevant to ergonomics have been drawn to the attention of the government. In addition, the ES has been able to comment on government proposals and policy items as well as making sure that ergonomics is included as part of future research and societal agendas. In more recent years, the president and past-president of the ES have served on the Committee in various roles, including that of acting as the Committee Vice-president.

During the 1990s the ES played a role in commenting on the various rounds of the Foresight programme (<http://www.foresight.gov.uk>). Foresight is a government initiative that aims to identify future opportunities and threats for science, engineering and technology. The programme began in 1994 and has so far involved two rounds. In the first (1994–1999) the aim was to identify future market and technological opportunities over a 20-year timescale. In the second round (1999–2002), smaller panels organized

around specific industrial and commercial sectors (e.g. defence and aerospace, agriculture) and themes (e.g. changes to the workforce) were asked to identify challenges and opportunities for the UK in these areas for the coming decades. The ES has played a role in both Foresight rounds, although it has been most active in the second round. During the first round there was a concern that ergonomics was not being included in the consideration of future developments and was being largely overlooked by members of the various Foresight committees (c.min 3/95, c.min 1/96). The ES has been more successful with the second round, partly due to the lobbying of Foresight members and arguing for the inclusion of ergonomics issues within the programme (Sell 2001). In particular, the ES has taken part in a number of panels centred around future social and technological developments, one example being the consideration of ergonomics issues as they apply to the ageing population of the UK (Department of Trade and Industry 2000).

The ES has also served on a number of other committees and provided input over the years to the Trades Union Council as well as other bodies, many of which were mentioned earlier in section 4.3.2 and table 5. One of the other ways in which it has played a role in influencing developments within government and society has been through evidence it has provided to various inquiries that have been conducted over the years. In some cases these inquiries have come about as the result of accidents and disasters (e.g. the Ladbroke Grove train accident – Cullen 2001), in others they have arisen as a result of requests from other bodies, for example, government in the form of public inquiries. One of the most influential cases in which the ES had a good deal of involvement was the public inquiry concerning the plans to build the Sizewell 'B' nuclear power station in the mid-1980s (Ergonomics Society 1984, Singleton 1990, Whitfield 1995), as well as general ergonomics input into its design and construction.

The Society's involvement with Sizewell 'B' began around 1982–83, when it was invited to submit evidence to the inquiry. In November 1982, the ES put forward a statement of case outlining a number of ergonomics issues relating to the design of the nuclear power station. In addition, the ES argued at the time that the Central Electricity Generating Board had not provided enough information that would allow a proper ergonomics assessment to be made of Sizewell 'B'. At that time, the ES pointed to the overall safety of the nuclear reactor, as well as issues relating to its operation (e.g. task allocation, job design, operator – plant interface), as areas in need of further investigation. During the 1980s there was a real worry that the lessons from the Three Mile Island incident in 1979 and the later Chernobyl (1986) nuclear disasters might be forgotten. After 2 years work, a report covering the ergonomics issues of Sizewell 'B' was produced by a working party especially devoted to the area (c.min 1/85), this was submitted to the inquiry alongside a final report that followed in 1987. Looking back on this period, the Society's involvement with Sizewell 'B' represents one of its most influential moments, particularly in terms of raising the profile of the subject and making a definite contribution towards the well-being of the general public.

In the next section, we examine in more depth two specific areas where the Society has played a large part in influencing legislation, both within the UK and internationally.

4.6.3. Contribution towards ergonomics standards and health and safety legislation. We have already seen (section 4.1.1.) that the growth in ergonomics standards throughout the 1970s and 1980s did much to encourage international relations between the ES and other federations and societies. However, there is evidence that standards had preoccupied the ES for a much longer time. During the early 1960s the BSI had been trying to involve the ES in forming new international standards (c.min 10/62). By 1962, the ES was already

serving on the BSI committee on standards in furniture and by 1967 there is increasing evidence that the Society was working closely with other bodies in the development of early versions of standards (c.min 11/67). Some of these standards (e.g. dial design)²² were based upon research work in the late 1950s and early 1960s and were eventually published in the latter half of that decade. By 1971, the Society had formal representation on other BSI committees and standards (c.min 11/71).

Although there was initially some concern that the ES had been excluded from decision-making with regard to international standards and representation on ISO committees (c.min 6/77), these problems gradually dissipated and the Society began to exert an influence, particularly within Europe. By 1995, for example, ES members were represented on a total of 36 national or international standards committees covering a wide range of issues from the design of agricultural equipment to control room ergonomics (c.min 1/95). Much of the activity in standards had been prompted by changes to health and safety legislation during the 1970s. In addition, developments within other areas of legislation (e.g. consumer law) and technology, in particular the growth of research and development in human-computer interaction during the 1980s, prompted further activity in standards (for further details concerning the growth of the ergonomics of user interface standards, see Stewart 2000).

Within the field of health and safety, the ES has over the years played, on the one hand, a major role in establishing ergonomics within government legislation and, on the other, it has provided a good deal of support to the government's HSE and Health and Safety Commission. Part of the involvement had been through the work of people such as Bill Tideswell, a founder member of the ES and a key player in research and application of findings to the safety and well-being of miners (e.g. studies of workload, the design of breathing apparatus for miners).

Most of the Society's more recent involvement dates from the early 1970s; for example, the ES held an important joint meeting with the British Occupational Hygiene Society and the Society of Occupational Medicine in 1970, at which Lord Robens gave the opening address (see Robens 1970). Lord Robens was later to head the review that ultimately led to the passing of the landmark Health and Safety at Work Act in 1974. Even though at this time there was a good deal of lobbying for the inclusion of ergonomics with the 1974 Act of Parliament, it turned out that very little explicit mention was actually made of ergonomics issues within the Act itself. Murray (1975) in his Society Lecture pointed to a number of explanations. In his view, one of the main reasons was that ergonomics falls between a number of different 'stools' (c.f. section 4.2), particularly in the area of occupational health, where disciplines such as industrial medicine and hygiene take priority alongside roles such as safety inspectors and trade union officials. None of these people is necessarily associated with ergonomics and, as a consequence, ergonomics issues may end up being either overlooked or in some cases ignored. It is certainly the case that many of the people interviewed during the preparation of this paper felt that the lack of inclusion of ergonomics in the 1974 Act was a significant 'missed opportunity' on the part of the Society.

In the late 1970s and 1980s, it is clear that the ES was more successful in influencing and stimulating links between ergonomics and health and safety. Aside from work on standards and inquiries, the ES has played a key role in helping to set up advisory groups linking the ES to other bodies such as HSE and the Health and Safety Commission, as

²²Simpson (1984), for example, points to Murrell's work on BS 6393 on dial design and describes it as 'arguably, still the British Standard which is most firmly based upon ergonomics research.' (p. 240). This work was ultimately based upon publications by Murrell (1951a,b, 1952a,b).

well as the trade unions and the Advisory and Conciliation Arbitration Service. In other cases, the Society has helped to run education courses (e.g. the courses run at Aston University for factory inspectors) or seminars in the area of the ergonomics of health and safety (the 1987 seminar held at the Robens Institute at University of Surrey on repetitive strain injury amongst supermarket cashiers). In addition, the ES has helped to promote health and safety through the writings of key individuals (e.g. Stephen Pheasant), as well as publishing booklets and pamphlets jointly with other bodies such as HSE.

In the last 10–15 years there has been a flurry of activity in the area of the ergonomics of health and safety. Part of this has been prompted by legislation such as the European ‘Six Pack’ regulations²³ covering issues such as manual handling, or regulations governing the use of visual display units. In all of these activities the ES has attempted to promote ergonomics, whether it be through the setting up of working groups for specific issues, workshops held at the annual conference or other activities jointly organized with HSE (e.g. the highly popular conference for recently qualified ergonomists held in the last few years in Sheffield). Whilst there have been some problems in the past in establishing ergonomics within health and safety, it is fair to say that many of these have been overcome in the last 10 years or so.

4.7. Image and identity

One of the main changes to the Society over the course of time has been the manner in which it has come to be regarded and the perceptions, internally and externally, that ergonomists and non-ergonomists have of the ES. Looking back over the past 50 years reveals that there have been some major changes to the external image of the ES, as well as changes to its internal identity. Some of this is, of course, to be expected, any learned society is bound to change over time, particularly in terms of its scope, coverage and application. However, it is perhaps true to say that within the ES debates about image and identities have taken particular prominence over time. One reason for this is the difficulty of defining the term ‘ergonomics’ itself and the various connotations the word has for different communities. Many of the changes that have shaped the image of the ES derive from its earliest days and we begin with these.

4.7.1. Early ‘schisms’: Psychologists and physiologists. The early history of the ES has been described elsewhere and in greater detail than fits the present focus and time period of this paper.²⁴ However, it is worth looking once more in detail at some aspects of the immediate period prior to 1960, since it provides some clues to the present state of the ES.

During the war, a number of interdisciplinary groups had been formed in order to carry out wartime work on military and civilian tasks. These groups existed in a variety of places including the Admiralty and the Applied Psychology Unit in Cambridge (Baddeley and May 1994). The work of these groups had proved highly effective and, in part, this was due to the unique opportunities that existed for groups of psychologists, engineers, physiologists and other specialists to work together on a common problem (Bourke

²³These regulations were introduced in 1993. The implemented EU health and safety directives meant to ensure that EU member states had the same standards to allow for fair competition between businesses working within the EU. The six areas covered by the regulations were: (i) Management of health and safety at work; (ii) Manual handling operations; (iii) Display screen equipment; (iv) Workplace (Health, safety and welfare); (v) Provision and use of work equipment; (vi) Personal protective equipment.

²⁴See, for example, Edholm and Murrell (1973) and the other historical materials listed in Appendix A-1, particularly the introduction section in Singleton (1982).

2001). One of the drivers for the formation of the ES (as well as other societies such as the Experimental Psychology Society – Mollon 1996) could therefore be seen as providing a forum where these groups could continue their collaboration and intellectual exchange (Welford 1976). The Society at this stage was more of a ‘society of like-minded individuals’ (Edholm and Murrell 1973), as compared to the formal and professionally oriented body we recognize today.

Several of the people contacted during the research for this paper mentioned that the early days of the Society were characterized to some extent by ‘schisms’ between groups that aligned themselves to psychology and physiology/anatomy (see also Murrell 1967).²⁵ These were reflected in such developments in the early days as the fact that there were two secretaries for the ES covering psychology and physiology (c.min 11/58). A Council paper from 1979 (c.min 11/79) also sheds some light on the atmosphere of the early days of the ES. The paper describes how during the 1950s there existed two strong interdisciplinary groups within the ES (psychologists and physiologists), alongside a much smaller number of anatomists, physicists and engineers. At the time, there was strong rivalry between these two groups and this was one reason why the office of Chair of Council of the ES took a while to come into effect (1954). Similarly, these various groups initially rejected the idea of a president for the ES, this took longer to come into effect and was eventually put in place in 1982.

As time went by, rivalry between different disciplines within ergonomics died down and the ES matured during the 1960s into a more homogenous body (Singleton 2001). However, it should also be noted that debates surrounding the core identity of the ES, and ergonomics in general, remain to this day. Much of the debate has moved on from concern about leanings toward one discipline or another or about the status of psychology or physiology within ergonomics. During the 1960s, for example, discussions centred on issues of how wide to extend the scope of the subject and how to manage the growing disparity that was perceived to exist between the research basis of ergonomics and its application in industry.

4.7.2. Ergonomics and ergonomists. ‘What the world needs is ergonomics not ergonomists’ (attributed to K.F.H. Murrell sometime in the 1950s).²⁶

‘Ergonomics is too important to be left to ergonomists’ (comment during an interview for the preparation of the paper – anonymous).

As is well known, the actual word ‘ergonomics’ came about due to the efforts of K.F.H. Murrell in the late 1940s to find a new name for what was to become the ES (Edholm and Murrell 1973). The word itself in fact had been coined earlier in the mid-19th century (Jastrzebowski 1857); however, it only came into use in the period following 1949. Murrell (1958a) gives four main reasons for choosing the word in preference to alternatives such as Human Engineering or Human Factors, these were:

²⁵It is interesting to note that similar ‘turf wars’ existed in the early days of the Human Factors and Ergonomics Society in the USA – see Meister (1999, Chapter 5).

²⁶The quote was made by one of the individuals contacted during the course of the preparation of this paper. Murrell makes a similar comment (which is worth quoting at length) in an article published in *ERS News*, 1970 (Murrell 1970): ‘One thing I am sure none of us had envisaged was the development of a professional ergonomist. We were, if you like, society oriented rather than individual oriented; in other words, we felt that ergonomics would provide a forum for the exchange of information between scientists rather than a body of knowledge which would require experts for its application . . . I feel that the chain of events which we had originated on July 8th 1949, had, and is still having, a very marked effect on work design so that man is now considered as important or even more important than the machine’.

1. There should be no implication that the area belongs to any one of the component disciplines or technologies;
2. It should be short in its root form, and different parts could readily be derived from it;
3. It should be defined from the outset and be unambiguous;
4. It should be usable in languages other than English; this made use of Greek and Latin roots obligatory (Murrell 1958a, p. 602)

It is clear from this description that the original intention behind the use of the word 'ergonomics' was to partly unify the ES during its early development and also to facilitate the spread of its use throughout the wider world. As was shown in section 4.1.1. above, the ES has played a great role in disseminating the subject matter of ergonomics, this view is reinforced by comments by Welford (1964) amongst others that the original role of the ES was to act as a 'communicating society'. Other accounts describe how the word was only accepted by the early ES members in the face of 'grave misgivings' (Welford 1976).²⁷ This may go some way toward an explanation for the fact that in early publications the word seems to have been infrequently used and may have taken a while to catch on (R. Stammers, personal communication).²⁸

During the 1960s the meaning of ergonomics and its core identity took on a slightly different emphasis and this in turn had implications for the ES and its operation. One of the ironies of the use of the term 'ergonomics' was that although many people felt the term was difficult to define accurately and was considered by many to be awkward and ugly (Welford 1976), its use and application began to be popular amongst industrialists. Rodger (1959), commenting on the tenth anniversary meeting held in Oxford, notes that the then Postmaster-General (Ernest Marples) considered the meaning of the word to be ambiguous and confusing; however, he goes on to say that: '... for ergonomics itself he [Marples] has nothing but praise. The General Post Office has used it for nine years... and that it could only be got out again by "positive action"' (Rodger 1959, p. 20).

The 1960 conference is interesting in that it could be said to be one of the first indications of a tension that was to dominate later decades, namely, the tension between the subject matter (then primarily academic and research-based) of ergonomics and its practical application (within industry and led by practitioners and others, either with or without some training in the subject). This is not to imply that the ES in its earliest days was avoiding contact with industry, in fact the contrary is the case (e.g. Murrell had set up the first ergonomics department in industry in 1952); however, the growing numbers of those practising ergonomics meant that the ES had to start to refocus its activities away from an exclusively academic basis and more towards the needs of applied workers. A Council paper from 1962 by P.T. Stone, for example, summarizes the situation at the time as it applied to criteria for membership of the ES:

At the beginning the Society was very loosely organised, mainly around the founder members... the concept of doing research was probably uppermost in their minds, as distinct from being a group of practical practitioners... the especial feature was that such a group did not represent any particular scientific speciality exclusively, it was not, and this is still true, a professional group in this sense.

(c.min 1962)

²⁷See also Lecoultre (1985) and Smith and Smith (2000, p. 85) for further discussion of the controversy and dissatisfaction surrounding the term 'ergonomics', this time within the IEA rather than the ES.

²⁸For example, Murrell's Admiralty reports (1951a,b), do not mention the word ergonomics.

By the early 1960s it was becoming clear that there were: 'growing differences between the aims of the founding members and those recent members and other organisations that have taken a recent interest in ergonomics' (c.min 6/62). It was also around this time that calls started to be heard for a separate group within the ES for practitioners. Membership of the ES had grown substantially during this period and most of the new members were drawn from industry. In addition, individuals from disciplines other than from the established psychology/physiology membership groups were beginning to join the ES (e.g. Occupational Hygiene, Architecture and Physiotherapy). This influx of individuals from other subject areas, combined with a growing student population who wished to join the ES, resulted, amongst other things, in changes to the membership structure and new grades such as Fellow, Associate and Student member. These changes brought about a greater flexibility in gaining membership to the ES and also marked a change of emphasis away from research exclusively and toward practice.

By the later 1960s, a number of other changes were beginning to be discussed within Council. First, there were proposals that the definition of ergonomics should be broadened out to explicitly include women (c.min 11/67) and should be more inclusive in general. Second, there was a perception that the ES needed to broaden its interests to cover areas such as job satisfaction and personnel selection. In combination, these changes appear to have come about partly through changes in society at large and also because of the expanding membership base and their needs and wishes. In 1969, the biggest indication that there needed to be changes to the identity and image of the ES came with the first proposals that the ES drop the word 'Research' from its title (c.min 7/69). Several discussions also took place within Council regarding the direction the ES should take; these included focusing upon the research basis of the subject as compared to adopting a more interdisciplinary approach to applied problems.

Debates concerning the identity of ergonomics and the manner in which this might impact upon the ES continued during the 1970s and 1980s, culminating in the dropping of research from the title in 1977.²⁹ Two ES lectures during the 1970s pick up on the theme of the identity of ergonomics, both emphasizing the value of its multidisciplinary nature. Wisner (1972), for example, discusses the problems involved in treating ergonomics as a homogeneous scientific discipline, as well as the moves away from pure research and towards application. Murray (1975) likewise pays tribute to the 'unique combination of anatomy, physiology, psychology and engineering applied to the principles of work design', he experienced at the EPA conference in 1957. Both lectures implicitly touch upon what could be said to be one of the most difficult, and sometime sensitive, issues facing the ES at that time and to a large extent today, namely, the virtues of a loose combination of the specialisms associated with ergonomics (i.e. a holistic perspective)³⁰ vs a more specific concentration upon particular knowledge and skills (i.e. specialization).

By the later 1970s the ES was approaching its 30th anniversary and this proved an opportunity to take stock on the progress of ergonomics and developments within the ES. Some of the discussions at the Seventh IEA Congress (Warsaw, 27–31 August, reported in *Ergonomics*, 1979, 22), for example, centred on the expansion of ergonomics and

²⁹Strictly speaking, 1976, the last Council minute to use the ERS title appeared in April of that year. The suggestion to drop 'Research' from the title of the Society is attributed to Albert Cherns, who put forward the view that government was unlikely to take seriously any society that had research as part of its name.

³⁰A similar adherence to the 'holistic' perspective is made by Goldsmith in an editorial in *Ergonomics* in 1983: 'The strength of ergonomics is that it does not consider the findings from one discipline to be an irrelevance to the conclusions drawn from another; it is the interaction between the disciplines that makes ergonomics.' (*Ergonomics*, 26, 213–214).

contrasts this with the more constrained subject matter of the discipline earlier on. Chapanis (1979) also points to the growth of ergonomics research into areas such as social planning and strategy, as well as the enlargement of the systems concept, which had become dominant in the late 1960s and early 1970s.

Donald Broadbent's Society Lecture (1979) draws a contrast between the Oxford meeting in the autumn of 1949 and the situation 30 years later. He identifies two main developments, which have helped to shape the development of ergonomics as a discipline and, likewise by implication, the identity and image of the ES. The first main development is that most of the research within ergonomics had shifted in the last 30 years away from the military and towards the universities, which had been established in the 1960s. However, he also argues that the growth of civilian research has not resulted in many theoretical advances within ergonomics, at least nothing to compare with those of wartime activity: 'Nothing comparable has been achieved in civilian life to match the personnel research committees which carried out ergonomic research for the armed services during the 1940s' (Broadbent 1979, p. 1277). Broadbent also mentions as a second major development, the move toward establishing ergonomics as an academic subject (at the time half the membership of the ES was made up of academics). Despite this trend, and the growth of training for ergonomists, there were fewer jobs for ergonomists within industry. During the late 1970s, for example, major groups such as the Human Factors group at British Steel and the National Institute of Industrial Psychology had been forced to close due to economic cutbacks. As a result of these changes to the employment prospects of ergonomists he goes on to say that:

The centre of gravity has shifted sharply and decisively towards the academic field . . . The development of ergonomics within the universities is of course very much to be welcomed; the worrying point is the lack of a similar and balanced development on the applied front. This may be another factor in slowing down the advance of the subject, and in slowing it intellectually as well as in terms of general impact.

(Broadbent 1979, p. 1278)

It is clear that at this time there was some concern that ergonomics was failing to have an impact within industry and wider society in general. At the same time there was a trend toward widening the boundaries of the subject. This trend can be seen in the modifications that have been made to the definition of the subject (table 6).

What is clear from table 6 is that the subject matter of ergonomics has moved away over time from an exclusive focus upon a straightforward division between physiology or anatomy on the one hand and psychology on the other. Similarly, the more recent definitions share a concern with systems thinking, macro-ergonomics (Hendrick 1991) and the socio-technical nature of work settings. These developments might be taken to indicate that the subject has, to some extent, achieved a degree of unity. Whilst this may be true up to a point, it is still a matter of debate as to the degree of unity between all of the various components of ergonomics. As we have already mentioned, some people argue that it is a lack of unity that gives ergonomics its strength.

To some extent, debates about the core identity of ergonomics, and the balance between applied and theoretical approaches, may seem out of place in a paper describing the development of the ES. However, it is clear that the identity of the subject has had great implications for the ES over time, not least in terms of debates that have regularly occurred in the past and continue to occur within the ES. For example, discussions regarding the core content and identity of the subject have had an impact on the decisions

Table 6. Definitions of ergonomics.

<p>‘The study of the relation between man and the environment in which he works, particularly the application of anatomical, physiological and psychological knowledge to problems arising from it.’ (1949 definition)</p> <p>‘the application of the human biological sciences in conjunction with the engineering sciences to achieve the optimum mutual adjustment of man and his work, the benefits being measured in terms of human efficiency and well-being.’ (International Labour Organisation definition, cited in Currie 1959)</p> <p>‘the study of the relation of the worker and the environment in which he works, particularly the application of anatomical, physiological and psychological problems therefrom.’ (Definition given by ES Council following request from British Standards Institution, c.min 11/67)</p> <p>‘A science of design (the three important targets being) to improve safety, productivity and operator satisfaction.’ (Helander 1997)</p> <p>‘study of efficiency of persons in their working environment.’ (Concise Oxford English Dictionary 1982)</p> <p>‘Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.’ (International Ergonomics Association definition, Marshall 2000)</p> <p>‘Ergonomics is the theoretical and fundamental understanding of human behaviour and performance in purposeful sociotechnical systems, and the application of that understanding to the design of interactions in the context of real settings.’ (Wilson 2000)</p>
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about the content of ergonomics curricula (e.g. CREE). In other cases, the ambiguity of whether ergonomics research within the universities should be assessed by psychologists or physiologists has caused difficulties in recent activities such as the RAEs of the 1990s.

The identity of the ES remains a thorny problem today. The nature of this problem has taken different forms in the history of the ES. In the early days, it mainly concerned the tension between research and practice. Later, it moved onto concerns that ergonomics should have more impact within industry and commerce. This is also reflected in the move towards mentioning ‘the ergonomics profession’ and ‘application’ within more recent definitions of the subject (see table 6). This is not to imply that these have not always been concerns for ergonomics and the ES; however, it does seem to reflect a shift in emphasis and coverage. One of the main issues that remains unresolved is the tension between theory and practice, as illustrated by the quote from Murrell at the beginning of this section of the paper. In the next section we examine this in more detail.

4.7.3. Later ‘schisms’: Steps toward professionalization. In section 4.1.2., we noted that during the 1960s there was a significant growth in the number of ES members who were practising ergonomics and that there was a shift in the membership base away from academic research towards application. This trend continued to gather pace throughout the subsequent decades. The 2002 ES Directory of Registered Ergonomics Consultancies, for example, lists some 56 consultancies involved in a variety of ergonomics activities spanning 14 competence areas including manual handling, office ergonomics, product design and risk assessment. Even without the benefit of more systematic figures for the period 1960–1990,³¹ it is clear that there has been a huge expansion in the number of people involved in the practical application of ergonomics. Whilst this state of affairs is one indication of the success of the ES, it also should be recognized that discussions

³¹The Professional Register was only introduced in the early 1990s; however, data such as the number of affiliated organizations having membership of the ES available in membership lists (e.g. in *Ergonomics* during the 1960s) and in Society records gives some indication of growth.

about the relationship between practice and theory have proved to be problematic, and sometimes heated, within the ES.

As long ago as 1960, there were proposals made within Council for a register of consultants to be set up in order to: '... ensure that Industry received help from those best qualified to give it... and to help protect the name of the ES and avoid abuses of the word "ergonomics"...' (c.min 3/60).

Similar proposals, such as a separate division for practitioners, were made in 1962 and at other times during the mid-1960s. By the mid- to late 1960s it is clear that a number of institutions, which were either funded by the research councils (e.g. MRC Applied Psychology Unit) or industry (e.g. EMI, BISRA), employed a large number of practising ergonomists. As time went by, these groups were joined by independent consultants, and pressure begun to be put upon the ES to represent their needs. Discussions took place in 1969 within Council about the identity of the ES and whether it should focus its image to the outside world upon 'problem oriented' research, or the application of the findings from research (c.min 7/69). Likewise, at the end of 1971 (c.min 11/71), there were worries that the ES was not moving fast enough towards establishing itself as a professional body. The dilemma facing the ES can be summed up by a quote from one of the sub-committees set up to examine Society rules in 1972, which illustrates its ambivalent role at the time: '... [the ES is on one hand] a learned Society [contrasting with] one in which it is becoming involved in professional problems' (c.min 9/72).

Throughout much of the early 1970s there were many calls for a professional division or section of the ES to be set up. The Society newsletter, *ERS News*, from September 1975 (No. 68) mentions that there was considerable debate about the role and status of practitioners within the ES. Letters written by two prominent members of the ES epitomize the debates that took place about the status of theory and practice within ergonomics and the ES at the time. One letter argues the case for 'tough minded research', whilst the other discusses the problems involved in transferring results from academia into industry. Similar discussions took place within Council at the time (c.min 11/75). It is also worth noting that, at the same time these discussions were taking place, the UK was entering into a period of economic recession, one outcome being the worsening employment possibilities for ergonomists (c.min 11/78).

Eventually, steps were taken to make better provision for the growing number of practitioners. In particular, a division for practitioners was set up in the early 1980s and a register was begun in 1983–84 (ES Annual Report 1984). There is also quite a lot of evidence that the ES was trying very hard at this time to involve practitioners in the Society, for example, a working party was set up in 1984 to deal with requirements for the training and development of practitioners. However, it is also clear from documents and conversations with ES members that, at that time, the term 'schism' was starting to be used again, this time to describe problems reconciling the academic and practitioner wings of the Society. For example, an Academic Division had been constituted at the same time as the Practitioner Division and this was causing some concern in the mid-1980s. The PAB was formed in 1984 with the remit to: '... promote high standards of professional conduct in the application of ergonomics, within the UK and elsewhere, to the advantage of those seeking the services of members of the Society' (Statement about PAB in Harvey 2002).

However, despite these developments, and possibly as a consequence of them, there appears to have been considerable disquiet within the ES about the relationship between members from academia and practice, as well as the implications this had for the identity of the Society:

After considerable discussion the members concluded that, within the present structure of the Society, an academic body is needed to maintain the balance of interests, but were apprehensive that creation of an academic division might lead to further unhealthy schism within the ES.

(c.min 10/84)

Problems with the Practitioner Division in the later 1980s were highlighted by a survey of its members in 1986, which showed that two-thirds wanted fundamental changes to its role, function and operation (c.min 1/86). These sorts of criticisms eventually resulted in more power being given over to the PAB, the overall outcome being that things appeared to quieten down for a while during this time. However, some indication of the lingering dissatisfaction amongst consultants in ergonomics can be found in the problems that came about by the formation of the Association of Professional Ergonomics Consultancies in 1992 (c.min 11/92). The Association of Professional Ergonomics Consultancies was set up to try and maintain appropriate standards for consultancy in the subject, as well as to counter what was perceived as the danger of 'cowboy' consultancies.

Many of these problems, and how they relate to theory/practice distinctions, have been overcome in the last few years; however, there still remain many challenges in reconciling this particular aspect of the identity of the ES. The 1997 minutes from Council, for example, record that the ES was seen as not doing enough for practising ergonomists and their needs, in presenting a viable business case to industrialists.³² Likewise, a survey of the membership carried out in 1996 concluded that the image of the ES was primarily of an academic body. These debates still dominate today, although it is equally true that, in recent years, the ES has taken a number of steps towards reconciling these and other problems associated with theory and practice.

One of the most central issues that has yet to be reconciled is centred around the attempts that have been made to gain a Royal Charter for the ES. Discussions about the importance of Chartership seem to have first taken place in the early to mid-1960s.³³ The next clear mention of the issue appears in Council minutes in 1975 when it notes that the ES expected to gain a Charter within 3 years. After this time, the issue of Chartership appears regularly within the minutes for the remaining years of the 1970s, culminating in a full-scale petition document (Cooke 1980). It appears that in 1984, a petition letter was sent to the Privy Council (c.min 3/84) and over 10 years later further discussions were held in Council regarding the difficulties and expense involved in petitioning for a Charter (c.min 5/95). It is certain that there are many advantages from gaining a Royal Charter, not least in terms of the status and prestige that would be conferred on the ES. However, problems such as proving that the Society is an homogeneous body (i.e. its distinctiveness from other groups such as the BOHS and the British Psychological Society), the laying down of strict guidelines for entry qualifications, as well as the expense involved, have so far proved to be a considerable barrier to Chartership. Nevertheless, there are some signs that the ES is getting closer, albeit that the prospect of full Chartership seems once again to be some time away (Galley 2002).³⁴

³²Norman (1996) makes some similar comments in relation to the Human Factors and Ergonomics Society in the USA.

³³Based upon the comments of one of the people interviewed during preparation for the paper. These discussions may have been prompted by the granting of Royal Chartership to the British Psychological Society in 1965.

³⁴At the time of writing, it appears that there may be a possibility that the ES could obtain institutional chartership, rather than full Chartership, which would cover individual members of the Society.

5. Summary and challenges for the future

It is clear from our account of the history of the ES that the Society has gone through some major changes over the course of the last 50 years. On the face of it, this is not surprising, particularly given the developments that have taken place within industry, academia and the wider world since 1949. In other cases, there are a number of paradoxes and issues that are difficult to explain, even with the benefit of hindsight. In this section, we summarize and discuss the main developments and recurrent themes mentioned in the paper. We first draw attention to the achievements of the Society before moving on to discuss what is perhaps one of the most fundamental issues in the history, namely, changes to the image and identity of the ES over time. A final section of the paper discusses some of the paradoxes and outstanding challenges that face the Society in the future.

5.1. *The Society's achievements*

Throughout the account we have given of the history, there are numerous examples of the exemplary contribution the Society has made toward ergonomics in all of its forms (i.e. theoretical, practical, educational etc). The fact that ergonomics exists as a worldwide activity (see Appendix A-2 for details of other worldwide societies) can be attributed in no small part to the efforts of the ES and the work of its founders and other subsequent figures within the Society. A Council paper from 1991 that outlined the Society's strengths pointed to the worldwide reputation of the ES as something to be particularly proud of:

The Society has almost 1000 members distributed widely across the UK and 27 other countries. With the exception of the Human Factors Society, it is the largest grouping of ergonomists in the world . . . The Society has provided a model for the development of other societies overseas.

(c.min 7/91)

The paper goes on to pay tribute to the contribution made by members of the ES, as well as the various staff who are employed by the Society:

There is a large amount of goodwill and enthusiasm amongst the active members of committees and Council. These people are prepared to give their time voluntarily with little personal benefit. [In addition] . . . the Society has loyal and effective permanent staff.

Some indication of the debt that the Society owes to its members can be seen from the efforts that were made to ensure that the 50th anniversary celebrations proved to be a success. The amount of voluntary work and, moreover, the enthusiasm and professionalism of the people involved in organizing events, writing material or engaging in other activities is a lasting tribute to the goodwill and self-sacrifice of the members of the ES. This type of behaviour runs throughout the history of the Society and continues today, despite the many other pressures placed upon members. The success of regional groups spread throughout the UK, for example, shows that at its grass roots the ES is still vibrant and very much alive (Horberry and May 1999).³⁵

³⁵Regional groups have also contributed a great deal to the Society in terms of bringing non-ES members into contact with the subject of ergonomics as well as the Society itself.

An additional indication of the success of the ES can be seen in the way in which the term 'ergonomics' has passed into everyday usage and has gained a degree of currency amongst the general public. Although there are many cases where the term is abused and/or misconstrued, there are also many other cases that demonstrate that the public at large understand the value of ergonomics and its role within such diverse areas as health and safety and product design. Much of the credit for publicizing ergonomics and raising its profile should be attributed to the Society and the many efforts it has made over the years to publicize ergonomics.

Finally, as other sections of the paper have shown (e.g. section 4.6.1) ergonomics is an intrinsic part of a wide range of industries and application contexts. In the earlier times, what might be called proto-ergonomics (c.f. Monod 2000) was involved mainly with the military. As the subject began to be established during the 1950s, it gradually became associated with the manufacturing industry. Finally, in the 1960s and 1970s, ergonomics became part of consumer design and other aspects of the home. Similarly, during this period, ergonomics became associated with health and safety and standards, both of these developments helped to ensure that today there is hardly any industrial sector or aspect of everyday life, which involves design in some form or other, that does not encounter ergonomics consideration. These developments over the years are due in part to the efforts of members of the ES.

At the same time that ergonomics spread out into different industries and become more widely known in the public sphere, there have also been developments and changes to the image and identity of the ES. Much of this was covered in section 4.7; however, it is worthwhile focusing briefly on changes to the image and identity over time, since this issue offers some clues to the successes of the ES, as well as its outstanding problems.

5.2. Changes to the image and identity of the Society over time

Table 7 represents the four main time periods in the development of the ES since its beginnings in 1949. For each of these time periods, we suggest that there was a dominant image or identity, or set of images and identities, which could be used to characterize the Society.

During the early 1950s for example, the ES could be said to have been primarily a research body, this is reflected in the many references of the time to the ES as a 'learned society'. Twenty or so years later, in the late 1960s, the image and identity can be seen to have changed. By 1969, the ES has moved more toward becoming a professional society, whose membership spans both academics and practitioners. Finally, if we move to the recent present, we find that the ES has matured into a professional body where although a sizeable proportion of the membership is drawn from the universities, much of the ES is made up of members from industry and consultancy.³⁶ The point to note here is that although the dominant image or identity of the ES may alter over each time period, parts remain in place over time. For example, the ES is still regarded as a 'learned society' (its earliest image/identity), and 'educating body' (something it took on in the 1960s), as well as a 'professional body' (the most recent image/identity).

On the face of it, these various images and identities, and their co-existence in the present day ES, would seem not to be too much of a problem. After all, many other societies (e.g. the British Psychological Society) have gone through similar transitions and transformations. However, one of the main problems faced by the ES is that the subject matter of ergonomics has been similarly ambiguous throughout its history. We have seen,

³⁶For example, the majority of present day members of Council are drawn from practice.

Table 7. Changes to the image and identity of the Ergonomics Society (ES) over time.

Time period	Images and identities	Notes
Wartime (1939–45) Pre-formation of ES	‘Backroom’ personnel	Groups based at various locations engaged in wartime research and development (e.g. Admiralty, APU, Cambridge)
Late 1940s–early 1950s (Formation of ES)	‘Society of like minded individuals’	The Society was a small interest group made up of the groups and individuals associated with wartime applied psychology, physiology, medicine etc.
1949	‘Founding Fathers’ and birth of ergonomics	K.F.H. Murrell <i>et al.</i> (list of founding fathers)
Early 1950s	ES as a ‘communicating society’ between the disciplines Early schisms ES as a research body	Welford (1964) Splits and divisions in the ES Main emphasis upon research and experimentation as a means of tackling applied problems
End of the 1950s	Academic emphasis ‘Learned society’	Two most dominant images
Early 1960s	An ‘interface’ with the public and industry ‘Engineering discipline’ ‘Educating body’ Supporter of ergonomists working industry (as well as other groups such as work study practitioners) ES still has emphasis on research Academic emphasis with some support (albeit at this stage limited) for practitioners ‘Learned society’	Growth of standards and increasing links with industrial bodies Data and guidelines for engineers First university courses in ergonomics set up More jobs in industry become available for ergonomists But also increasing pressure from those practising ergonomics outside of academia Image and identity starts to become more complex
Late 1960s–1970s	Links with consumer bodies and widening out of ergonomics concerns ‘Consultative body’ Steps towards becoming a professional body Movement away from a focus upon research in isolation Schisms between academic and practitioner divisions in the ES Breadth of the subject increases Academic and semi-professional body ‘Learned society’	‘Quality of working life’ Providing government with advice and consultation (e.g. 1974 Health and Safety Act) Chartership becomes a priority Dropping of ‘Research’ in the Society’s name Problems about the identity of the ES. Concern that it should do more to meet the needs of consultants and practitioners ‘Holistic’ approaches still dominant, also increase in specialism Two identities become more closely associated

(continued)

Table 7. (Continued).

Time period	Images and identities	Notes
1980s–1999	Grandparent of the federation of Ergonomics Societies	ES occupies important role within IEA and contributes to discussions regarding education (e.g. CREE) and overall direction of the subject
	Professional body	Start of formal bodies such as PAB Register of consultancies MergS membership category Further steps towards gaining Chartership
	Academic and professional body 'Learned society'	More stability in threefold identity, but still some disquiet about the role of the Society

IEA = International Ergonomics Association; CREE = Council for the Registration of European Ergonomists; PAB = Professional Affairs Board; MergS = Member of the Ergonomics Society.

for example, that different viewpoints exist concerning the nature of the discipline (e.g. specialized *vs* holistic), as well as different emphases in terms of the core competences required of ergonomists (section 4.2), and changes to the definition of the subject itself (table 6). One of the main consequences of this is that the core image and identity of both the discipline of ergonomics and the ES is very much a 'moving target'.

A phrase that recurs throughout the history of the ES is that many of its activities 'fall between two or more stools' (sections 4.2.3, 4.6.3; Bonjer 1971). In one sense this can be interpreted as the fact that ergonomics is made up of many disciplines and this causes problems, for example, in terms of funding from research councils. In another sense, it also refers to the fact, as one of our interviewees put it, that the ES: 'Faces in at least two, if not three different directions – it is an academic body, primarily a learned society or a society for professionals'. One of the consequences of what might be called the 'split personality' status of the Society is that it is difficult to present a coherent case for the uniqueness of the ES, for example, in such matters as applications for Chartership status. During the 1990s one of the most frequent statements in the various Council minutes, some of which were based upon membership surveys,³⁷ was that the Society needed to make up its mind regarding its fundamental aims, its strategy and direction, as well as to whom these activities should be targeted. Changes to the image and identity of the ES, we would argue, as others have similarly done for the subject as a whole (e.g. Vitalis *et al.* 2001), represent the most important aspect of the history of the subject, particularly since they have so many consequences for the day-to-day operation of the ES, as well as its future conduct.

5.3. Paradoxes and outstanding challenges

During the course of writing our account of the ES, it became clear that one of the main paradoxes we came up against is that although there is ample evidence of the involvement of the members of the ES in all of the spheres in which ergonomics takes centre stage, there is also a great deal of activity from individuals and groups who are not members of the ES. For example, the recent inquiry into the Ladbroke Grove train disaster (Cullen 2001) involved a considerable amount of input from ergonomists who are active in research and practice. However, the majority of the experts who gave evidence at the

³⁷E.g. the 1996 survey of members ('How are we doing?', April 1996).

inquiry were not members of the ES. Although the Society did comment on the ergonomics aspects of the disaster (e.g. by writing letters to the press), their involvement was actually minimal. Much the same conclusions can be drawn for other activities (e.g. ergonomics in industry, health and safety). Although the ES has played a key part within the UK in establishing and maintaining ergonomics in all its forms, much activity that goes on in the world of ergonomics, at least in the UK, operates outside of the ES. A key challenge for the future is thus to reclaim some of this ground and to make sure that the ES is at the centre of ergonomics research and practice, rather than on the margins.

The nature of any society that has established itself over many years is that there will always be a list of outstanding challenges for the future. We have touched upon some of the most important (e.g. the need for a consistent image/identity) but, needless to say, there are many more. Many of these have been mentioned before by other authors (e.g. Wilson 1996); these include the challenge of moving away from a volunteer culture and the overwhelming need to increase the size of the Society, which remains modest in comparison to others. As a final thought, we would suggest that the biggest need is for the Society to work out what it is actually for, rather than to take its existence for granted. There exists an enormous amount to be proud of and we would suggest that future members of Council and other prominent members of the ES adopt, or at least take some inspiration from, the pioneering spirit of the founding members of the Society when facing future challenges. There exist many opportunities to develop the Society in the next 50 years and, needless to say, much remains to be built upon. Hopefully, the achievements we have described will provide future generations with some basis from which to go forward.

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Appendix A: Extended bibliography³⁸

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