The Flaming Torch
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Presidential Foreword

You may think that *The Flaming Torch* is a strange title for a book about the accountancy profession, yet it is one which we believe to be particularly appropriate. It comes from a book by David Kock *The Flaming Torch of Italian Bookkeeping* which was published in Amsterdam in 1658. A copy is held in the National Library of Scotland as part of the Antiquarian Book Collection of The Institute of Chartered Accountants of Scotland. Why, though, have we chosen to use it again here?

First, the publication of this book coincides with the holding in Edinburgh of the Institute’s second Festival of Accounting. The Festival is being held in 1994 to coincide with the 500th anniversary of the publication of Luca Pacioli’s treatise *Summa de Arithmetica, Geometria, Proportioni and Proportionalita* which included the first printed description of double-entry bookkeeping – the flaming torch of Italian bookkeeping to which Kock’s title refers.

Second, the flaming torch image used by Kock over three centuries ago holds true today. Double-entry bookkeeping is still the fundamental accounting technology used to record and shed light on complex business transactions. However, the flaming torch image also serves to remind us that flames can flicker and go out if not tended. As accountants, we should have an understanding of the history of our profession and of the challenges which face us today so that we can prepare ourselves better for the twenty-first century. The Festival therefore reflects on developments in accounting since Pacioli’s time and looks ahead to challenges to the profession posed by developments in information technology.

Last but not least, our plans for this book and for the Festival of Accounting 1994 have been prepared with help from our friends and colleagues in the Nederlands Instituut van Registeraccountants. The Edinburgh/Amsterdam link through Kock’s book reflects the close bonds which exist between our two Institutes.

This book has three chapters, each by a different author. Franz Volmer describes Pacioli’s life and work. Then Stephen Walker takes us through highlights from the history of the accountancy profession. In the final chapter, Fenton Robb reviews aspects of the interaction between information technology and the accountancy profession. I would like to thank the authors for all their efforts and for giving us a book which is interesting and thought-provoking. The views expressed are, of course, their own. I would also like to thank the National Library of Scotland for
providing photos of pages of *Summa* and Ernst & Young for sponsoring publication of the book.

Our profession's standing is a direct reflection of its relevance to the community we serve. Our skills must constantly evolve so that they remain relevant and I am confident that this Institute which, having been founded in 1854, is the oldest professional accountancy institute in the world today, will continue to take a leading role in this evolutionary process.

Nigel C L Macdonald  
*President*
Introduction

by Ernst & Young

It is perhaps typical of the Renaissance period that the first exposition of double-entry bookkeeping should have come, not from a bookkeeper or even a mathematician, but from a philosopher and friend of Leonardo da Vinci. Pacioli was the archetypal Renaissance man, whose passion for inquiry spanned mathematics, science and architecture, just as Leonardo da Vinci’s led him to design crossbows and flying machines and to dissect corpses to better his understanding of anatomy. The specialised approach of individual discipline did not deter them from pursuit of their wide-ranging interests: their challenge was to understand the uniting principles underlying life’s diversity.

Today, with our vast and constantly growing body of knowledge, it is almost impossible for us as individuals to be actively involved in fields which range across such a broad spectrum. Yet it is interesting to reflect that an important role in uniting us with just some of this diversity is played by the professional. For the professional’s fundamental functions are to make the knowledge and practice which constitute his discipline available to others, and to interpret and use them to each client’s best advantage. The lawyer provides access to the forces of law, the doctor to health through everything that modern medicine has to offer, the priest to spiritual growth; and the accountant is there to make sense of the world of business. There are many areas of our work as accountants in which we interpret and evaluate the financial status of commercial activities for the benefit of others – the individual shareholder, the creditor, the government, the public interest.

There is also a second way in which the accountant serves to unite the varied elements of our world, and that is between theoretical knowledge and its practical application – between, on the one hand, accounting practices, the law, regulatory requirements and professional ethics and, on the other, the day-to-day running of the businesses and other organisations we serve. It is our responsibility to know what is mandatory, what is possible and what is advisable in the circumstances, and to be able to apply that knowledge in the light of our experience and professional judgment to the unique challenges of each situation. This is true not only of accountants
who are employed in industry, commerce and the public sector, but particularly of those in public practice. Working with a wide range of organisations, their skills are constantly being honed in different situations, and they can apply their accumulated wisdom for the benefit of them all. It is this role as a financial and business adviser and solver of clients’ problems that has led to our firm’s growth in an ever-widening range of services covering areas such as information systems, management accounting, organisational structures, raising capital, taxation and a range of further services, as well as in audit.

The connections between different areas of professional knowledge and experience are fascinating, and it is because of this that Ernst & Young is pleased to sponsor this publication. It is appropriate, too, that a book which looks at the place of accounting in history and in society should be published by – and focus on – the first professional accountancy institute in the world, The Institute of Chartered Accountants of Scotland.

In the early years of the Institute, of course, the function of the accountant as auditor and company doctor was dominant. The common bond with the practising accountant of today was the ability and need to stand outside the organisation in order to be able to assess it objectively for the benefit of those with an interest, as creditor or as investor, in its soundness and performance. In an economy which is highly dependent on the effective operation of capital markets, this audit role is an essential function; thus the accountancy profession is strongest in those economies with the most significant capital markets.

However, this does not mean that the accountant merely applies rules and standards set by an external legislature. On the contrary, our close involvement in all levels of activity – from the minutiae of individual stock items and invoices, to the high-level judgments as to whether accounts present a ‘true and fair’ view and to forward-looking assessments of future viability – gives us a unique understanding of the measurements that can be made of business activity. It also leads us to be actively involved in the debate among accountants from all parts of the profession, which seeks to ensure that the measures used by companies are meaningful and valuable to their users. It is therefore not surprising that it is the accountancy profession which has been primarily responsible for the dramatic improvements in standards of financial reporting which have been made over the last twenty years.

A consequence of these improvements has been that it has become an important part of our role to help our clients understand how they are affected and deal with the changes efficiently. Thus we not only explain and discuss the changes and their implications with them individually, but we also provide explanatory books, seminars, training and advice, or do the work for the client if that is what is required. Books such as Ernst &
Young's comprehensive *UK GAAP* and our fully updated edition of the Companies Act with its extensive index have been welcomed by companies across the country for the invaluable guidance they provide. As we noted earlier, this assistance with external reporting is today only one of the ways in which practising accountants help their clients. In the modern business environment, the need for companies to keep constantly in touch with both market demands and their own performance means that internal reporting of various kinds is also crucial. This had its origins in the birth of management accounting in the USA after the First World War, and its spread to Europe after World War Two has been instrumental in giving our businesses the ability to analyse and monitor their performance and productivity and thus improve their competitiveness. However, it was the arrival and development of information technology which created a quantum leap in the value of internal reporting. The ability to process vast quantities of data at lightning speed, to recombine information in whatever form is required, to disseminate it in different forms to different users, and to utilise directly information from suppliers, customers and points of sale - these have provided the ability to monitor constantly every aspect of what the organisation is doing, to analyse it in different ways, and to ascertain whether it can be done more competitively. As a result, many businesses have been able to make substantial gains in efficiency and productivity through changing the way they operate - for example, through matching inventories to demand, reducing stocks, moving to 'just in time' production scheduling, and even to completely automatic production of customers' requirements. We at Ernst & Young have been active in helping our clients harness these new techniques successfully, over and over again. Perhaps the major current challenge in internal reporting is to move beyond financial and production targets and measures and find ways of assessing how far a business is successful in meeting its longer-term goals. In recent years it has become far more common for companies' goals to include not just financial objectives such as profitability or earnings per share, but also non-financial objectives concerning dimensions such as quality, customer satisfaction or reputation. Assessing progress towards such goals will necessitate non-financial as well as financial measurements, and much work is being done (by the Scottish Institute amongst others) to establish ways of producing meaningful measurements of such aspects. This shift in emphasis implies that the role of the accountant will expand as such measures come into use - and this highlights the importance of our profession in being actively involved in formulating these developments. An important part of our work in future will be helping each of our clients to identify the measures - both financial and non-financial - which are most appropriate and valuable to them. It is extremely important that their choice
is well-founded, as it will determine the business’ focus in the short and medium term. Once the measures are in place, our role will extend to helping to ensure that our clients’ interpretation of the results is valid and that their response is appropriate.

Finally, it is interesting to reflect that many of the varied activities of a professional services firm like Ernst & Young already involve both external and internal aspects of reporting. In tax services, our role is on the one hand to help ensure compliance with legislation and correct reporting to the revenue authorities; and on the other to advise the client on ways of reducing the total tax liability and managing tax collection and accounting procedures as efficiently as possible. In the field of acquisitions, disposals and buy-outs, we perform investigations and due diligence work such that outsiders can have a full picture of the business they are interested in, as well as advise managements on corporate and financial structuring. In corporate recovery work too, we provide reports for creditors and bankers, while at the same time working with the company to put viable parts of the business on to a sound footing for the future.

As accountants, we spend much of our time in closely detailed work concerning individual organisations, and we believe there is much value in periodically stepping back from our day-to-day work to see it in a longer-term perspective. It is that sense of perspective which makes Pacioli’s original contribution so remarkable, and we hope that you find the historical context and the ideas in this book both relevant and interesting.
CHAPTER 1

Luca Pacioli,
the Perfect Accountant

(The Life and Works of the Father of Accounting
On the celebration of the 500th anniversary of the publication of Summa)

By Dr F G Volmer CPA, University of Limburg
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Introduction – the portrait in Naples of Pacioli as the perfect accountant

A mysterious portrait of Luca Pacioli hangs in the Galleria di Montefeltro in Naples. We can only assume that Pacioli himself gave the detailed instructions for this unique artistic construction of his curriculum vitae. He is wearing the grey habit of a Franciscan monk. We see him pointing to a construction drawn in chalk on a board, on the edge of which has been marked ‘Euclides’. The large bound book on the right on the table is Pacioli’s *Summa de Arithmetica, Geometria, Proportioni et Proportionalita* (1494). On the book lies a dodecahedron which we take to be a reference to another of Pacioli’s books *De Divina Proportione*. The manuscript book on the front is Pacioli’s *Euclid* (1509). Other objects on the table are the instruments of a mathematician or an arithmetician: a sponge, on a piece of chalk, compasses, a protractor, a pen and a case.

Then we discover mystic signs on Pacioli’s right (see Davis, 1977) “...the shimmering celestial crystal icosahexahedron, where, though immersed in light, it remains isolated by its singular perfection. All its shining, transparent faces.... are simultaneously visible. Some of these faces reflect buildings, apparently the shadows of the Palazzo Ducale in Urbino, from an unseen window”. We do not know the name of the young man on Pacioli’s right but he is probably meant to symbolize mankind instructed by Pacioli. We see in the portrait Pacioli’s ideals: mathematics and perfection. In the rest of this chapter, I shall expand on these themes.

Pacioli’s life and work

First of all, let us trace his career. Pacioli was born in 1445 in Borgo San Sepolcro of a lower middle class family. His fellow countryman, the great artist Piero della Francesca, was his first teacher. After this primary education and an apprenticeship to a merchant called Folco di Belfolci, he became a private tutor in Venice (1464), at the house of the rich merchant Rompiasi, during which time he attended the lectures of the mathematician Bragadino. During his apprenticeship, Pacioli learned about the double-entry system that had been in use in Italy for at least 200 years. During his time in Venice he wrote a book of commercial arithmetic for his pupils. At the recommendation of Piero della Francesca, Pacioli then moved to Rome and lived with the famous artist Leon Alberti.

Around 1473, Pacioli became a Franciscan Minor and began a wandering way of life, resulting in his visiting the courts and universities of Italy. He became a professor in Perugia teaching arithmetic. After a short stay in Zara in 1481 (probably to recover from severe health problems and to study theology) and a longer residence in Florence, Pacioli returned to Perugia in 1487. In 1489, he became a professor of mathematics at Sapienza University, Rome, after which he lectured on Euclid for three years at Naples University teaching military science and military tactics.
In 1494 Pacioli came to Venice where a Professor Sanuto supplied the money necessary for the publication of the *Summa*. Two years later Lodovico il Moro, Milan’s ruler, called Pacioli to Milan to lecture on mathematics. After the fall of Lodovico, Pacioli and his new friend Leonardo da Vinci moved to Florence. Pacioli lectured on mathematics in Florence from 1500 to 1506 as he had done in Pisa, Bologna and Perugia. In 1509 and 1510 Pacioli was in Venice for the printing of his version of *Euclid* and of his *De Divina Proportione*. Pope Leo X appointed him a professor of mathematics at the Sapienza University in Rome in 1514. After a year Pacioli, tired, returned to Borgo San Sepolcro and died on 18 June 1517.

Having traced Pacioli’s life, let us now consider the various influences on him. I shall explain the impact of his being a Franciscan as well as the importance of his friendships with the leading artists of his time.

**Pacioli and his Franciscan revolution of thought**

As mentioned above, Pacioli became a Franciscan minor around 1473, a decision which was to have a great influence on his work. The Franciscans had a distinctive philosophy which was evidenced by being non-theoretical, non-rational, mystic and worldly. They had a fascination for numbers. For instance, the chronicle of the Franciscan Fra Salimbene of Parma (1280) clearly reveals a fastidiousness for getting numbers right: lists of food prices, numbers of killed and wounded, the exact sums spent on the war, etc. Salimbene rejected the number of killed and wounded in the battle between Genoa and Pisa in 1284 which were circulating and preferred to wait for the Franciscans of Genoa and Pisa to bring a more reliable figure.

This emphasis on numbers included seeing a deep connection between religion and mathematics, extending to a belief in number mysticism. For example, Pacioli writes in *Summa* about the virtues of the number three: “There are three parts of the spirit: intellect, memory and will. Three principal sites in our world: Europe, Africa and Asia. Three principal metals: gold, silver and copper. Three parts of the soul: stimulation, sensibility and intellect.. There are three principal sins: avarice, luxury, and pride; three sorts of satisfaction for sin: fasting, almsgiving and prayer; three persons offended by sin: God, the sinner himself, and his neighbour; three degrees of penitence: contrition, confession and satisfaction... and if we well consider all the devout acts of Christian worship, they are found in a ternary combination. There are three enemies of the soul: the Devil, the world, and the flesh. . . . And all things in short, are founded in three: that is, in number, in weight and in measure” (*Summa* folio 5).

I have included the above extract at some length because from it we get an intimate portrait of Pacioli as a crusader against the new heathenism of his times. Franciscans believed that mathematics was a reflection of nature and
that nature was an instrument of the Divine Plan. Pacioli believed that mathematics and the arts could revive the dying Christian faith.

**Pacioli as a friend of artists**

When in Rome, Pacioli stayed with Leon Alberti, the famous artist, architect, mathematician, philosopher, poet, jurist and humanist. Alberti came from an aristocratic family and was a very learned man. In living with him, Pacioli was introduced to many prominent and famous people and his friendships with the great artists of his time were to prove constructive for all parties involved. Pacioli had frequent discussions with Piero della Francesca, Leonardo da Vinci and others resulting in approaches to the measurement of solid bodies in art on the one side and the development of applied mathematics (such as accounting) on the other.

For instance, in 1457, Alberti discovered a way of tracing natural perspectives and effecting the diminutions of figures, as well as a method of reproducing small objects on a larger scale. We can see the influence of Alberti on Pacioli and especially on his treatise of architecture in *De Divine Proportione*. It could also be argued that the new art of perspective had relevance to accountants in that accounting is both objective and subjective.

**Pacioli as a teacher**

Pacioli started to teach at the University of Florence on 1 November 1499, when he was 54 years old, and continued teaching till the beginning of the school year 1506/1507. He was hired at one hundred florins a year to teach Euclid. Pacioli wrote in the *Summa* (folio 49 ff) “The teacher must never frighten the student at first, because the beginning in itself is enough; so much so that many lose faith in learning and leave school because they have no one to protect them from such a bad step. We teach in schools the long method of finding the least common denominator at first, in order to fix fractions in the minds of the pupils. Then the shorter ways are given later, for their pleasure, and they are so glad to have them that they learn them at once, so as not to have to go back to the hard ways. This is in line with the proverb which says ‘No one knows the good if he has not first experienced the bad’ or also the Latin proverb: ‘He has not deserved the sweet who has not first tasted the bitter... it is harder work to teach than to learn; since often the teacher must find a thousand different ways to make the pupil understand.”

Pacioli used a problem-based, case study approach to his teachings in an attempt to encourage the use of mathematics in everyday life. Indeed, he wrote an unpublished manuscript *Viribus Quantitatis* which consisted of 309 folios divided into three parts:

1. a collection of 81 mathematical recreational problems;
2. a collection of geometrical problems and games and
3. a collection of proverbs and verses.
Pacioli called this work a compendium because it consisted of problems drawn from other works (especially those of Alcuin of York and Leonardo da Pisa (Fibonacci)) as well as including problems thought up for his students. Further Pacioli encouraged students to make original contributions of their own.

K W Hoskin & R H Macve (1986) discovered that a new mode of writing, or a new textuality, had developed since 1300. Rouse & Rouse in their *Preachers, Florilegia and Sermons* (1979) sum up the innovations under three headings:

- the use of alphabetical order “as a means of arranging words and ideas”;
- the development of a new visually oriented layout for book and page, involving rubrics, paragraph marks, different letter sizes, list of chapters and running headlines and formal cross-references and
- the emergence of systems of reference with which to designate portions of text and codex.

The new systematic writing, as an aspect of the new textuality, made possible a new kind of control. This control over goods, money and people was achieved by re-writing texts. Pacioli’s fully-developed double-entry system, with bilateral layout and systematic cross-referencing of debit and credit, was a particular form of the new general textuality.

Pacioli’s reforms of mathematics to an applied art resulted in a re-evaluation of this science to a real profession, highly esteemed by the whole of society.

**The charges of plagiarism against Pacioli**

The close contact between Pacioli and the other great thinkers of the time resulted in many of the manuscripts produced being co-productions. Pacioli made frequent references to many other authors. In particular this is clear from his eulogy of Piero della Francesca (the ‘maestro’). Pacioli described himself as a compiler/editor and said that his workings resulted from discussions and team work with scholars and artists. However, it was Pacioli who collected, restored and ordered old material and transformed it into a new standard work. Pacioli was always eager to recognize his indebtedness to other contributors and did so in many places in his work. He took as much as three-quarters of the *Summa* from Fibonacci. In fact, he stated that, when he acknowledged no other source, it was understood to be Fibonacci.

However, this did not prevent accusations of plagiarism being made. Vasari (1550) wrote a biography of the great painters in which he stated (vol 1, page 191): “Piero della Francesca was regarded as a great master of the problems of regular bodies, both arithmetical and geometrical, but he was prevented by the blindness that overtook him in his old age, and then by death, from making known his brilliant researches and the many books he had written, which are still preserved in Borgo, his native town. The man
who should have done his utmost to enhance Piero’s reputation and fame, since Piero taught him all he knew, shamefully and wickedly tried to blot out his teacher’s name and to usurp for himself the honour which belonged entirely to Piero, for he published under his own name, which was Fra Luca dal Borgo, all the researches done by that admirable old man, who was a great painter as well as an expert in the sciences... As I said earlier, Piero made an intensive study of painting and perspective. He acquired an intimate knowledge of Euclid, understanding better than any other geometrician the nature of the perfect curves drawn on a basis of regular bodies; and the clearest elucidations of these matters come from his pen. The Franciscan, Luca dal Borgo, who wrote about the regular geometrical bodies, was his pupil; and when Piero died at an advanced age, having written many books, this Luca arrogated them to himself and published as his own work what had fallen into his hands after his master’s death” (p 196).

George Bull, the translator of Vasari concludes in a note “that this is hard on Luca Pacioli, who is regarded as having edited rather than plagiarized Piero”. Indeed, by the second edition of his Lives of the Artists, Vasari had diminished his charges concerning plagiarism.

Other charges of plagiarism were based on the fact that the Summa is written in Tuscan dialect, except for the part ‘Tractatis XI’ which is written in Venetian dialect. Pacioli had decided upon use of the everyday language in his work so that educated and non-educated would benefit from it to the same extent. Several scholars have cast doubt on Pacioli’s authorship of ‘Tractatis XI’, supposing Troilo de Cancellariis to be the real author. But other scholars have strong arguments in favour of Pacioli: in fact we discover through the whole Summa the style of only one unique personality – Pacioli himself. Besides that, Pacioli demonstrates in several parts of the Summa a detailed knowledge of mercantile practice and uses both Tuscan and Venetian dialect. In my opinion, consideration of the ‘Tractatis XI’ alone is not enough for a conclusion about the authorship of this part of the book. Esteban Hernandez-Esteve (1993) found that the part of the Summa covering bookkeeping, ‘De Computis et Scripturas’, has a number of obscurities and difficulties of interpretation. Pacioli’s prose is not easy to follow and it is written in a half Tuscan, half Venetian language with many abbreviations. He is of the view that Pacioli’s Summa “.. is not a single work written from start to finish, but a collage in which heterogeneous elements written on different occasions and for a different purpose have been juxtaposed”. The same can be said of the ‘De Computis et Scripturas’ – chapter 1-35 on the one hand and chapter 36 (Summary) and the rest on the other hand. The former are written in Venetian style whereas the latter follows the Tuscan model. Probably Pacioli wrote both parts at different times and for different purposes. He already mentions the Summary (chapter 36) in chapters 12 and 34. So it seems that the ‘De Computis and Scripturas’
Portrait of Luca Pacioli from the Galleria di Montefeltro, Naples.
(See Chapter 1 for detailed explanation)
Summa de Arithmetica geometrica
Propositiones et proportionalis

Continent quidam de arithmetica et alia mathematica et alia naturalia et alia moralia et alia historica et alia occultia.

Loomenia de menta operis:

De numero et numero in multis risuli,
Propositionem et proportionem multiplicabitis
vel in aliis libros et aliis.

Conventiatura aulorum numero 11, per
quum continet proportionem vel
vel in aliis libros et aliis.

Multa est partis de algebrarum
et numerorum multiplicabitis et
et numerorum multiplicabitis et
et numerorum multiplicabitis.

De la regula merens imita de

Quidam sunt in capite discretis et
et numerorum multiplicabitis et
et numerorum multiplicabitis.

Loomenia de menta operis:

De numero et numero in multis risuli,
Propositionem et proportionem multiplicabitis
vel in aliis libros et aliis.

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et numerorum multiplicabitis.

De la regula merens imita de

Quidam sunt in capite discretis et
et numerorum multiplicabitis et
et numerorum multiplicabitis.
The arms of The Institute of Chartered Accountants of Scotland, matriculated on 11th March 1953.
The saltire, the white cross of St Andrew of Scotland, is placed on a blue and white chequered ground, representing the exchequer table of the medieval treasurer or accountant. The red vertical stripe acts as a foil for the two gold orbs representing money. Above are ranged the symbols of the three cities whose Societies combined to form The Institute, Glasgow on the left (the fish and ring being part of the city’s arms), Edinburgh in the centre (the castle, described as ‘triple towered, sable, port and vanes’), and Aberdeen on the right (a conventional representation of one of the towers of that city). The motto ‘Quaere verum’ (‘Seek the truth’) appears on a scroll above the whole shield.
The development of accounting.

The illustration from Pacioli’s ‘SUMMA DE ARITHMETICA’ depicts finger signs for numbers, used from Roman times through the Middle Ages. The left hand was used for numbers up to 90 and the right for numbers of 100 and over.

The title of the accounting software demonstrates the lasting influence of Pacioli’s Italian method of double entry book-keeping.
and the rest of the *Summa* must have the same author. 
Also, many references to religion are made in *Summa*. Only a very religious person, only a theologian, could or would want to write in that way. Pacioli has affixed his personal “stamp” to many parts of the *Summa* (‘our Sansepolcro or our Toscany’ in chapter 9, 15 and 16 of ‘De Computis and Scripturas’) and Pacioli also gives biographical information about himself elsewhere in the *Summa*. It is also important to remember that Pacioli’s printer was a Venetian whereas Pacioli himself was a Tuscan. “The Italian of the main text of the *Summa* appears (see Lee, 1989) to be of Tuscan provenance, but with some Venetian forms, such as z for g and x (pronounced ‘sh’) for c before e or i (pronounced ‘ch’).”
My conclusion is that Pacioli edited other works to describe for the first time the excellent system of double-entry and explained it with methodical clarity and mastery of detail. I would conclude that none of the accusations of plagiarism against Pacioli seems to be correct. There are many charges, but the necessary evidence seems to be weak.

**Pacioli’s conceptual framework of accounting as a worldwide accepted accounting framework**
Pacioli’s *Summa* thus was not original but was a detailed description of the best accounting practices used in the international commercial centre of Venice. It is not only a review of double-entry bookkeeping but is also a description of sound business practice: how to succeed in business with the tools of accounting. As we will see below, Pacioli’s conceptual framework meets the definition of a conceptual framework used by the Financial Accounting Standards Board (1976): objectives, fundamentals, standards, nature, function and limits of accounting are a coherent system.
Thus, in Pacioli’s framework, we see that:

* an orderly bookkeeping is the basis, consisting of the Memorandum, the Journal and the Ledger. Internal controls are important, as are the numbering and dating of the books, complete detailed transaction documents, etc

* next are fairness and good faith. “The word of a good businessman, indicating the great confidence in his integrity” is the ethical basis of accountancy

* the principles of systematicalness, consistency and reliability then emerge. “Every item must be systematically and carefully recorded in the Inventory with all countermarks, full names and in as much detail as possible.”

* full disclosure, understandibility and a fair view are also included. In chapter 4, Pacioli states: “Because of the vast number of things that might occur, transactions can never be too clear to a businessman. A businessman’s head has a hundred eyes.”
* the principle of relevance is very important: "A businessman rightly resembles a rooster which is the most alert animal that exists . . ."

* in chapter 2 Pacioli assumes: ".. every action is determined by the end in view and in order to pursue this end properly, we must use every effort. The purpose of every merchant is to make a lawful and reasonable profit so as to keep up his business". Profit-making as an objective and continuity are therefore paramount assumptions and are the fundamental axioms of commercial financial reporting

* the prudence principle is evidenced by the custom of balancing the books annually although they are not complete (chapter 6)

* in chapters 7 and 12 Pacioli mentions: "Many keep their books in duplicate. They show one to the buyer and one to the seller . . ."; and "Make the prices rather higher than lower . . . so that you can make a larger profit". I believe Pacioli means that, next to a prudent profit calculation, current (high) values are useful to estimate the value of the firm and the owner's equity

* in chapter 22, the materiality principle evolves: "The account named small business expenses is kept because we cannot enter every little thing . . ., it would be too long and too expensive". In other words the benefits have to exceed the costs.

The accounting principles outlined above and the double-entry in Pacioli's framework have not changed in essence over 500 years.

**Pacioli's basic framework of books and accounts**

Pacioli's accounting system is based on three principal books:

1. the **memorandum (memorale)** where all events are recorded chronologically with all narrative details. It is the daybook of business;

2. the **journal (giornale)**, in which the events are converted into debit and credit entries with an appropriate explanation, the date being in the centre of the page above each entry. Debit is preceded by the technical term 'Per' and credit by 'A', both being Italian terms (a = to and per = from). Two diagonal lines // separate debit and credit and

3. the **ledger (quaderno)** where debits are posted on the left side of a double page (label: 'deve avere' or assets) and credit (label: 'deve dare' or liabilities) on the right. At the top of each page the account title is recorded. The ledger is used in a systematic way for tracing back the transactions.

Thereafter, Pacioli deals with special accounting issues such as banking transactions (chapter 17); joint ventures (chapter 21); branches (chapter 23); bills of exchange (chapter 24); extraordinary items (chapter 25) and accounting for closing and balancing of the books (chapter 27 – 34) to name but a few.

This last issue is very important for the detection of errors which is why
Pacioli recommends annual balancing. However, Pacioli stops there and does not draw up a balance sheet or construct financial statements as we do today. Neither does he write about accruals or prepayments. This is because of the dominance of Venture Accounting, ie the system of opening a separate account for each venture and thus eliminating the necessity for inventory valuation and accruals. The profit is calculated on each venture and the net result is transferred to the profit and loss account which, in turn, is balanced and carried to the capital account.
Let us look at some parts of *Summa* in more detail.

**The Bill of Exchange: 'De Cambiis seu camptionibus'**
Pacioli dealt with the bill of exchange extensively in the *Summa*. Part 1, section 9, treatise 4 is called 'De Cambiis seu Camptionibus' or all about the bill of exchange and bill-brokering. Pacioli begins with the warning: 'Many people object to the chief ingredient of business economics or the bill of exchange and people engaged in bill-brokering are called usurers or worse. But we have to bless the bill-brokers... because if the bill of exchange were abolished, all business would break down...'. However, the complexities of this financial instrument are difficult to understand.
Pacioli describes four kinds of bills of exchange:
- cambio minuto or the real exchange of currencies
- cambio reale or the well-known draft
- cambio secco or dry exchange, where the bills were not actually sent abroad which was a way of credit accommodation and sometimes usury. This practice was doubtful in the fifteenth century but was not formally condemned until 1571 by Pope Pius V
- cambio fictio or fictitious exchange, for example the re-exchange in case of non-payment of the bill.

According to de Roover (1948), the Italian bill of exchange presumed .. “the existence of organised money markets, stereotyped forms, and well-established business practices, all of which were unknown in the Northern trade. The English merchants began to use the bill of exchange only towards the end of the fifteenth century, and their dealings were limited to London, Calais and Bruges. One should not forget that the business practices of the Italians were far in advance of those of other nations” (page 81).

**Translating of foreign currencies in the financial report**
One of the most controversial theoretical accounting issues facing multinational companies at the moment is accounting for foreign currency translation. (For more details and references see Volmer, 1991.) The consolidated financial statement integrates the reports of the subsidiaries into a report on the whole economic entity, requiring the translation of financial data from any subsidiaries reporting in a foreign currency into the parent
currency. The controversy is concentrated on two fundamental accounting issues concerning the balance sheet: (1) which exchange rate(s) should be used, and (2) how translation gains and losses should be accounted for.

The historical background to the translation of currencies

a. The several moneys of account in Medieval Venice

In Medieval Venice, accountants had to decide whether they would consider gold coin or the (new) silver coins as the basis of the money of account they were using. Until 1404, several moneys of account were used in quoting wholesale prices, but finally in 1404 the 'lira a grossi' was officially replaced by the ducat. The ducat became a standard of value and gave its name to a money of account. When the ducat of account was equated with the gold coin it was called 'ducat a oro', and when with silver coin, it was called the 'ducat a monete'. Naturally, many complications arose from these multiple standards. The accountant had converted from ducato a oro in order to make his entry in ducato a monete. He had converted by adding to the gold value the difference between the legal value of the ducat and the day's market valuation. The accountant who made the conversions began with a knowledge of the current price of the ducat but he also had to calculate by reducing figures in lire to figures in smaller units, such as piccoli.

The very complex conversion procedures consumed time and energy and added to a businessman's transaction costs. Which money of account was meant in a private contract? Sometimes the kind of money (lira) could be assumed because of the long established practice of a particular office. A dispute was possible over whether coins offered in payment should be valued as they were at the time the contract was made (= historical rate) or at the rate prevailing at the time the payment was due (= current rate). As a result of inflation, fewer coins would be needed to pay a sum stated years ago, if coins kept their full weight. Paying a debt of 640 soldi di piccoli in ducats in 1383 would have required 10 ducats if the coins were valued at the old rate of 64 soldi but only 8 ducats if the coins were valued at their market price in 1383, which was 80 soldi (see Lane & Mueller, 1985). In the sixteenth century and earlier, the Venetian courts were likely to decide in favour of the creditors and require payment at the (historical) rate that was legally established at the time the contract was made.

b. Pacioli's Tariffa

Pacioli had become familiar with the problems of commerce through acting as resident tutor to the sons of one of the merchant princes of the Republic, Antonio de Rompiasi. Pacioli devotes particular attention to the difficulties caused in counting-house work by the chaotic state of the coinage of the period. Each state, even each town in the Middle Ages, had its mint and
there was doubtful money in circulation (debased and clipped). In Section 12 at the end of part one (Arithmetica) of Summa, entitled: ‘Tariffa’, Pacioli gathers detailed tables of all the usual coins, weights and measures, the terms of the bills of exchange in use in the various towns and countries. This was not uncommon for textbooks of commercial arithmetic at that time. It should be noted, however, that Pacioli only collected together tables which had been prepared by others.

Pacioli’s De Divina Proporzione – visualisation of accounting by means of graphs

I believe that Pacioli’s De Divina Proporzione (1509) is his most important work as this dissertation about geometry is one of the keys to the future of the accountancy profession. Pacioli linked double-entry bookkeeping, business arithmetic and statistics with Pythagorean harmonies, Platonic Solids and the music of the spheres. De Divina Proporzione has to be seen as the final result of an evolution starting with the Summa and ending in this great work. This development in thinking arose from the debates at the Court of Lodovico Sforza, Duke of Milan, between Pacioli and the leading artists and philosophers. Pacioli was the secretary of this “academy”, teaching arithmetic, geometry and military tactics in both the University of Milan and the Court, and recording the conclusions in a book presented to the Duke of Milan. Leonardo da Vinci was the founder of these meetings.

Visualization and absolute beauty were the new perspectives. The eye is seen as the most important part of the human body. “Eyes are the first door by which the Mind acknowledged and enjoyed”, Summa page 272). Leonardo da Vinci, too, stresses the importance of visionality: Visualisation is the most secure way to knowledge! A breakthrough and revolution in the history of man. The emphasis is not on logical thinking and formulating in Latin but in observation of the real world by one’s own eyes. Writing in the vernacular is the preferred way. The inductive, descriptive and experimental approach of the artists had laid siege to the deductive, abstract approach of the scholars of the early Middle Ages.

Pacioli’s De Divina Proporzione, illustrated by Leonardo da Vinci, is a fascinating compendium of phi’s (or the ‘golden ratio’) appearances in various plane and solid figures. The golden ratio has a unique property in that it is the only number, which when diminished by unity, becomes its own reciprocal or 1.61803-1= 1:1.61803. There is a relationship between nature’s fundamental ratios: phi and pi: phi squared and then multiplied by 6/5 equals pi or 3.1416404. Phi like pi can be expressed not only as the sum of infinite series as described by Fibonacci, but as logarithmic spirals too. Piero della Francesca used phi or the geometric symbolism of the Golden Proportion in his Baptism of Christ (see R Lawlor: Sacred Geometry,
Thames and Hudson, 1982). For it is in the human body too that the metaphysical meaning of phi can be found. “According to several traditions which provide us with a human canon, that is a delineation of the average and ‘ideal’ body proportions, the navel divides the body according to the Golden Section. Taking the full height as 1, the body from the feet to the navel is equal to 1/phi, with the proportion from the navel to the top of the head equal to one divided by phi squared. The relationships between the bone-lengths of the human finger, hand and arm are examples too of phi relationships which occur in the human body”. There are many other examples of proportionality and the golden ratio in music, in architecture (for example the well-known Parthenon at Athens), in biology (sunflower, cactus) and so on. The German psychologist Fechner (see Huntley, 1970) conducted research into the existence of Pacioli’s golden ratio: “He made literally thousands of ratio measurements of commonly seen rectangles – playing cards, windows, writing-paper pads, book covers and found that the average was close to phi.”

Has this topic any relevance for accountants today? It seems not if we look only on the surface of the discipline. But if we dare to dig deeper, we discover that an accountant is a painter too. His picture, however, is not expressed well because the abstract numbers are not yet transformed into pictures or graphs. Previously, this transformation was difficult or even impossible, but now we have computers with software which makes it simple to produce pictures from these numbers. The accountant cannot ignore the aesthetic consequences of his work any longer. Indeed, we are already seeing some companies prepare financial reports paying attention to aesthetic considerations.

**Arithmetic**

In *Summa*, Pacioli discussed many arithmetical problems and many of these problems are solved by ‘the method of false assumption’ (or El cataym in Arabic) which involves assuming any number for the unknown quantity and, by trial and error, altering it by simple proportion (see Rouse Ball, W.W.: A short account of the history of mathematics, 1960, page 209).

Mercantile arithmetic is also fully dealt with and illustrated by numerous problems. An example is the problem to find the original capital of a merchant who spent a quarter of it in Pisa and a fifth of it in Venice. He received on these transactions 180 ducats and had left in his hand 224 ducats. To start with, assume that he had originally 100 ducats. If he spent 25+20 ducats at Pisa and Venice, he would have had 55 ducats left. However, this would have meant he then had 224-180=44 ducats. Hence the ratio of his original capital to 100 ducats is as 44 to 55. Thus his original capital was 80 ducats. Pacioli described problems in an amusing way
sometimes, such as in treatise 5 concerning progression: there is a mouse in
a tree and a cat on the ground at the foot of the tree. The cat climbs, the
mouse descends and the tree grows each day. How long will it take the cat
to reach the mouse? Most of the examples, however, relate to travelling, for
example to couriers making journeys. This is very important for a merchant
as time is money. So Pacioli demonstrated that applied mathematics is a tool
for better decision making.

The theory of proportion
Pacioli pays much attention to the crucial phenomenon in mathematics of
proportion. The natural philosophers such as Socrates, Plato, Aristotle noted
this quality in their discussions about the nature of the universe. Plato
discusses proportion not only as a mathematician but as a principle of nature
and as a tool for speculation too. In the part of Plato’s Timaeus that deals with
the making of the ‘soul of the world’ and the doctrine of the elements, Plato
writes: "And the fairest of bonds is that which most perfectly unites into one
both itself and the things which it binds together; and to effect this in the
fairest manner is the natural property of proportion". Pacioli demonstrates
that proportion is crucial in all branches of learning (medical science,
engineering, law, art, theology, statistics, cosmography and so on). It is, for
example, impossible to paint ignoring proportions. And accountants, too,
have to look at proportions as well as at individual numbers. For example,
profit and tax, inventories and turnover, equity and liabilities.
The Summa is not an original work but is a compendium which described
standard mathematics of those days. Pacioli never claimed originality –
rather Pacioli’s contribution consisted in digging up old material,
reorganizing and systematizing it and in making a science out of
mathematics. Pacioli as a Renaissance humanist tried to search the writings
of the past in order to revive them in everyday life.

How Pacioli’s teachings came to the rest of Europe
Pacioli’s book was reprinted several times with the result that other authors
picked up the thinking in it. Jan Ympijn Christoffels published a book called
Nieuwe Instructie ende bewijs der looffelijker consten des rekenboecks (New
instruction and the demonstration of the praised art of ciphering) in 1543. In
England, Hugh Oldecastle wrote a book about double-entry, but the work
has been lost. A London schoolmaster John Mellis published a book in 1588
about double-entry, similar to Pacioli’s treatise but with some original
additions. The first book about double-entry in England was the translation
of Ympijn’s book in English in 1543, printed by R. Grafton in Antwerp. In
1533 Grafton printed Peele’s Maner and Forme, the third book in English
about double-entry bookkeeping.
Simon Stevin, Pacioli’s image in the Netherlands

The Dutchman Simon Stevin was deeply influenced by Pacioli. Like Pacioli, Stevin was interested in the practical application of sciences (especially mathematics): arithmetic, geometry, perspective, military science, and like Pacioli worked for a rich merchant so he had to learn the practices of bookkeeping and commercial arithmetic. The latter resulted in his first book in 1582: Tafelen van Interest (Tables of Interest), in which he set out the rules of single and compound interest and as a help he gave tables for the computation of discounts and annuities (which were important for the use of bills of exchange).

The idea of tables was not new – as we know Pacioli had published some in his Summa (1494), entitled “Tariffa”. In Italy bankers had been using tables for two centuries, but often the tables were kept secret as tools of trade. Like Pacioli, Stevin stressed that the native language and not Latin or Greek was the best tool for communication. This decision turned out to be an unfortunate one in Stevin’s case because it limited the circulation of his books and public awareness of his work. Also of interest is Stevin’s mathematical treatment of perspective (Van de deursichtige), a subject also studied by Piero della Francesca and Pacioli. Stevin was also one of the first authors to write a treatise on governmental accounting.

Stevin composed a treatise on double entry in the Italian manner (Coopmans bouckhouding op de Italiaanse wijze, part of his Mathematical Memoirs) based on Pacioli’s Summa. It is important to note that Stevin used the form of a dialogue for setting out a systematic rationale of bookkeeping practices. For example transactions needed to be distinguished into capital affecting and non-affecting ones. The basis of bookkeeping according to Stevin is the beginning and the end of ‘property rights’. This idea is a topical one and there is a rich ‘property rights’ literature with emphasis on rights established by contracts.

There is, however, a great difference between Pacioli and Stevin. Pacioli begins for example: “In the name of God, November 8th, 1493, Venice”. Stevin omitted all religious terms at the tops of pages or at the beginning of books. Pacioli urges that the conscience of the accountant and his love for the truth had to be the ethical base and not simply adherence to the rules or even his own or his client’s selfishness. It is interesting to note in this context that the motto of The Institute of Chartered Accountants of Scotland is “quae re verum” or “seek the truth”.

The move towards Scotland

The first book on bookkeeping published in Scotland was Idea Rationara or The Perfect Accountant by Robert Colinson (1683). At about this time, the Dutch influence on bookkeeping books in English was beginning to wane. For the next century most of the most authoritative books in English were
published in Scotland or were written by Scottish authors. Interestingly, Colinson was a merchant in the Netherlands before becoming a teacher of accounting in Edinburgh.

In Scotland there are no fewer than five examples of the *Summa* now. Four of the *Summas* are examples of what is generally agreed to be the first state of the edition (editio princeps). (See Antinori, 1980.) These are the Aberdeen *Summa*, the Glasgow *Summa*, the Crawford *Summa* and the Edinburgh University *Summa*. The fifth, the *Summa* of the Edinburgh Society of Accountants, is a variant or rather an early reprint of the first edition. Richard Brown, a member of the Edinburgh Institute, paid 2 1/2 pounds for it about a hundred years ago and in 1900 he presented it to the Scottish Institute (see Dunlop, 1985).

**Conclusion: triumph and tragedy, Pacioli’s last will**

*Pacioli’s death and last will (21 November 1511)*

Pacioli, although a Franciscan Minor, had received from his friend Pope Julius II the authority and power for making a will relating to his property up to the amount of three hundred large golden ducats. This was not a large amount as the annual salary of a private teacher was about 500 ducats. It was Pacioli’s second will, the first will having been made in 1508. In the will (see Taylor, 1980) Pacioli stated that he should be buried in the Monastery Church of his Minorite Brothers in San Sepolcro. Five denari were to be paid out to the Church of St. John the African for celebrating Masses for his soul and those of his ancestors. His nephews Ambrogio and Guinipero (Franciscan Minorites, too) would receive 25 florins each with the stipulation that they should obey Pacioli himself during his life. The wife of Pacioli’s nephew Antoni would receive 25 florins with the married couple becoming joint heirs, with the stipulation that they had to buy a vineyard to the amount of 100 florins. However, should they die without children, the Monastery of San Sepulcro would be heir in which case 50 florins had to be expended for a silver chalice with his name and seal L and M engraved thereon. Besides that, his brothers of the Monastery had to construct a tomb with a large stone on it and the images of Pacioli and his nephews Guinipero and Ambrogio.

The tomb of Pacioli (see A. Nakanishi, 1979) has never been found in the precinct of the Monastery. This is not surprising given that his relations with his fellow monks were strained and his last will was unfavourable to them. He liked his family much more. Perhaps he was buried under the altar of Chiesa di S Giovanni, like his parents and ancestors. Unfortunately this Church, which was built in 1331, is now a warehouse. Last word of Pacioli comes from a letter dated 15 April 1517 concerning the annual meeting of the Franciscan Order at Assisi and states: “We, all the friars, do justly hope to have Master Luca Pacioli elected as the Provincial Minister of Assisi, as he
is so virtuous, duly aged and respected by the people of the district". The relations with his fellow friars had improved because Pacioli had given up his privileges apostolicus and he had lived harmoniously and peacefully with them in 1516.

**Conclusion**

Pacioli's enduring importance to accountants is in his efforts to connect mathematics and accounting and to create a perfect accountant. Much of Pacioli's work is timeless – his bookkeeping model is still in use after 500 years with only little change, but his other work is useful as well. His ideas evolved under the influence of the great artists from the *Summa* to the *Divina*. Pacioli's importance for accountants comes through in three themes: the visualization of financial statements by geometry, the importance of proportions (ratios) to accountants and the accountant's image as a mathematician and historian.

Pacioli deserves the place of honour as the perfect accountant firmly based on mathematics: in his own words: "The Apostle Paul says that no one will be worthy of the crown except he who shall fight valiantly for it".
Further Reading
Agostini, A, De Viribus Quantitatis di Luca Pacioli, 1924
Bijwater, H F, Yamey B S, Historical Accounting Literature: a companion guide, 1982
Brown, R G, Paciolo on Accounting, 1963
Claagett, M, Archimedes in the Middle Ages, 1978
Clarke, D A, The first edition of Pacioli’s Summa de Arithmetica, Gutenberg Jahrbuch, 1974
Dubreton, J L, L’Age d’Or de la Renaissance Italienne, 1959
Dunlop, A B G, Bibliographical Notes on Five examples of Pacioli’s Summa (1494) in Scotland, Abacus 21, 1985
Gillispie, C C, Dictionary of Scientific Biography, 1976
Huntley, H, The Divine Proportion, a study in mathematical beauty, 1970
Knowles, D, The Evolution of Medieval Thought, 1962
Lawlor, R, Sacred Geometry, 1982
Geijsebeek, J B, Ancient Double-Entry Bookkeeping, 1914
Hernandez-Esteve, E, Comments on some obscure or ambiguous points of the Treatise De Computis et Scripturas by Luca Pacioli, 16th EEA Congress, April 1993
Lee, G A, Manuscript Additions to the Edinburgh University Copy of Luca Pacioli’s Summa de Arithmetica, Abacus, vol 25, no 2, 1989
Nakanishi, A, On the life of Luca Pacioli, The Accounting Historians Journal, Fall 1979
Murray, A, Reason and Society in the Middle Ages, 1978
Serge, B, Leonardo, Biographie, 1988
Stevin S, Vorstelikke Bouckhouding op de Italiaense Wijze, 1607
Taylor, R E, No Royal Road, Luca Pacioli and his times, 1980
Vasari, G, Life of the Artists vol I & II (transl G Bull), 1965
Vianello, V, Luca Paciolo nella Storia della Ragioneria con Documenta Inediti, 1991
Volmer, F G, Effect of graphical presentations on insights into a company’s financial position: an innovative educational approach to communicating financial information in financial reporting, Accounting Education, 1 (2), 1992
Yamey, B S, Pacioli’s pioneering exposition of double-entry: a belated review, Studi in Memoria di Frederico Melis, 1978
Yamey, B S, George Peacock, an Early Translator of Pacioli, Accounting and Business Research, Autumn, 1982
Yamey, B S, Two Typographical ambiguities in Pacioli’s Summa and the difficulties of its translators, Gutenberg Jahrbuch, 1976
Yamey, B S, Fifteenth and Sixteenth Century Manuscripts of the Art of Bookkeeping, Journal of Accounting Research, 5 (1967), no 1
Yamey, B S, Luca Pacioli's Scuola Perfecta, A Bibliographical Puzzle, Gutenberg Jahrbuch, 1926
Zan, L, Towards a History of Accounting: Perspectives From the Italian Tradition
CHAPTER 2

A History of the Accountancy Profession

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Introduction
Less than 150 years ago accountancy was an unorganised occupation comprising a small number of practitioners of questionable professional status. By 1905 Richard Brown in his seminal *A History of Accountants and Accountancy* estimated that there were no more than 11,000 professional accountants in the world. The enormous growth of the profession in the twentieth century may be illustrated by the fact that The International Federation of Accountants currently represents 1.2 million accountants in 80 countries. Notwithstanding the modern public perception of its practitioners as characterless, conservative and boring, professional accountancy continues to rank near the top of international scales which measure the prestige of occupations. By comparison, finding derogatory comments about accountants during the Victorian period, when the profession was in its infancy, is not difficult. For example, in 1881 the British chartered accountant was characterised as follows:

He is generally to be found (with, of course, certain notable exceptions) of limited education, of brusque and aggressive manners, insolent and irrepressible to secure an advantage, and of unlimited self conceit. It is the peculiarity and also the misfortune of all professions, that he of the lowest attainments and acquirements is the loudest in sounding his own praises, and resorts to expedients to procure employment to which the man of culture and ability would never stoop.

This chapter provides a summarised history of the organisational development of the accountancy profession and in doing so provides some explanations for the substantial growth of the occupation in recent times. Throughout, the emphasis is placed on showing how the work of the accountant and the structure of the profession in different countries has been moulded by a variety of contextual factors such as: the nature and timing of a nation’s economic development, its geography, changes in its social structures and its systems of government and law.

The earliest accountants
In the history of civilisation the development of accountancy as a profession is a recent phenomenon. However, record keepers existed in the first complex societies which emerged in Eurasia during the fourth millennium BC. The early Mesopotamian and Egyptian civilisations arose from the intensification and organisation of agricultural production in the fertile valleys of the Nile, Euphrates and Tigris. Regional trading centres and cities were established in which goods were collected, allocated and redistributed under the aegis of state apparatus. As economic and government activity became more sophisticated, improved measurement and writing techniques
were developed in the form of pictographs, hieroglyphics and cuneiform in order to track the movement of goods. The recorders of economic quantities and values (using clay tablets and later papyrus as a medium) in the early civilisations were educated public scribes who recorded transactions primarily for legal, tax gathering and stores management purposes.

Greco–Roman civilisation was characterised by an expansion in the movement of goods over long distances and by the need to establish and finance administrative structures to control vast empires. The increased scale of commerce and government was accompanied by more sophisticated means of exchange (the invention of money), recording techniques and account keeping, particularly by banks, estate owners and tax authorities.

Under the feudal monarchies of medieval Europe accounting functions were performed by agents and public officials. The estate (which comprised a number of manors) became the central economic and political unit. Responsibility for estate management and account keeping was vested in stewards and the consequent divorce between the ownership and management of assets encouraged the development of more sophisticated charge and discharge accounting and created a need for regular checking of the agent's management. In England in 1377 it was recommended that:

The Lord of the Manor ought to command and ordain that the accounts be heard every year, not in one place but on all manors, for so can one quickly know everything, and understand the profit and loss. The Lord ought to command the auditors on the manors to hear the plaints and wrongs of everybody who complains of the steward or others, that full justice be done, and that the auditors do right at their peril.

The need to monitor and control revenues payable to the Crown also encouraged account keeping and auditing. The earliest recorded accounting systems in Britain are considered to be exchequer accounts which date from the twelfth century. In Scotland, national revenue collection was headed by the Chamberlain who received and distributed funds and whose accounts were scrutinised by Lord Auditors appointed by the Crown. The collection of local rents, customs and rates was entrusted to borough chamberlains and county treasurers. The earliest surviving charge and discharge accounts of the City Treasurer of Edinburgh date from 1552.

The first accountants in public practice are difficult to identify because of the ill-defined nature of the occupation of accountant. A deed was signed by an accountant or Rationatori in Milan as early as 831 and there are several other recorded instances of the services of an accountant being enlisted in Italian cities from the twelfth century onwards. From the seventeenth century 'writing masters and accountants' appeared in England though these
were predominantly teachers of the art of bookkeeping. In the Low Countries – the scene of significant advances in the refinement and dissemination of the “Italian Method” during the sixteenth century – instructors in bookkeeping also appeared from the seventeenth century. Richard Brown identified the earliest accountants in public practice in Scotland as being individuals such as George Watson (1645-1723) and Alexander Chalmers who were also accountants to commercial and public institutions. The earliest known ‘public accountant’ in the USA was Browne Tymms of Boston who, in 1718, advertised his services as a keeper of mercantile books.

The first organisations of accountants
The earliest known organisations of accountants were founded at the start of the “European Age” in the history of civilisation. From the late fifteenth century voyages of discovery established direct sea trading contacts between continents and by the late eighteenth century few areas of the world had not fallen under European influence. The centre of the commercial world was the Mediterranean. Outside Paris only Venice, Milan, Naples and Constantinople had populations of more than 100,000 in 1500. Given the increasing sophistication of commercial relations and the advanced state of accounting technology (as exemplified by Pacioli’s Summa of 1494) in the Italian mercantile republics, it is no surprise that Venice was the location for the formation of the first society of accountants.
In 1581 a decree was issued establishing the Collegio dei Ragionieri and in 1596 the Senate of Venice decreed the conditions for entry to the College. By the late seventeenth century the practice of accountancy in Venice was restricted to members of the college who were obliged to serve a six-year apprenticeship followed by an examination before attaining the status of Regionieri. In 1739 a Collegio dei Regionieri was also established in Milan and five years later a decree was issued stating that entrants were required to have served a five-year apprenticeship, studied Latin and Arithmetic, passed an examination in accounting and were aged at least 25 years. The professional organisations which were formed during the nineteenth century in Britain were also to adopt similar techniques to close off accountancy practice to those who could satisfy specific criteria.

The emergence of modern professional accountancy
The development of organisations of professional accountants and the vast increase in the number of accountancy practitioners has been coterminous with the replacement of an economy based on agriculture by an urban industrial society. Industrialisation not only increased the demand for various kinds of accounting labour, it also changed the structure of social relations and released forces which encouraged the formation of professional
organisations and recruitment to the new profession of accountancy. It was in the first industrial nation, Britain, that the professionalisation of accountancy initially took place.

The history of the accountancy profession in Britain is characterised by episodes of internecine struggle induced by attempts to protect hard won professional status from interlopers and subsequent attempts at retrenchment. One distinguished accounting historian has recently described the history of the profession in Britain as a process of “creation, amalgamation and fragmentation”. In order to understand how this situation arose it is necessary to trace the origins and development of professional organisation in Britain. Within the United Kingdom, the scene of the earliest organisation of professional accountants was Scotland.

The emergence of the profession in Scotland

During the late eighteenth century, Scottish accountants were increasingly appointed as trustees or factors on insolvent and landed estates. Significant changes to the process of bankruptcy administration in 1772 encouraged an increase in the number of practitioners to nearly 40 by 1799. A similar expansion was not apparent at the same time in England and this has been attributed to the different law of insolvency south of the border. Littleton was to explain that:

The Scottish laws, by providing so clearly a place for skilled technicians in law and accounts (factors, trustees), undoubtedly fostered the growth of a body of men relying upon their own merits for success. The early English [bankruptcy] laws, while in a sense they opened the way for skilled services, at the same time placed much responsibility in the hands of officers poorly qualified for the existing work.

The nature of the early capitalist economy of the late eighteenth and early nineteenth centuries provided a good deal of insolvency-related work for Scottish accountants which their English counterparts, working within a different system of jurisprudence, could not access. The economy was still predominantly rural based and as such was subject to significant fluctuations according to the vagaries of the weather and other adversities. Poor harvests, a reverse in the French Wars and recurring periods of speculation and financial crash could all induce periodic recession and an increase in insolvency work for accountants. By the early 1850s there were over 300 accountants in Scotland.

The nature of the work of the Scottish accountant in public practice by the mid-nineteenth century can be summarised as being the administration of the property of others and the need to ensure that such management had been properly conducted. Appointments were derived from two principal
sources. The first was judicial—in the form of trusteeships in bankruptcies, judicial factories, curatories and remits from court. The second source was extrajudicial—in the form of the management of landed estates, residential and personal property, trusteeships (for creditors and under testaments), executryships, treasuryships (of charitable and educational institutions) and the audit of the above. Work of a less “professional” nature such as insurance agency and stockbroking were offshoots of the management of property. The nature of much of this work brought accountants into close occupational proximity to the group at the head of the professional hierarchy in Scotland—the lawyers—and this connection ensured that Scottish accountants, in Edinburgh at least, gained professional respectability long before they formed a professional association.

The accountants of Edinburgh were the first to form an association and they were induced to do so by proposed legislation which threatened two of the major components of their practice outlined above. An early attempt at organisation occurred in 1834 with the formation of The Committee of Accountants Practising Before the Court of Session which, with the assistance of the Edinburgh law societies, successfully lobbied against a Bill which proposed that the audit of judicial factories be conducted by an Accountant-General rather than by accountants appointed by the court. During the early 1850s a more significant threat to the practice of Scottish accountants appeared in the form of proposals to overhaul the Scottish system of bankruptcy and insolvency and the administration of bankrupt estates by trustees (of whom 60% were accountants). On 17 January 1853 the first moves were made to form an Institute of Accountants in Edinburgh to resist the threat to insolvency work. By the end of January, 47 accountants were involved in the new organisation and James Brown, who had convened the committee in 1834, was elected as its first president. In September 1853 the accountants of Glasgow also organised to protect their interests in insolvency work and commenced the formation of an Institute of Accountants and Actuaries in Glasgow.

The nature and structure of the early Scottish institutes were to have a formative influence on the subsequent development of the profession in Britain. Firstly, the Edinburgh and Glasgow societies sought to confirm their professional status by incorporation under Royal Charters (granted in 1854 and 1855 respectively). Despite the fears of some Edinburgh lawyers, the charters did not confer a monopoly of practice on accountants nor was the exclusion of non-members from the provision of accountancy services sought from the state. In Victorian Britain, registration was usually only granted to occupations—such as doctors, mine managers and ship’s officers—where human life was threatened by quacks. The door was therefore left open for the provision of accountancy services in Scotland by accountants outside the institutes.
Secondly, the Edinburgh and Glasgow societies were local organisations of accountants. Due to the perceived status differences between Edinburgh accountants and those elsewhere, no attempt was made in 1853 to form a single Scottish institute and practitioners outside the localities of the organisations were precluded from membership. The early societies in Scotland set the precedent for the subsequent initial organisation of the profession on a local basis in centres where sufficient numbers of practitioners existed (as in Aberdeen 1866, London 1870, Manchester 1871 and Sheffield 1877).

Thirdly, the Edinburgh and Glasgow societies established the premise that professional accountancy (and chartered accountancy) was synonymous with public practice. In Victorian society the distinction between the fee earning professional and the profit seeking tradesman and between the independent professional gentleman and the dependent employee were particularly acute. Hence, only respectable accountants in public practice were admitted to the new societies. Those who were employed as accountants in local government, banks, mercantile houses and law offices were excluded.

Fourthly, in order to consolidate the status of the accountant, entry to the profession was restricted to those who served a registered indenture, passed examinations and paid apprenticeship and membership fees. The impact of this set of closure practices and those similarly imposed by the early chartered organisations in the rest of Britain was to exclude a substantial number of practitioners from membership and a failure to accommodate the emergence of new specialisms within the narrow definition of what constituted ‘professional practice’. The consequences for the future organisation of the profession were the formation of a number of competing organisations and years of intra-professional discord, particularly in the period from 1880 to the outbreak of the First World War. The process was recognised by Richard Brown:

There will be three classes of “outs” who are likely to give trouble to the new society before it has attained much strength and public standing. These are, first, men who were invited to join the movement, and who did not then think it worth their while, but who afterwards saw cause to change their minds; second, men worthy of being invited who are unwittingly overlooked; third, men deemed by the promoters unworthy of being included, but who themselves held a different opinion. The probability is that such men, if they are not at all numerous, will form a new society within a few years. Again, if the community is a large one, this new body will meet with exactly the same difficulty, though most likely at a point a little lower down the scale, and a third society may be formed.

Brown concluded that it might be a considerable time before the profession emerged “from the consequent confusion”.

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Although the Royal Charters awarded to the Scottish institutes did not confer a legal monopoly of practice, the early adoption of the credentials ‘CA’ and their increasing perception as a hallmark of the highest professional standing in accountancy, created a situation in which the great majority of auditing and insolvency work in Scotland was awarded to members of the Edinburgh, Glasgow and Aberdeen societies by the late nineteenth century. One contemporary explained the currency of ‘CA’ in prose in 1881:

I’m a “Chartered Accountant”, it sounds rather loud,
As a “Chartered Accountant” I feel rather proud,
For a “Chartered Accountant’s” a noble degree,
As a “Chartered Accountant” confers £, S.D.

Not surprisingly, those accountants in Scotland who were excluded from the chartered societies wanted a share of the spoils. In 1880 a rival Scottish Institute of Accountants was formed and made three unsuccessful attempts to gain a Royal Charter during the 1880s and 90s. The failure of the Edinburgh, Glasgow and Aberdeen societies to accommodate the Scottish Institute also resulted in the formation of a Corporation of Accountants, Ltd, in 1891 whose organisational title was specifically designed to be abbreviated to ‘CA’ and thereby usurp the business and status of the members of the chartered organisations. Such pretensions were successfully fought off by the CAs in landmark court cases in 1893 and 1903 which gave legal protection to the exclusive use of the initials.

The development of the profession in the rest of the UK

The importance of acquiring ‘chartered accountant’ status was not lost on accountants south of the border. The Institute of Accountants in London, founded in 1870, one of the societies which formed the Institute of Chartered Accountants in England and Wales (ICAEW) in 1880, had as its principal object to take steps “to form an Association of Accountants, to be incorporated by Royal Charter”. Similarly, the initiator of the Institute of Chartered Accountants in Ireland (ICAI) is reputed to have stated in 1887 that he and his colleagues “would have a Charter or nothing”.

As in Scotland, the accountancy profession in England was initially organised on a local basis. The exclusion of certain practitioners on the basis of their geographical location and lack of professional standing from the London Institute resulted in the formation of an additional association of provincial practitioners in the form of the Society of Accountants in England in 1873. So far as acquiring chartered status was concerned a problem confronted the English societies. In 1867 when the Society of Accountants of Aberdeen received its royal charter, a Companies Act was passed which permitted incorporation without the use of the word “Limited”. Subsequently, the government discouraged applications for incorporation by royal charter.
The formation of the Institute of Chartered Accountants in England and Wales was the outcome of disputes between the five English bodies concerning an attempt by the London Institute to steal a march over the Society of Accountants in England and achieve incorporation via a parliamentary bill in 1879. The Bill was rejected and the institutes were unexpectedly advised to seek a unifying royal charter which was granted in 1880.

The aim of the charter was "the elevation of the profession of public accountants" in England and Wales. To achieve that object, lengthy discussions took place before the integration of the English societies as to what constituted the work of a "public accountant". Whereas in Scotland there had existed a respectable accountancy profession previous to organisation in 1853, in England there was a greater need to distinguish the professional practitioner from the host of commercial occupations such as auctioneering and brokerage in which many 'accountants' were also engaged. The resulting 'illiberal' definitions of what constituted public practice and the imposition of closure techniques to exclude the non-professional from the ICAEW resulted in the formation of another competing organisation in 1885: the Society of Accountants and Auditors. As the chartered societies had done in Scotland, the ICAEW's reaction to organisational competitors was degradation rather than accommodation. The Accountant described the members of the new incorporated society as "a formidable array of clerks of all kinds – rent collectors, corn merchants, shop-keepers, valuers, collectors of taxes, bailiffs, secretaries of various concerns, civil engineers, school board clerks, overseers, timber agents, pawnbrokers and manure merchants."

The inter-organisational hostility which was fostered by such confrontational comments came to fruition during the last two decades of the nineteenth century and the first decade of the twentieth. During this period of 'social liberalism' the state became increasingly involved in establishing national infrastructures in spheres such as local government and education. Legislation was passed which specified the qualifications of the auditors of local councils and this offered the prospect of a legal monopoly of certain forms of appointment for professional accountants. In 1890 the President of the ICAEW was confident that "The time is not distant when a clause will find its way into every Act of Parliament enacting that in any and every case where the appointment of a public auditor, liquidator, trustee or receiver is required, that official shall be a chartered accountant."

Not all local authorities concurred and some such as the City of London opened its audit to all "properly qualified accountants". The result was the presentation to Parliament of a succession of competing Bills sponsored by the various accountancy organisations designed to close off practice to those who were not within the definition of 'public accountant' or those not
eligible to appear on a register. From 1879 to 1912 accountants were the subject of no fewer than 25 parliamentary bills none of which were successful.

**The emergence of new specialisms**
The maturation of urban-industrial society from the mid-nineteenth century increased the demand for accounting labour outwith public practice and additional organisations were founded. Rapid urbanisation (in 1851 half the population of Britain lived in towns compared with 80% by 1911) created substantial problems in the provision of housing and basic utilities during the nineteenth century. New municipal corporations were established together with a plethora of boards to provide local services and raise the revenue to finance their operation. During the 1880s the institutions of local government were rationalised and the scale of local administration increased in the period of ‘municipal socialism’. In 1885 the borough accountants of the great industrial centres in the north and midlands of England formed the Corporate Treasurers and Accountants Institute (incorporated in 1901 as the Institute of Municipal Treasurers and Accountants and currently the Chartered Institute of Public Finance Accountants).
The structure of British industry underwent significant changes in the second half of the nineteenth century. The transition from an agrarian to a manufacturing dominated economy was completed. Technological advances resulted in improved efficiency, increased standardisation and made mass production techniques feasible. Changes in company law, particularly in 1856 and 1862 encouraged joint stock enterprise and the pooling of capital to finance larger businesses. These developments were vital given Britain’s loss of economic supremacy following the industrialisation of Germany and the United States from the 1870s and pressure to reduce costs during the ‘great depression’ which lasted until the mid 1890s.
The increase in the scale and capitalisation of business together with assembly line technology and the need to monitor prices and costs required more complex management structures. Within the larger organisations the functional demarcations between production engineers, managers and cost accountants became clearer. The increasing importance of costing and those who practised the technique was apparent during the first great international conflict of the industrialised world – the First World War. As the scale of the war became more intense it was apparent that the unfettered market was unable to distribute resources in a manner which satisfied military and domestic requirements. From 1915 the government took control of vital industries, labour and prices and accountants were employed to apply scientific methods of control.
The occupational respectability accorded to cost accountants during the war
may be measured by the formation of the Institute of Cost Accountants in 1919 (later the Institute of Cost and Works Accountants and currently the Chartered Institute of Management Accountants). The members of the new organisation had two non-professional characteristics which precluded their integration into the then existing organisations of accountants: they were not engaged in public practice and they were employees. Hence, when the ICWA petitioned for a royal charter in 1922, the ICAEW and the Incorporated Accountants objected that the members were "not engaged in professional work but are employed in the service of traders".

The 1914–18 War also created an expansion in taxation work for accountants which had been boosted earlier by new attitudes toward the use of taxation for social expenditure. This required increased revenue and new tax structures as epitomised by the advent of death duty in 1894, the distinction between earned and unearned income in 1907 and the redistributive Lloyd George budget of 1909. The financial demands of the First World War resulted in a near six-fold increase in the rate of Income Tax during the conflict and in 1915 Excess Profits Duty was introduced on wartime business profits. Earlier, in 1903, the Finance Act had provided official recognition of the participation of accountants in the Inland Revenue appeals process. However, by defining an accountant as "a person who has been admitted as a member of an incorporated society of accountants" the Act induced the formation of a new generation of societies registered under the Companies Acts and containing practitioners outside the existing professional organisations. These bodies were the: Institution of Certified Public Accountants Ltd. (1903), the London Association of Accountants Ltd. (1904) and the Central Association of Accountants Ltd. (1905).

The number of societies of accountants continued to increase during the inter-war years as other specialists (such as poor law accountants and company accountants) and those unable to gain entry to the existing bodies formed their own organisations. By 1930, when the Goschen Committee of the Board of Trade was constituted to consider the registration of the profession, there existed at least 18 bodies representing the accountants of the United Kingdom.

The rationalisation of the British profession
Since the 1930s the disparate societies of accountants have made several, mostly unsuccessful, attempts to integrate the profession. These efforts have occurred in the context of the increasing intervention of the state in economic and social affairs. An indication of the increasing scale of government in Britain is the fact that national government expenditure has risen by over thirty times in real terms since the last years of the nineteenth century and the number of white collar civil servants has increased five-fold.
The trend toward the centralisation of power and of governmental functions have resulted in consistent demands for the profession to speak to governments with one voice.

Following the world economic crisis of 1929-31, the National Governments of the 1930s finally abandoned free trade policies and through selective intervention in industry and depressed areas commenced the development of a mixed economy in Britain. Moves towards managed capitalism received a substantial impetus during World War Two. The exigencies of 'total war' required the imposition of comprehensive state control of land, capital and labour. The foundations of post-war demand management, nationalisation, regional policy, central planning and social welfare were established during the 1939-45 conflict.

The Second World War had a further consequence which strengthened the argument for a united front by the British accountancy profession when consulting with government institutions. The need to prevent a reoccurrence of military conflict in Europe by encouraging cooperation and a commonality of economic interests resulted in the formation of the EEC in 1957 of which the UK became a member in 1973. The EC views accounting harmonisation via the incorporation of directives into national law as an important component of the development of a single economic space.

In the light of centralising tendencies in national and international government, the disparate structure of the British accountancy profession has appeared anomalous.

Concerted attempts to amalgamate the societies of accountants in public practice began during the 1930s. In 1939 the London Association and the Corporation of Accountants merged as the Association of Certified and Corporate Accountants which, in turn, absorbed the Institute of Certified Public Accountants in 1941. Plans to co-ordinate the chartered profession emanating from the ICAEW commenced during the Second World War but proved to be protracted and difficult. However, a Public Accountants Bill which proposed registration did emerge from the negotiations in 1946. The Bill, which was redrafted in 1950, was eventually abandoned due to the recurring problem of defining public accountancy and the achievement of some of its objectives in the Companies Act 1947 which restricted corporate auditing to the members of certain institutes.

Although the war-time co-ordination movements were unsuccessful, the discussions between the institutes which arose indirectly resulted in two important measures of integration within the profession. In 1951 the Edinburgh, Glasgow and Aberdeen societies merged as The Institute of Chartered Accountants of Scotland (ICAS) and in 1957 10,300 members of the Society of Incorporated Accountants and Auditors were absorbed by the ICAEW, ICAS and ICAI. A Chartered Accountants' Joint Standing
Committee was also constituted in 1957 to co-ordinate future policy on integration and to consider matters of common interest. During the mid 1960s concerns over the confusing number of accountancy qualifications together with the potential advantages of a unified profession encouraged the emergence of a more ambitious scheme of integration. It was proposed that the institutes of the certified, cost and public finance accountants would be combined with the chartered societies to create three institutes based in England and Wales, Scotland and Ireland and that a twotier professional qualification consisting of chartered and licentiates would be established. Of the six major professional organisations, only the members of the ICAEW rejected the scheme for a variety of reasons including the breakdown of the fundamental status distinction established during the nineteenth century between those in public practice and those outside it. The reaction to the failure to integrate in 1970 was the formation in 1974, at the instigation of ICAS, of the Consultative Committee of Accountancy Bodies to develop joint representation on matters of common interest.

A series of comparatively less ambitious attempts at merger were made during the 1970s and 80s culminating in the proposal to form an Institute of Chartered Accountants of Great Britain by amalgamating ICAEW and ICAS in 1989. The object of the Anglo-Scottish merger was to construct a single authoritative British chartered profession in the context of the increasingly regulatory environment and the prospect of the Single Market in 1992. Although 94% of votes cast by ICAEW members favoured the formation of a British Institute, 55% of ICAS voters were against the proposal.

**Professionalisation in other English speaking countries**

Following the organisation of the public accountants of Scotland and England by the mid-1870s, the example of professionalisation was attempted elsewhere though seldom was the British example of the formation and maintenance of a large number of competing societies based on different layers of professional status and occupational specialisms to be emulated. Despite the partial integration of the societies since the 1930s, the UK still has a disproportionately large number of organisations of professional accountants. The British influence was most apparent in those nations which received massive amounts of investment capital and significant numbers of emigrant accountants from the United Kingdom during the late nineteenth and early twentieth centuries.

Accountants in Canada originally organised on a local basis and their associations were incorporated under provincial statutes. The first society was The Association of Accountants in Montreal which was initiated in 1879 and incorporated in 1880. The Montreal association imposed
conditions of entry based on geographical location, age, indenture, examination and the payment of fees. Accountants in Toronto also commenced organisation in 1879 and made concerted efforts to achieve incorporation under the British royal charter model. In 1883 The Institute of Chartered Accountants of Ontario was constituted under an act of the provincial legislature which granted powers to the society to award diplomas conferring the credentials FCA. Other institutes of accountants and chartered accountants were subsequently formed and incorporated in Manitoba (1886), Nova Scotia (1900) and British Columbia (1904).

In 1902, the forerunner of the present Canadian Institute of Chartered Accountants was formed as The Dominion Association of Chartered Accountants which was incorporated by the Canadian Parliament to organise accountants on a federal basis. Despite the initial opposition of the provincial institutes, it was agreed in 1910 that the Dominion Association should co-ordinate the national activities of the profession. In addition to the chartered profession, a number of small second-tier organisations of accountants formed in Canada, such as the Certified General Accountants Association in 1908. As in the UK, Canadian cost accountants organised in 1919.

Several aspects of the British-chartered model of professional organisation were imported in Australia. The first organisations of accountants were organised on a local-state basis in the colonial capitals: Adelaide (1885), Melbourne (1886), Brisbane (1891), Sydney (1894), Hobart (1897) and Perth (1900). Duplication emerged within the larger, developed states. By the end of the nineteenth century there were four bodies of accountants in Victoria. Unsuccessful attempts were made by the competing societies to achieve registration by legislation during the 1890s followed by applications for charters in the 1900s. In 1907 the Australasian Corporation of Public Accountants was founded and became the Institute of Chartered Accountants in Australia following the grant of a royal charter in 1928. As in Britain, a separate institute of cost accountants was formed and the early proliferation of societies was followed by a period of rationalisation. The formation of the Australian Society of Accountants in 1952 was a result of the merger of the Commonwealth Institute of Accountants – the successor of the early state organisations and the Federal Institute of Accountants (1894).

The growth and development of the accountancy profession in the USA has been attributed to industrialisation and the rise of financial capitalism after the Civil War which increased the demand for accounting services. The American industrial achievement was made possible by raising large sums of capital, much of it from Britain. A small number of British accountants established firms in the major American cities to take advantage of the late nineteenth century expansion of auditing and investigation work and to
monitor British investments. Two British practitioners (James T Anyon and Edwin Guthrie) are credited with initiating the American Association of Public Accountants (later the American Institute of Accountants) which was formed in 1887.

In 1896, at the peak of the registration debate in the UK, the Certified Accountants Act was passed by the New York state legislature "to regulate the profession of Public Accountant". During the last years of the nineteenth century and the early years of the twentieth, organisations of public accountants were founded in the individual states and by 1921 CPA legislation had been passed in all of them. The ability to practise thus became dependent on fulfilling conditions of entry and registration with State Boards. The use of the credentials 'CPA' was restricted by law to those who were licensed. Despite the advantages of CPA laws, the profession in the US has not been devoid of inter-organisational division: during the early 1900s there were disputes between the state societies concerning differing approaches to education and registration; in 1921 a "great schism" was opened by the formation of the American Society of Certified Public Accountants and was closed by a merger in 1937. The American Institute of Certified Public Accountants is currently the largest professional association in the world with over a quarter of a million members. In 1920 there had been only 5,000 certified public accountants in the USA.

In New Zealand some of the problems which encouraged intra-organisational discord in the British profession were not so apparent due to early legislative codification of the meaning of public practice and an absence of the obsession with chartered accountant status. The Institute of Accountants of New Zealand was incorporated in 1894 as was The New Zealand Accountants and Auditors Society in 1898, the latter being formed when the former introduced entry only by examination. The profession came under state regulation in 1908 when an Act of Parliament established the New Zealand Society of Accountants whose members were exclusively entitled to use the term 'public accountant'. A comparatively constructive relationship existed between the New Zealand Accountants and Auditors Society and the New Zealand Society of Accountants and a merger took place in 1950. The Incorporated Institute, which was open to members of the New Zealand Society of Accountants, was disbanded in 1972. An institute of cost accountants was formed in 1944 and this was also accommodated within existing professional structures by becoming a division of the New Zealand Society of Accountants in 1966.

In South Africa also, although the earliest societies of accountants were constituted on the British model and the chartered-incorporated accountant divide was imported and influenced organisation, some of the structural problems of the UK profession were later avoided by successful attempts at registration. An Institute of Accountants and Auditors in the South African
Republic was formed in 1894 in Johannesburg. An application for incorporation by charter was interrupted by the outbreak of the Boer War in 1899 and, following the cessation of hostilities in 1902, the Institute became the Transvaal branch of the Society of Accountants and Auditors in the UK. In 1903 a rival Transvaal based Institute of Chartered Accountants in South Africa was founded by British chartered practitioners resident in South Africa. In 1904 the Transvaal Institute secured an Ordinance which reconstituted itself as The Transvaal Society of Accountants – a regulatory body with responsibility for maintaining a register of public accountants – the first registration of the profession within the British Empire. Similar legislation was passed in Natal in 1909. Following the Union of South Africa in 1910, the accountancy profession became organised in the four provinces. In 1927 members of the societies were given exclusive right to the title “chartered accountant” and in 1951 registration was imposed on the whole Republic under the Public Accountants' and Auditors' Act.

Professionalisation in Europe

In Italy the organisation of the profession has been influenced by the early collegiate bodies and the determination of the duties of the accountant, his professional conduct, fees and the purpose of the profession by laws and decrees. Following a National Congress of Accountants in Rome in 1879, Colleges of Accountants were established in judicial districts of which there are now 100 under the supervision of a National Council (Consiglio Nazionale dei Ragionieri e Periti Commerciali). In 1906 a law was passed regulating the conditions of admission to the Collegi dei Regionieri and reserving public practice to their members. In addition to Ragionieri, from 1929 Institutes of Doctors in Accounting (Ordine dei Dottori Commercialisti) were also legally established, of which there are currently 113 overseen by a National Council. Although decrees specify the nature of the work to be undertaken by each category of accountant, there is little difference in practice.

The first public accountancy practice in Holland is reputed to have commenced in 1880 and during the last two decades of the nineteenth century an increase in the numbers of practitioners culminated in the formation of five organisations of accountants by 1914. The most important of these was the Netherlands Institute of Accountants (NIVA) which was founded in 1895 and was organised on a basis similar to the chartered institutes in Britain. One of the objects of the Institute was to strive “toward a legal regulatory system for the profession of accountant, as auditor of books and accounts, liquidator, and administrative expert”. Attempts to achieve regulation were made in 1900, 1906, 1920, 1930, and 1939 but failed due to a number of reasons including disagreements within and between the several institutes. However, in 1962 a Chartered Accountants
Act, which created the Nederlands Instituut van Registeraccountants (NIVRA), finally reserved auditing to Registeraccountants (RA) and regulated examinations for admission. In 1974 another category of accountants – accountant-administratieconsulent (AA) – were regulated by law. Until recently, AAs could only conduct business other than the certification of accounts. However, as from September 1993, as a result of new legislation, AAs have acquired the right (after passing additional examinations) to certify. As in Britain, the implementation of recent EC directives encouraged demands for the creation of a single class of practitioner but in the end the qualifications of AAs and RAs were kept separate.

The development of the profession in France has been influenced by the comparatively low status accorded to the occupation during the nineteenth century, state involvement, and by the institutional separation of accountants and auditors (also a feature in Belgium). The first professional association was the Société Académique de Comptabilité (later the Société de Comptabilité de France) of 1881 which based entry on examination and established three categories of practitioner: teneurs de livres, comptables and expert-comptables, the latter being the most prestigious. A number of other societies, each offering their own diplomas, were subsequently organised for certain classes of practitioner or those resident in particular areas of the country. The accountancy profession was rationalised by the Vichy Government in 1945 under a decree which formalised the Ordre des Experts Comptables et des Comptables Agréés (instituted in 1942) and delineated the functions of the two types of practitioner (preparing and keeping accounts) and their routes to qualification. The formation of regional organisations of auditors was encouraged by legislation in 1935 which extended the audit function. During the 1960s further regulation of auditing culminated in the formation of a new professional organisation – the Compagnie Nationale des Commissaires aux Comptes.

Compared with the rest of Europe, the organisation of the accountancy profession in Germany is a recent phenomenon and this has been attributed to the correspondingly late emergence of German accounting law, which was developed after the economic crises of the inter-war period. The Institut der Wirtschaftsprüfer (Institute of Certified Auditors) was initiated at the time of a decree in 1931 which required statutory audits to be conducted by independent practitioners. In 1961 a Wirtschaftsprüferkammer (Chamber of Auditors) was established by law as a professional organisation supervised by the Federal Minister of Economics to which practising accountants (certified accountants and auditors) must belong. Membership of the Institut is voluntary.

As is apparent from the above, the development of the profession in Europe has been conditioned by national systems of law, post-war European
integration, economic, social and political developments and the example provided by professional organisation in other countries. In Denmark, a professional association was established in 1912 following the state taking control of the examination and authorisation of public accountants. In Sweden the profession also became established in 1912 when the Stockholm Chamber of Commerce commenced the authorisation of public accountants. In Greece an Institute of Sworn-in-Accountants was established by law in 1955 following advice from British chartered accountants on the establishment of an institutionalised auditing profession. The emergence of professional associations in Eastern Europe has, by contrast, been disturbed by political upheaval. For instance, in Poland an Association of Accountants was formed in 1907. After the Second World War and the imposition of a centrally-planned economy, an Institute of State Authorised Accountants was established and since the transition toward a market economy commenced in the late 1980s, the profession is once more being restructured. Similarly, in Russia, attempts to establish a professional organisation date from the late 1880s and after the 1917 Revolution an Institute of State Accounting Experts was formed but was disbanded under the Stalinist regime. In 1989 an Association of Accountants was formed in the USSR following the entry of the Soviet Union to the World Federation of Accountants.

Professionalisation in the rest of the world
The organisation of the accountancy profession in countries which have become developed or reconstructed during the post-war era has often been heavily influenced by the structure and practices of the profession in the UK and USA. This has been attributed to several factors: the example provided by the professional bodies in the USA and UK and the emulation of their best features; the spread of Western capitalist philosophy and culture; the internationalisation of business and of the major accountancy firms (which were founded in the USA and UK); the use of English as a second language and the emigration of practitioners to developing countries, particularly while these were under colonial rule.

The first groups of professional accountants in Japan have been traced to 1907 and twenty years later an Accountant Law restricted public practice to those with certain qualifications. The American influence was apparent during the occupation of Japan by American and Commonwealth forces from 1945 to 1952. The formal institutionalisation of the Japanese profession occurred with the passing of the Certified Public Accountants Law 1948 which arose out of the financial reporting requirements of post-war reconstruction. The Japanese Institute of Certified Public Accountants, the only organisation of professional accountants in Japan, was originally established in 1949 as a voluntary body. In 1966 a revised CPA Law
required that all CPAs were required to become members of the Japanese Institute. The development of the profession in Japan has occurred contemporaneously with Securities and Exchange Law (from 1951) which requires corporate audits to be conducted by CPAs or an independent audit corporation.

A CPA based structure was also introduced in The Philippines in 1923 when a Board of Accountancy was established to regulate accounting practice and issue CPA certificates. In 1929 the Philippine Institute of Certified Public Accountants was formed and became incorporated after the Second World War. Professional organisations were established in several other developing nations (often based on the CPA model) of the Far East from the 1940s such as in Korea (1944), Taiwan (1948), Thailand (1948), Indonesia (1957), and Malaya (1958). The advantages of early state regulation of the profession and of the formation of single institutes are a common feature of those countries where the profession is still in its infancy.

In India, corporate law has been heavily influenced by British legislation and during the early years of the independent state a Chartered Accountant Act was introduced under which a qualifying body – The Institute of Chartered Accountants – was established in 1949. The Act effectively introduced registration as non-chartered accountants were prevented from conducting audits. An Institute of Cost and Works Accountants was incorporated in 1944 and this was reconstituted and regulated by a Cost and Works Accountants Act 1959. In Pakistan, an Institute of Chartered Accountants was established in 1961.

With the rapid decolonisation of Africa since 1945, independent nations have developed their own accountancy institutions. However, the legacy of colonial rule has often coloured the professional associations which have been established. In East Africa the dominant influence has been UK company law, particularly the Companies Act 1948. In Tanzania, Kenya and Zambia, accountants formerly qualified under examinations sponsored or organised by the British institutes and this has influenced the qualifying structures which have been established when national professional organisations have been formed. In the west of Africa, British influences have also been apparent in the formation of Institutes of chartered accountants in, for example, Ghana in 1963 and Nigeria in 1965 following independence in 1957 and 1960 respectively.

In some Central and South American countries the progress of indigenous professional organisations has been adversely affected by the slow growth of an occupation which is perceived to have a comparatively low status. In Colombia, for instance, the history of professional organisation began in 1924 but a durable association dates only from 1952. The first Chilean society of accountants was formed in 1915 and during the 1920s and 30s
over a dozen local and specialist organisations were established which merged as the Sociedad Nacional de Contadores in 1937. The political and economic relationships between the USA and the South American countries has influenced the development of the profession in nations such as Mexico where the Institute of Public Accountants was founded in 1917. European influences are apparent elsewhere. In Peru the Institute of Peruvian Accountants was instigated in 1900 by a German accountant.

**Conclusions**

It is apparent from the foregoing that throughout history the number of accountancy practitioners has expanded in response to the increasing complexity and sophistication of the economic, social and political structures of nations. Other factors have also encouraged occupational expansion. Not the least important is the development of improved accounting technologies. A distinguishing characteristic of accountancy is the flexible definition of its occupational boundaries. The inability to identify the features of 'professional practice' has been a source of inter-organisational discord and weakness in several countries but it has also permitted accountants to broaden the field of their practice to satisfy the demands for new services in the maturing industrial and post-industrial societies. Occupational expansion has also been self-generated where the profession has comprised a multiplicity of competing organisations (particularly where the British model of professional organisation has been adopted). However, it was partly due to the emigration of the oversupply of practitioners produced by the rival accountancy bodies in late nineteenth and early twentieth century Britain that nascent professional associations were constituted overseas. The dominant influences in the formation of professional organisations in the developing world have been British and American though most countries have avoided total emulation of the former by taking action to avert the perpetual problems which have been caused by the failure to achieve state registration. As the last bastions of communism concede to the free market the prospect of the further extension of the Anglo-American professional models to Eastern Europe and China is a real one.
Further Reading

Association of Certified and Corporate Accountants, Fifty Years (Margate: Eyre and Spottiswoode, 1954).
Littleton, A.C., Accounting Evolution to 1900 (New York: Russell & Russell, 1933).

Murray, D., Chapters in the History of Bookkeeping, Accountancy and Commercial Arithmetic (Glasgow: Jackson, Wylie & Co., 1930).

Parker, R.H., The Development of the Accountancy Profession in Britain to the Early Twentieth Century (Academy of Accounting Historians, Monograph 5, 1986).


CHAPTER 3

Information Technology and the Accountancy Profession

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Introduction
The purpose of this paper is to review some aspects of the interaction between information technology (IT) and the accountancy profession. In particular, I consider the extent to which the profession has influenced the development of IT and vice versa. To address these issues, I sketch some history of information technology to show that it became as it is today not so much by design as by accident. I try to show the many ways in which IT actively affects people and shapes their attitudes and behaviour. Finally I reflect briefly on how organisations are changing under the influence of the new technologies and how I think the accountancy profession may be deeply involved with these changes.

Origins of IT
It is difficult to separate the many streams of thought that have resulted in the existence of the present information technologies. I have divided them arbitrarily. First I look at some early efforts to graph and mechanise logical and causal relations. I then sketch the history of adaptive machines and, finally, take a look at how these support mass data processing for operational purposes, such as bookkeeping and the generation of information for forecasting and decision-making. I try to relate what is afoot to the accountancy profession.

Logical technologies
Analysis
For generations there have been attempts to produce devices for solving logical and mathematical problems by analysis. The devices have been conceptual, graphical, mechanical and, recently, electrical and electronic in form. For instance, Aristotle used tree-like graphs to divide and classify the primary and secondary substances and to distinguish species from genus. Branching tree-graphs of just this kind can represent the dumb machines that contributed so much to the early development of modern information technology. Document sorting boxes were perhaps the earliest office machines. The automatic Hollerith sorter/tabulator in the 1890s performed the same work using punched cards. Electric telegraphs, such as Reuters ticker-tape, used punched tape. Both punched cards and punched tapes became favoured ways of entering programs and data into early mainframe computers.

Synthesis
Another stream of activity was devoted to synthesising knowledge by combining different fragments of data to form information. In the thirteenth century, Fr. Ramon Lull invented a set of tables for arranging all possible combinations of the a priori principles or categories in every branch of
knowledge. He claimed that this would enable one to know everything. By rearranging letters, words and ideas into unfamiliar patterns Lull must have produced some surprises, if not heresies, and stimulated creative conversations just as in a brainstorming session today. Of course such ways of generating random associations of letters, words, ideas and opinions, do not guarantee that the relationships between them, though they might make sense or even be true, are logically consistent and valid. Consistency and logical validity have been very highly prized for so long that it is almost heretical to question their value.

Logical relations

The third type of logical technology is that based on logical relations. Although Aristotle presented us with the rules for valid logical argument — if the premises of a valid logical argument are true then its conclusion is true — we have had problems since then testing real life arguments against his pure form. Leibniz (1646-1715), and others, dealt with this problem using circles to depict propositions. Euler (1707-83) and Venn (1834-1923) developed similar diagrams and these now form the foundation for the new mathematics introduced widely in the United Kingdom in the 1960s. These diagrams can depict only a strictly limited number of variables so many people tried to add further dimensions to them. For example, Charles Pierce (1834-1919) believed that his system of graphs and a sheet of assertion made of rubber, that he stretched and shaped to connect the signs on his graphs, would reveal new truths. His symbolism bears a resemblance to the topological graphs used by Kurt Lewin in his group dynamics work between the World Wars, to some of the diagrams used by today’s soft systems methodologies and to programs such as COPE and STELLA that use computers to aid cognitive mapping.

Martin Gardner, whose work provides many insights into the history of such machines, awards Charles Stanhope (1753-1816) the title of inventor of the first engine for solving both logical and arithmetical problems rigorously, although Lewis Carroll (1886) and Jevons (1835-82) were among the many inventors of progressively more successful engines for conducting operations in formal logic. George Boole (1816-64) was the originator of the modern truth-value based propositional calculus which eventually led to the modern approach to computation that employs at least binary (true or false; yes or no; on or off; 1 or 0) logic.

Lately there has been greater interest in representing degrees of truth or the likelihood of something belonging to a particular class of things, using many-valued logics, such as Zadeh’s probabilistic fuzzy logic or Reichenbach’s three-valued quantum logic (true, false and indeterminate). Some think these modifications of formal logic emulate human thought
processes more convincingly than strictly formal two-state logic can ever do. Despite all this, others hold that human thought is really more about model building and relating ideas than it is about the operations of logic, digital, fuzzy or otherwise. They claim that we could build credible models of people's perceptions and thought processes without having to depict reasoning at all.

Causal relations
Very similar to logical diagrams are those graphs and graphical engines that reflect causal relations. Some depict actual operational connections between events in time. Containers of coloured water connected by pipes and valves have depicted accounting and stock control systems. Such a device is an analogue computer. Today a common example of such a device is a planning chart. Charts can describe what are and what should be the causal relations between things. A common example is the Program Evaluation and Review Technique (PERT).
I should not omit mention of a London accountant, Stavros Foundos, who, around 1977, developed a logical engine, which, but for the arrival of the cheap digital computer, might well have found applications as a ready reckoner in law, taxation, business decision-making, cost allocation and financial accounting, medical diagnosis, operations research and game theory — indeed anywhere that binary or ternary decision trees could be used. Computer programs now embody all these charts of logical and causal relations and support accountants and managers in their daily work.

Adaptive technologies
Cybernetic feedback
A quite different stream of thought developed in the world of the engineer as a result of using cybernetics, ie the science of control and communication in animals and machines. James Watt was probably the first to theorise and apply the cybernetic principle of negative feedback when, during the industrial revolution, he designed and built mechanical governors to replace the human engine driver who throttled the supply of steam or water to the engine or the mill wheel.
Stimulated by the successes of the cybernetic principle in code-breaking during the Second World War and the development of a number of machines that could learn to behave better from experience, there was great enthusiasm for building machines that reflected aspects of human intelligence. For example, Grey Walter's Docilis was one of many mechanical turtles that developed Pavlovian conditioned reflexes by bumping into things, and then discovering for themselves how to get around obstacles. Other machines sought light, sound and heat within certain thresholds and under stipulated conditions employing the cybernetic principle.
Cybernetics has been familiar to accountants for many years as variance analysis and budgetary control, and these remain the main devices for steering most functions in companies. Hofstede argues that its application to non-routine processes will certainly fail. Others contend that it inhibits learning by the system because it provides strong incentives to cover up mistakes and to throttle initiative.

**Gaming machines and expert systems**

The application of computers to playing games has found an important place in strategic planning and control. The first uses, apart from experiments with chess playing machines, were mainly military. Games theory has played a variety of roles from strategic planning and control to the training of submarine commanders.

Computer-supported business games now train managers and accountants and model real life business situations. They act as test beds for different strategies and provide answers to “what if?” questions. Some of these machines learn from experience, from trial and error; others are successful because they can recall from memory similar situations in the past and what the acceptable solutions were then.

Some machines modelled human personality traits, suffered neuroses and simulated human reactions to stress. Such models had potential use in demonstrating the behaviour of patients suffering the effects of trauma, customers in sales situations or managers under pressure. Today these models have the potential to depict the landscape of the mind and to permit non-invasive exploration of that unfamiliar territory in a kind of virtual reality.

Expert systems, the latest in this family of research, come in many varieties. Loaded with a tree of knowledge, they can diagnose a situation by interrogating someone about it in a systematic way, or they may advise how to reach a particular solution by stipulating what are its sufficient conditions. They can also explain how they come to their conclusions. Expert systems have attracted considerable attention from accountants and there are many in use commercially, often embedded in conventional decision-support programs.

In this section I hope I have shown that today's technologies have emerged from very many different streams of thought. I have tried to avoid giving the impression that these have converged in any way. With hindsight the past always seems to converge on the present, but of course this is the same illusion that we experience when we stand anywhere in a network and view what is around us. Our viewpoint preferentially selects the history that looks as if it led to the present and firmly excludes everything that does not look that way.
Bulk processing information
We experience the same illusion when we look at the physical things that made up the technology.

Typewriters and their successors
The printed word has become the main medium of communication in our society. I believe it is responsible for much of the uniformity of social organisation and for the monotonous adoption to the contemporaneously fashionable “one right way”. The written word can be seen as a means of standardising definitions and meanings and of promulgating procedures. Its adoption marked important changes in the ways in which society was organised.

The printing press was domesticated when the typewriter arrived in the nineteenth century. Once the keyboard had become standardised and the mechanism arranged so that the typist could see the work, this mechanical wonder became very popular. Copying devices complemented the typewriter and extended the sphere of influence of the typewritten word. By the turn of the century automatic cash registers incorporating the features of list-adding machines with a secure cash box, were in extensive use. In the early 1950s book-keeping machines (which were just large list-adders) typed many-copied orders and invoices on continuous stationery, posted entries on to ledger cards and kept running totals of the value and numbers of transactions entered, all at the same time.

The big engines
The main stream of computer-supported information technology started to flow when the first business machines, UNIVAC-1 and the IBM 650, came to the market around 1954. By today’s standards these machines were big, slow, comparatively temperamental, very hot and demanded specially clean air-conditioned environments. Larger companies used these great machines for simple, repetitive, labour intensive tasks such as payroll, billing and the processing of accounts.

In the early days, the production of information other than for accounting purposes was often just a by-product of bookkeeping. Gradually this changed. Management consulting, based on scientific principles, addressed rate-setting, time and motion study, material usage control, waste control and recovery. The new profession of cost and works accountant emerged and computer support of their practices was often needed.

The set-up costs for each different kind of transaction processing were very high. Previously most office work was regular and continuous. Now all turned on the work schedule for this somewhat unreliable machine. This new constraint had quite a significant effect on the flow of work everywhere in the company, on planning the production line, in stores, and in the purchasing, sales and cash receiving offices. It became increasingly necessary
to program work in the office as if for a production line and quite diverse skills were required of the different kinds of office worker.

**Monsters no longer**

In the late 1960s and early 1970s, transistors replaced the big hot valves only to be replaced in turn by microchips and integrated circuits. Power increased whilst size and cost dropped; the contraptions generated less heat and became much more reliable. Programmers prepared their work off-line and prototype-tested it before mounting it on the machines. As set-up time reduced, more real-time processing was possible. As reliability increased, the work became more regular. Dumb terminals, intelligent terminals and then multi-purpose workstations slowly replaced the card and tape readers, first to provide input and later to help the end-user to call up programs and control the computer's operations.

The minicomputer edged its way into the market for special purposes such as modelling and processing one-off calculations. Compared with the mainframe it was much easier for non-professionals to program. Many companies installed it as a type of self-service support for the new, very much more numerate, generation of managers, engineers and research workers which had emerged after the Second World War. In a period of very full employment of such people, the provision of computing facilities clearly attracted the brighter candidates. They could have the benefit of computing power available when they wanted it without disrupting the routine accounting work already taking place on the computer.

**Contemporary information technologies**

**Microcomputers**

Perhaps the most surprisingly useful development was the personal microcomputer, which was introduced by Apple in the early 1980s. Compared with the mainframe, it was smaller, cheaper, easier to program, easily networked and it soon became integrated with all kinds of other equipment including the mainframe itself. The costs of data storage and retrieval also dropped dramatically.

The typical microcomputer now has a colour screen with very high definition, a word processor with spelling checker, thesaurus, grammar checker and convenient editing facilities. It also has a spreadsheet able to perform a wide variety of mathematical and statistical operations, with facilities for graph drawing. Microcomputers are now delivering far more power than the early mainframes (some of which are still in use) at prices comparable with those of the electric typewriters that they so often replace. Also, higher level programming languages, culminating in intelligent enquiring languages help quite unskilled users to run specialised applications and make complex searches of data bases. The advent of the personal
computer has put the end-user right in the driving seat.

Distributed computing
In the early days the big engines had to be centrally located so that they could be easily served with work and their outputs made readily available to management. Often big new headquarters grew up around the computer centre. Latterly, with the availability of cheaper and more reliable communications, the location of computers, whatever their size, became of much less importance. There is now a very marked tendency to decentralise administration. In some installations a network of microcomputers can perform operations just as well as a single large mainframe.
This distributed processing has reached impressive sophistication, for example in supermarket chains. The bar code readers at the checkout, connected to computers, can update the stock record for every item in the store and re-order stock; it can check that each item carries the correct price and print out a detailed receipt listing and pricing every item; it can also charge the total to the customer's bank account using a debit card as authorisation, and it can make the appropriate bookkeeping entries and provide sales returns for the buyers at headquarters either at the same time or by downloading overnight when the network is less occupied.

The strategic management of information technology
Decisions involving the strategic management of information technology are complex and exasperating. Complex, because different technologies progress at different rates and intermittently, which makes for difficulties in maintaining compatibility between components of the system. Exasperating too, because the past is absolutely no guide to the future. The progress of the technology is not well behaved and linear; it moves in fits and starts.
Big problems emerged in the early days of large scale computing. Some companies made strategic commitments to source from only one supplier to maintain compatibility of hardware and software, and to sustain some continuity of knowledge and skills. Under pressure from competition there were many failures among hardware suppliers and great difficulty in sustaining continuity. Some companies found themselves in a real mess because they allowed the technology to invade the company in a piecemeal way, thus becoming heavily reliant on out-dated equipment, incompatible systems, cumbersome programs, expensive-to-maintain machinery and an ageing and irreplaceable staff nearing retirement.
There are still pleas for company boards to become more IT literate and for them to have clearly defined IT strategies. Such was the uncertainty and the speed of change that the demands for long-term IT strategies were often unrealistic and attempts to meet them were time consuming and distracting from other important aspects of corporate affairs. We needed to adopt less
rigid ways of managing the development of information technology. It is no
surprise that some companies, instead of putting more information
technology specialists on the board, put the whole information technology
function out to contractors.
The situation may be stabilising now and the function of planning the
strategic management of IT may have become more mature and realistic.
There may be opportunities for the accountancy profession, with its interest
in the company’s future, to move into it. First, of course, it has to
demonstrate its superior expertise in the field.

And from here?
Of course, everything that already exists will get better, but there will also
be some very novel products and services widely available to enhance or
replace some things. I mention just a few:
* the increase in the use of home computers connected to cable or
  telephone networks will make home banking and shopping ever easier;
* computers will continue to get smaller and faster and deliver better value
  for money;
* even the keyboard is under threat. A plain sheet of paper, quite
  unconnected to the computer, with the diagram of a keyboard drawn on
  it and a miniature video camera fixed to the computer screen watching
  the user’s fingers could shrink portable machines even further. It could
  also provide physically more secure access to machines working in
  hostile environments such as operating theatres, heavy industry and cash
  dispensers;
* more intelligent document readers will be less vulnerable to failure
  through difficulties in reading poor typescript. Where the spoken word
  is appropriate, we shall use voice synthesisers. Handwriting readers are
  still at a primitive stage and generally require either highly stylised
  writing or quite long periods of training;
* the uses of paper as a communication medium will reduce as inter-
  terminal communications become faster, cheaper and capable of
carrying visual and animated material as easily as we send text today. A
personal computer with a videophone is already in production and
video-conferencing between the users of up to eight computers will
soon be possible; and
* in the field of information technology there is always a hope that
  someone will invent an entirely new form of computing to replace the
  conventional linear processor. If we could achieve truly concurrent
  processing then there could be a massive increase in reliability and
  performance. An entirely novel architecture, called the artificial neural
  network, is now available. This has demonstrated that it can generate its
  own program without using algorithmic logic, just by training or
learning from experience. It is particularly effective at detecting and recalling patterns of inputs and already has important applications in providing secure visual identification of the faces, fingerprints or voices of people using cash dispensers or needing to enter secure premises.

The profession of accountancy employs educated and experienced human intelligence of a high order – a scarce, very costly, often transient and relatively immobile, commodity. This makes the quest for artificial intelligence a great economic opportunity as well as a very interesting intellectual project. The neural networks mentioned above might further the quest for artificial intelligence, but there still seem to be three serious impediments remaining:

1. the most obvious is that we have no agreed notion about what constitutes intelligence so that with each step forward, once the surprise has worn off, we all say that the step, whatever it was, was not a sufficient reflection of human-like activity to be really intelligent;

2. whereas most computing systems in the past have been hierarchical, or at least dependent on a central controller, nervous systems seem to work concurrently, and we still have much to learn about how to run democratic computers; and

3. the third problem is that of scale – the world’s most powerful computer, Thinking Machines CM5 at Los Alamos, consists of just over a thousand parallel processors, but when my cat makes a learned movement with his paw, about one hundred million different neurones fire almost simultaneously.

Despite all this, the accountancy profession should remain alert to developments to neural networks, just as it has to be in the domain of expert systems generally, because much of accountancy could be both learned and taught by such machines. Neural networks might become the Paciolis of the future making the secrets of the profession available to a much wider public. They might even eliminate the need for using people for accounting altogether!

**How accountants and computer specialists have fared during the IT revolution**

*Clerks, accountants and computing experts*

As I mentioned above, the first extensive mechanisation of clerical work in this country started in the accounts departments of quite large companies. Thus, at the outset of the IT revolution, accountants were well placed to control the development of IT within companies. However, most accountants and auditors thought it best not to get involved in what was patently electro-mechanical engineering, so they tended to treat the whole computing function as just a huge black box. The computer was simply speedier, possibly cheaper, and, just sometimes, a bit more reliable than a
roomful of clerks. In arriving at this judgment many professional accountants, like very many others, quite underestimated the impact of information technology on organisational form.

Thus, although the mainframes and their associated systems were under the general control of the accounting function, those who ran them were specialists in programming, operations, system analysis and design, archiving and so on.

The computer brought with it an entirely new group of highly trained or experienced specialists. The computing experts were physically divorced from their colleagues, often living in relatively modern, air-conditioned and clean conditions, rarely typical of office work in the 1970s. As the big temperamental machines demanded shift and weekend work, the working hours of these very highly paid specialists were quite different from those of executives and office workers, more often being akin to those on a factory floor.

Most companies found that there was a constant queue for new systems analysis and design and for programming. Systems and computer specialists were in very short supply and commanded very high rewards. Most attention was directed to meeting the demands for new systems. In the early days, the maintenance of computing systems suffered. Often these specialists had educational backgrounds different from their superiors. They had quite different interests. Their first, and usually enthusiastic, commitment was to a technology that needed their constant attention and much nurturing. Some were quite uninformed about their company’s business or even the strategic role that data processing played in their company’s affairs.

As the technology changed, the specialists often found themselves marooned with very narrow skills and able to cope only with the particular systems on which they had served their apprenticeships. They, with the help of the hardware suppliers, often defended these systems long after they had become outdated and unsustainable. Few in the company outside their ranks had sufficient knowledge to challenge their judgment on technical matters. Some of these experts, initially the driving force for innovation, became very resistant to suggestions for change, seeing it threatening years of hard work.

Latterly, when most companies had almost filled their portfolios of new information technology, maintenance of old systems became the main task and as that became routine, so the job satisfaction of the specialists diminished. The creative urge was frustrated and many of the brightest drifted away to other more intellectually demanding activities. The microcomputer drove IT even further away from the direct control of the accountants, but it did serve to overcome the problem of queues for system design and programming. Even where companies had no policy at all for adopting microcomputers, computer buffs brought their hobby to work,
and inspired others with it. Soon many of the small nice-to-have programs were up and running, often in spite of the computer department. The new alternative technology presented itself as a strange mixture of hardware and operating systems of varying sophistication. Initially mastery of BASIC or some such language was essential, but soon word processors and spreadsheets made such skills redundant. The need for support of a new kind grew because the expertise that the big engines needed was inappropriate and there were very few outside experts to help. Suppliers of hardware and software were over-stretched, many products came to the market inadequately tested, and machine and program failures abounded.

The management of computing suddenly became very complex and beyond the competence of many IT specialists. Small data bases sprang up here and there, and incompatible hardware proliferated in wild variety. Management made almost desperate attempts to ensure that the ownership of information held on all data bases belonged to the company as a whole. Despite this, over time, as people came and went, user departments lost important data, documented and protected programs and data quite inadequately, corrupted data bases, allowed home-grown systems to crash irrecoverably and constantly produced incompatible systems. The users became a powerful class in real competition with the specialists. If the computer specialists did not meet their demands, they would meet them themselves, and in their own idiosyncratic ways. Computing ceased to be a technological problem and became and remains mainly a people problem.

One solution was to try to network all the systems so that they could share common data bases but, because of the variety of operating systems introduced by the enthusiasts, networking in large companies became a nightmare. The management of information technology was too important to be left with the technologists. Managerialism invaded the field and now new specialisms are appearing. Network managers try to create compatibility between systems developed by end-users and to develop seamless communications between all the systems in use. Included in the duties of information resource managers are ensuring that information is properly a corporate property, that functions do not keep it to themselves, that there are proper security standards and that users design, document, secure and archive programs properly.

These new specialisms may soon become very highly developed in their own right; they may well become professionalised and succeed in closing ranks against such "outsiders" as accountants.

*Money numbers and information*

To compound this problem, money numbers (adopted as the foundation of most organisational control systems) are quite inadequate measures of economy, efficiency and effectiveness, the watchwords of the managerial
culture. Not many managers manage money; they manage the disposition and control of very physical resources. They measure such things as machine performance, the standard minutes required to perform specific work, and the disposal of stock before its sell-by date. Thus, bookkeepers and accountants have long contended with other professions for the control of the company’s information, for example, with engineers measuring the weight of coal needed to produce a pound of steam. The assumption was that more information would provide the means of exercising more effective control.

The largest accountancy firms have diversified so widely into so many different activities that one might question whether some are accountants at all. So great now is the variety of their kinds that it seems unlikely that the profession as a whole will adapt very easily to the new technology. Despite this there will be a few pockets of substantial expertise, for example, in computer-audit that opens up the black box. The designers and owners of all the information systems in the company might once have been accountants, but I believe that a crucial moment has passed and they will not be able to regain that most important power base.

The repositioning of the accountancy profession is, however, not caused only by the new information technology. Another reason is the professionalising of managers. So how did management come to aspire to the lofty category of a profession?

Professionalising managers

It may seem odd to point to printing as having caused the emergence of what today we have come to call management. Printing is, perhaps, the most significant of all information technologies in history. The ancient Chinese invented it, but Gutenberg’s press enabled the printed word to reach out to educate and inform, not to say discipline, people far and wide.

With Pacioli and his contemporaries, printing started to become the vehicle for the professionalisation of the businessman. I submit that the publication of Pacioli’s handbook on bookkeeping de-mystified an arcane practice and revealed to all and sundry its dark secrets. Of course the numbers of people who had access to these secrets must have been few but the fact remains that, as Pacioli says himself, anyone with cash, an accounting and mathematical ability and an orderly set of properly kept books can be a successful businessman. Perhaps Pacioli was really promoting the professionalisation of the businessman when he preached the gospel of double entry?

By the late eighteenth century in the West, the printing press and increasing literacy were seemingly leading people away from mindless tradition, ignorance and fear of the unknown towards that daring to know with which we associate the Age of Reason, the genesis of modern scientific inquiry and
the development of many useful technologies. After Adam Smith's tour de force *The Wealth of Nations*, a management view emerged that, despite all efforts to decry, castigate or ignore it, remains to this day the dominant view of all those in business. What management regards as "good" centres on the efficiency, economy and effectiveness of the use of resources and everything (goods, people, skills, knowledge and even the company itself) are seen as commodities whose values can be established only in the market. Thus the ethical values of management are easily measured and conveniently processed by information technology and they all but eclipse the espoused values of the accountancy profession: trust, accountability, prudence, the reliable custodianship of the interests of others and personal, rather than corporate or collective, responsibility.

Traditions of dismissing ivory tower academics and of admiring practical men (the more unlettered the better) flourished and still persist in the United Kingdom. Neither literacy nor numeracy, beyond the level of the three Rs, was essential for membership of the managerial community. It has taken a long time for Pacioli's penny to drop; only in the last few decades has the need to educate managers and businessmen in accountancy and the like been widely acknowledged. What has been taught have been the techniques and methodologies rather than a liberal education. The practical use of the tools of the manager has been drilled into many, but few have any deep understanding of the assumptions, evidence and principles which underlie the craft.

*Technology and managerial detachment*

The managerial revolution started in the early twentieth century. It successfully established managers as a new class in society quite distinct from those of the older professions, the owners and their agents, accountants, technicians, salaried staff and wage earners. Managers had little choice but to converse eyeball to eyeball with their workforce as, until the typewriter made its mark, there were no practical means of communicating other than by word of mouth.

With the advent of the typewriter, managers retreated into the less challenging tranquillity of their offices and issued their instructions in writing. The transcription of notebook jottings into formal typewritten reports aided communications in the other direction as well, from the workplace to the, now remote, managers.

Access to the typing pool became a coveted asset, but pool typists often became gatekeepers, giving priority to the work of some and delaying that of others. Access to a secretary or typist became a status symbol. The personal secretaries, secretarial assistants and administrative assistants often exerted amazing power in the way they controlled access to the boss. The management literature has little to say about the role of the typewriter
(machine or person) in the power game of business organisations. Typists remained in this position until the personal computer eventually liberated managers and forced them to control their own work flow simply by making them do it themselves.

The typewriter also supported, maybe even created, a tremendous growth of bureaucratic hierarchies, and, from the interactions between businessmen, accountants, managers, typists, typewriters and typescripts, we can see a new way of viewing and manipulating the world emerge. The typewritten words and statistical reports initiated by managers came to carry nearly as much authority as the table of money numbers from the accountant. The same halo of truth beyond question now surrounds computer-produced information.

The technology of the typewriter and its successors performed a role similar to that performed by Pacioli's technology when it defined those things necessary to the successful businessman and excluded absolutely everything that he could not put on the right and the left side of a book. Through the form of its technology alone the typewriter, working interactively with the people around it, defined what it was to manage, what it was to be a manager and what were the things being managed. The manager now sees the world as abstracted, simplified, refined and constrained to contain only those aspects that typewriting could communicate.

In the early days of the IT revolution there was an explosive increase in the volume of information produced. Managers ignored much of it. Now computer-supported exception reporting is more widely employed, and shared data bases and inquiring systems allow accountants and managers to find out for themselves what is important and what is not. The flood of information seems containable. The hazard lurking here is that management may well relax and leave the computers to look after the work; but if we have set the thresholds for making the exception reports wrongly – then what?

How information is used

Now let us look at what typical managers do with the information they get.

- Information for managerial control

Managers are often content to find satisficing short-term solutions to their problems, rather than optimising long-term ones. They, like everyone else, have only limited perceptual and information-processing capabilities (what Simon has called bounded rationality), so there are strict limits to the complexity with which they can cope. They have to address many incompatible goals. They are often much more concerned with interchanging opinion and gossip with others than with formulating and understanding computational models of problem situations. Often they just try to muddle through.
When they do address data and try to make sense out of them, there is strong evidence that they do so simplistically. They read into the data what they want to see. They have overconfidence in predictions based on scant evidence and quite redundant information enhances their level of confidence. They tend to ignore sample sizes and focus instead on other sample and population variables. They overestimate the appearance of randomness in small runs, that is, they commit the gambler’s fallacy, and they take extreme observations as representative of underlying processes.

- **Information in novel situations**
  The directions in which managers’ attention moves when confronted by problem situations are also of interest. When things start to go wrong, they direct attention to imposing more control like the existing control mechanisms, rather than to reviewing the nature of those controls and considering how to change them. They tend to ignore or suppress actions that do not conform to this view. Management usually sees itself to be the sole agent of change in the organisation and it minimises the influence of non-managerial agents.
  Middle management groups and the relationships between them can change only infrequently, but senior management tends to change strategies much more frequently. Senior management presumes, usually erroneously, that the existing systems are, with just a little adaptation, capable of implementing quite substantial changes.

- **Information and the accountancy profession**
  So far as I know there was no similar research to discover whether members of the accountancy profession, with their presumed to be superior educational qualifications, are as prone to misunderstand numeric and statistical information as were these managers.

**Education and the end of conversation**
I am aware that many students of accountancy are only reluctantly numerate and see little that is fascinating in statistics, management science, operational research, systems dynamics or information systems analysis and design. Computing science is not their most popular subject and few seem interested in either logic or mathematics. I have little evidence but I have a strong feeling that either earlier schooling, or later pecuniary ambitions, have largely swamped students’ interests in anything other than gaining an entry qualification to a respectable and rewarding occupation.
So, in establishing what the educational requirements for the accountancy profession might best be in the future, perhaps it would be worth some effort to demonstrate that accountancy is still a profession with a real interest in furthering its understanding of its own domain and the domains around
it, and not just a craft to be practised in a routine way. The warning in the
Presidential Foreword, that flames can flicker and go out if not tended,
should be taken very seriously in the educational context.
I take it for granted that information technology will play an ever increasing
role in teaching accountancy, if for no other reason than that classes and
tutorials everywhere are becoming so large that teaching is becoming
depersonalised. The world into which the student of today is entering is
dominated by information technology but, in my opinion, this technology
has an immense and almost insuperable shortcoming, both in everyday use
and in its use as a teaching medium. Information technology is excellent at
communicating. Communications are the means of ensuring regulation and
compliance with norms. Although information technology provides
powerful means of communicating between people who share the same
views of the world and who do not need to debate the meanings of words
and ideas, it really does inhibit conversations. Let me explain further.
Conversations are the means by which we review critically our
understanding of the world around us. They enable us to appreciate some
situations as novel, they allow the setting up of new posts from which we
can view the world and they require that we draw and share new
distinctions. They are the way that organised society redefines the
boundaries around its core values and adapts them to the constantly
changing situation in the world of their own discourse. They are also the
means by which we explore the world beyond; the undefined,
undistinguished world still unexplained in the terms of our present
conversations. Conversations are the engine of creativity, the means of
changing those norms. Total disagreement and total agreement both
eliminate conversations. Vitality stops if conversation stops.
Information technology provides facilities for human interaction that are so
primitive, compared with everyday life, that real conversations are
impossible. We can say nothing spontaneously, convey no nuances or
colours, and we have to put everything on the record. Because we have to
use the written word, there must be long delays between the moves in any
conversational game as we construct and transmit whole sentences of
grammatically correct form. All non-verbal indicators are filtered out.
Programmed-learning texts and machine-supported teaching were in use
long before the appearance of electronic computers. Now multi-media
computer-based learning stations connected to many sources of information
are becoming available. The main constraint is the availability of suitable
course material. However document readers could download conventional
course material on to electronic media. Over the longer term multimedia
interactive teaching, learning and testing programs will be created much
more easily and cheaply and this will become the norm for most instruction,
just as the printed textbook eventually did.

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The suppliers of packaged application programs have already improved their help facilities so that off-the-screen instruction in personal computing is becoming much less necessary. To take full advantage of this, end-users, managers, directors and accountants alike will, if they have not done so already, have to acquire considerable keyboard skills, real understandings of the capabilities of their applications programs and a responsible approach to security and filing. The distinctions between information technology specialists and users will become increasingly blurred. In time, even the Board will be computer-literate, if only because the illiterate will have retired!

This is all very well, but the key to successful teaching and learning lies in just that conversation which modern teaching and information technology so patently lack.

There is hope yet, perhaps. As long ago as 1972 Gordon Pask and I constructed and successfully demonstrated a device called CHARLIE-GAS at the National Ideal Homes Exhibition at Olympia. This was an automatic salesman which discovered the cognitive style of its potential customer and adapted its presentation accordingly, at the same time as offering the product best suited to the customer’s need. Many customers preferred dealing with the machine because it was not biased. In fact it proved to be much more adaptive than its human counterparts! It was built from bits of an old telephone exchange and a multi-track tape recorder. It owed nothing to digital computing. It was, however, a first tentative step towards a psychologically adaptive machine able to engage in something which passed for conversation because it spoke its customer’s language in some sense.

So far as I know, little has been done since then to develop adaptive conversational computing on a commercial scale. Yet the need is obvious and the knowledge and technology are available. Perhaps we will have to wait until information technology delivers virtual reality and includes people with different cognitive maps in the scene. It appears that, in the meantime, IT must drag us, probably unwittingly, into a pit of conversational silence. It is a long time since poetry and rhetoric had a place in the business discourse. Now conversation will probably decay and gradually we shall come to believe that computer mediated signalling is all that we need.

With no very clear idea about where technology is leading us, with ever larger classes and tutorials, and with such dumb computer assistance, education (as distinct from teaching a skill) is going to become very difficult indeed.

Organisations, present and future
Information technology has brought about organisational changes in various
ways. They all affect the accountancy profession. I note here just three of these.

Participative and shared management
There are many ways in which managers try to persuade staff to share more of the responsibility of management. These have various guises such as commitment to customer service, just in time, right first time, towards total quality, re-engineering the organisation and so on. Charters or mission statements and similar protestations of commitment express the rhetoric of these efforts to change.
Pertinently to our discussion here, there are elaborate information systems set up to monitor performance and to hold people personally accountable for specific aspects of the work. I get the impression that in the frantic search for performance indicators practically everything measurable is to be measured. Appearances are deceptive. The ability, provided by information systems, to measure outputs in all their aspects, not just costs, is enabling the development of output-oriented control, that which focuses on the end products of work and which, in theory at least, pays much less attention to the method of production. No one discusses what happens when games are played with numbers to ensure success.
Although the newer forms of organisation may appear to allow greater autonomy to the periphery, to the group or the individual, the information technology enables ever more stringent and detailed control from the centre as and when the need should arise. The new information technology makes intensive and intimate surveillance possible. People will use it in this way sooner or later.

The development of internal markets
Information technology makes the formation of internal markets within companies possible and with this come entirely new ways of organising work. Contractual relations between parts of the company dissolve the hierarchical arrangement of authority and responsibility; and they move higher management even further away from the action.
Each autonomous unit is responsible for organising its own work, forming its own contracts with other parts of the company or with other suppliers and, if things go wrong, for negotiating the allocation of responsibility and excess costs. Information technology has created great opportunities for the accountancy profession to move into situations such as these. It can assist in forming contracts, evaluating competitive tenders and making the adjustments for variations and errors.
If money-accountants be needed in business at all, they would seem more likely to be able to flourish as financial advisors, arbitrators or, as recently proposed, as assessors of financial reports. All these activities could become
as pertinent to each of the sub-units as they are to the whole.

The changing boundaries of organisations

As entities are increasingly thought of as commodities to be bought and sold, as they are merged and divested, their boundaries change. Accountancy has had to wrestle with bringing together incompatible systems when companies merge, and with redesigning information systems when companies divide. The rate of change of ownership and of types of custodianship, already high, will increase as ever more ingenuity bears on these issues.

The boundaries of organisations are also likely to continue to change over time in quite another way, as support increases for companies taking social responsibility and being more aware of environmental issues. In future, as the technology becomes more mature, as technical developments enable databases in both the public and private domains to become more accessible, changes of accounting boundaries to encompass this kind of redefinition will become much easier. It will become progressively more feasible to meet the growing demands for accountability of a pluralistic society in all their increasing variety.

As Mepham demonstrated some time ago, we can perform accounting (and information processing generally) by recording transactions in a data base and extracting accounts in whatever form we require by running different pre-designed programs (tailored to some generally agreed accounting standard) to meet the needs of each stakeholder. The profession has in this notion another opportunity of extending its expertise to embrace not only money numbers but all the data, numeric and written, available in the company.

Conclusions

Information technology has done much to support accountancy in the practical business of preparing accounts and operating money control systems. It will do much more in the future to teach, if not educate, accountants. However the profession has not profoundly influenced the development of IT. The profession did have an opportunity of capturing the power over the production of information when IT was first applied by accountants to bulk data processing, but it did not take full advantage of its position.

Most accountants left it to computer experts to develop and control the corporate use of IT. In time, newer technologies displaced successive generations of experts and at every major change there was an opportunity for the accountancy profession to reassert itself and assume a dominant position. The changes are continuing, and the profession has the opportunity now to address the issues of planning the development of
information technology. The profession could have a hand in moves
towards standardisation, and it could play a part in promoting new systems
with flexibility and compatibility with existing systems. The profession
could also assume an important, maybe a dominant, role in solving the
problems of network management and of standardising inter-company
digital communications. The profession needs information systems that can
easily present information in a wide variety of formats. The pluralistic
company needs information tailored properly for all its stakeholders. Systems
should be seamless in use; yet, when the needs arise we should be able to
divide them into viable parts or combine them to form viable wholes. This
aspect of information systems has had scant attention from anyone. The
profession deals with mergers and demergers, and internal as well as external
markets, so it has some interest in this.

The profession could vastly widen its scope were it to relinquish narrow
definitions of accountancy that refer to money numbers and adopt a more
practical and catholic position. Accountancy uses all kinds of information to
chronicle, explain, forecast, plan, execute and control activities. You might
object that the information and the technology that supports it are quite
separate and distinct; that the technology should be able to deliver the
information we need. Certainly it will, if there is a large market and if
product development gets sufficient resources. However the user-clients
have already absorbed much technology and have got into quite a mess in
the process. IT has already made the big labour savings, and the profession
has yet to come up with a rational way of justifying IT investment on any
other grounds.

I know that the profession is very alert to the opportunities for auditing
computer supported accounting systems, but should it not extend its interest
into the technical auditing of managerial information and control systems
too? Their reliability and security from interference are becoming ever more
important as they provide the bases for compliance with elaborate
contractual arrangements and complex systems of reward (and punishment)
associated with both internal and external markets.

I have posed the question about whether the profession will succumb to the
growing managerial discourse. Accountancy, whatever its shortcomings,
portrays itself as being about accountability and responsibility, prudence,
custodianship, and preventing the abuse of power, while the new discourse
is all about effectiveness, economy and efficiency within very narrow fields,
sub-units of companies, and short timeframes. The managerial discourse has
armed with the full panoply of information technology and is a formidable
force. Will the profession become as well accounted, can it prevail or will it
in turn succumb and be sidelined?

I have mentioned the gravest shortcomings of information technology – its
pathetic incapacity to adapt interactively with its users in a conversational
mode. It is not the sole responsibility of the accountancy profession to remedy this. It should be that of everyone and anyone concerned with saving education, the professions and the whole of society from mindless mechanisation by well-meaning but ill-equipped technologists.

I have also shown that managers have an awful respect for information, yet they pay little regard to what it could tell them. I have suggested that it might be worth the effort to find out just how much accountants understand of such matters.

I would like to end by pointing to a discussion that should take place. This is about whether the notions of reason and calculation on which both the profession and IT found themselves are strictly sufficient. Forecasting and planning were thought to be as essential in business as in government. They have failed spectacularly in politics; business keeps its secrets better. We have repeatedly confused correlations with causal relations and much of what has passed for knowledge in business and administration is mere superstition.

Now the world is far more uncertain; the future seems not predictable any longer. Market forces, chance by another name, not business cycles, seem to rule. Every institution in society is being challenged and every expert is on trial. We discount experience; the past is no guide to the future. The new formula seems to be do the best you can with as little as possible. No one tries to account for the costs of accounting and management information, and our ever more elaborate information and accounting systems are probably absorbing far more scarce resources than they are worth.

Should we fail to tend the flame of understanding, there is a real possibility that the use of information, without insight into its origins and implications, could degenerate into empty ritual at best or sorcery at worst. No profession is better equipped than that of accountancy to examine critically the nature of the information produced by this technology and the uses to which it is put. This profession will readily recognise that it is not just data and information but knowledge, wisdom, conviction and commitment which are needed to set “The Flaming Torch” alight.
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Further Reading

Burnham, J, The Managerial Revolution, Pelican, Harmondsworth, 1941
Staw, B and Salancik, G (eds), New Directions in Organisational Behaviour, St Clair Press, Chicago, III 1977