European Modernism and theInformation Society.Edited by W.Boyd Rayward. Aldershot, UK: 2008, pp1-26,

European Modernism and the Information Society: Introduction

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There are four main institutional aspects to modernity: (a) capitalism (the production of commodities for markets in which wage labor is also a commodity); (b) industrialism (the application of inanimate sources of power through productive techniques for the transformation of nature; (c) coordinated administrative power focused through surveillance (the control of information and the monitoring of the activities of subject populations by states and other organizations; (d) military power (the concentration of the means of violence in the hands of the state) (Held summarizing Giddens 1992, 32).

Modernity is inherently globalizing – this is evident in some of the most basic characteristics of modern institutions including their disembeddedness and reflexivity ('disembedding mechanisms' 'lift out' social activity from localized contexts, reorganizing social relationships across large space–time distances; 'the reflexive appropriation of knowledge' [occurs when] the production of systematic knowledge about social life becomes integral to system reproduction, rolling social life away from the fixities of tradition) (Giddens 1990a, 55, 53).

Modernity is presented as a mediating concept linking two related transformative processes. The first of these is the objective process of *modernization*, a diverse unity of socioeconomic changes generated by scientific and technological discoveries and innovations, industrial upheavals, population movements, urbanization, the formation of national states and mass political movements, all driven by the expanding capitalist world market. The second is the cultural vision which attends, in contradictory form, this unleashing of change – *modernism* – the infinite variety of ideas derived from the overturning of the old order. These ideas make men and women subjects and objects of modernization but, in turn give them powers to change the relationships that are transforming them. This transformation of individuals through a heightening of human powers and a broadening of experience links back conceptually from the subjective to the objective through the shared concept of development; self development and economic development (Berman, quoted in Cooke 1988).

But the heart of modernity is the postulate of ontological discontinuity. So much of the thought and art of the twentieth century follows from atomism that thus far there has been no going back on it, even in the ages of structuralism and postmodernism. We cannot help seeing the objects of our knowledge as discrete and discontinuous – digital rather than analogue (Everdell 1997, 351).

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Modernity and Modernism

These quotations serve to reveal an issue for anyone attempting to open a discussion related to the ideas of 'modernity' and 'modernism'. The literature about them is large and amorphous and reports discussions at various levels of generality and across various disciplines, as is illustrated to some extent in the quotations above (see also the essays in Ross 1994; 'Postmodernism' 1988; also Gluck 1986). The discussion may focus, for example, on changing ideas about the nation-state, international organizations, globalization, capitalism, bureaucracy, labor and market conditions, modes of production and the circulation of goods and services, the nature of the self, human identity, community, progress, surveillance or power. Its focus may also be on changing ideas about the novel or poetry, painting, film, human habitation or design. The notion of change from something, even if there is no agreement about what the change is to, seems always implicated in the notion of modernism.

Another issue that is resolved, sometimes by declaration, sometimes by sophisticated argument (see especially in this respect Toulmin 1992) is, as it were, the time scale or periodization of modernity and how it is related to modernism. When is the modern – when did it begin and how? What is it that the modern is sometimes implicitly, sometimes explicitly contrasted with? What is premodern and what is postmodern? How do these categories help us organize our thinking about the world in which we live and about history, if modernization does not mark the end of history (Fukuyama 1993) and if we continue to allow the past to exist (Iggers 1997, ch. 10)?[1] Something oppositional is generally implicated in the idea of modernism.

For Giddens a first approximation in defining 'modernity' is to say that '"modernity" refers to modes of social thought or organization which emerged in Europe from about the seventeenth century onwards and which subsequently became more or less worldwide in their influence' (Giddens 1990, 1). Modernism from this point of view is rooted in the Age of Reason and the Enlightenment. Toulmin suggests that an argument can be made for its origins in the Renaissance. But coming closer to the 'modern' period, he sees a middle ground between those who consider modernity as 'done for' and those who still see it as 'vital and valid'. Here can be found two groups of writers. One group is essentially concerned with the transformative changes that occurred in the arts in the fin de siècle period of the nineteenth century with art nouveau, the *Sezession* and related movements and later in the period between the wars with the advent of the Bauhaus, de Stijl and the constructivists. The other group is by contrast more intellectual, more focused on the social sciences, and for Toulmin is represented by Peter Drucker's analyses of the nature and limitation of the nation-state (Toulmin 1992, 172; see also Drucker 1993).

The issue of periodization seems to be endemic to discussions of modernism. Gluck focuses on the post–First World War period. For her what would replace 'the shattered truths of nineteenth century liberal culture' did not emerge until the 1920s. But 'impersonality' and 'objectivity' were to be characteristic of the 'new age' that

1 For an interesting controversy on just this matter see Lawrence Stone and Gabrielle M. Spiegel (1992), 'History and Post-Modernism,' *Past and Present* 135 (May), 189–208.

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began with the First World War along with a repudiation of the '"personal viewpoint," a concern with practicality and functionalism, along with a new interest in "low" forms of art such as the music hall, the circus and jazz' (Gluck 1986, 877–8). Like Gluck, Robin Kinross, a leading typographer and historian of typography, focuses on the post–First World War period. For him the marker of modernism is the change in the design of typefaces for rail timetables that took place in the 1920s and 1930s from nineteenth-century serif types to the sans serif types Gill Sans and Univers. 'To put it rather portentously, one is here discussing the fate of modernism in the twentieth century: the attempted social and esthetic revolution that took off, shakily, from the continent of Europe in the 1920s and began to suffer drastic, almost fatal reversals in the 1930s (in Germany above all)' (Kinross 1985, 23–4; see also 1994).

Everdell asks the question, 'What is modernism?' on page 6 of his work on the 'first moderns' but only answers it – and then almost casually – on page 351 (see the epigraph). The first moderns he discusses is a group of philosophers, scientists and mathematicians living in Vienna in the last quarter of the nineteenth century. But, following accounts of Seurat, Whitman, Rimbaud and Freud, among others, who reach across the divide of the century, Everdell considers that the marker of a decisive break between the old and the new was the 1900 Paris World's Fair, the 'Grande Exposition Internationale et Universelle de 1900'. It is here that we see encountering each other for the first time two of the characters in the stories of this book, the Belgian documentalist and internationalist Paul Otlet, and Patrick Geddes, Scottish sociologist and urban planner. At the fair the two men began a friendship and collaborative relationship that lasted until Geddes's death in 1932. At the fair, too, the exhibit organized by Otlet on the work of the International Office and Institute of Bibliography that he and other colleagues had created in Brussels in 1895 to develop a universal catalogue on cards – the 'Répertoire bibliographique universelle'– was awarded a Grand Prize (Rayward 1975, 78).

For Everdell, the end of this first period of modernism is a year that he could only describe as an 'annus mirabilis' – 1913. It was the year of the 'Rite of Spring', of the appearance of the first volume of Proust's *A la recherche du temps perdu* and of the Armory Show in New York that brought examples of the works of the great modernist European artists to the 'new world'. It was the year that saw the appearance of major works by Virginia Woolf, Kafka, Schoenberg, Husserl, Bohr and Freud and others who were to change our ideas about the nature of literature, art, music, the self, consciousness, and the physical world (Everdell 1997, ch. 21). It was also the year of the Ghent World's Fair at which Paul Otlet and his colleagues organized the first meeting of the Congrès International des Villes, and at which Geddes's Town Planning Exhibit won a gold medal. It was here in the chaos of the exhibition rooms, as Geddes's son Alisdair was struggling to assemble the exhibit, that 'a white-bearded, exquisitely groomed and top-hatted Belgian gentleman, with a decoration in his button hole' asked anxiously after the elusive Geddes, '"Mais où est-il, ce bon Geddes, hein?"' This was Geddes's friend, Paul Otlet (Boardman 1978, 241–2).[2]

2 Boardman is quoting Amelia Defries who studied with Geddes (Defries 1927).

Perhaps a way to organize the different approaches to modernism presented above is to refer to Toulmin's distinction between those concerned with the arts and those with sociology and politics – between, to oversimplify, a modernism of the hand and that of the mind. An elegant and useful elaboration of a similar dichotomy by David Hollinger suggests that we distinguish 'the artificer' from 'the knower', an esthetic modernism from a cognitive modernism (Hollinger 1994).

It is clear that however modernity is to be characterized, extraordinary developments in science, technology and management are central to it. They had powerful effects on social agencies concerned with the education and certification of experts whose professionalization and regulation led to the formation of new disciplines in Universities and the setting up or expansion of learned associations, societies and academies, first at the national level and then at the international level. And they led to ever proliferating systems – and quantities – of publication. 'Modern' scientific and technical advances revolutionized medicine and, as the guns and gas of the First World War revealed, they disastrously transformed the practice of warfare. They were harnessed to create the machinery and factories needed for the mass production of consumer products and to regulate and redefine the role of the worker. They underpin the creation of modern systems of rail, road, sea, and later air transport that facilitated the worldwide movement of peoples and goods and that supported the international expansion of trade and markets. Urban infrastructures underwent dramatic change with the advent of electric light, the availability of plumbing and sewerage, the construction of high-rise buildings, asphalted roads and pavements, tramways, underground railways and so on (the Paris Metro was inaugurated during the Paris World's Fair of 1900). Of extraordinary importance was the impact on architecture and industrial design of developments in building and construction materials such as steel, reinforced concrete, glass and eventually plastics. The invention of the telegraph, the telephone, radio, the cinema and later television created modern systems of entertainment and communication that impinged on all aspects of economic, industrial, individual and community life.

A key ingredient of the modernism of *fin de siècle* Europe and the developments that modernism sustained in the long decades that have brought us into what some see as a 'post-modernist' world was the scientific management ideas of Frederick Taylor and his disciples and their extension in the mass production practices of Henry Ford. Taylorist uses of time and motion studies, intensive division of labor, standardization, 'the expert direction of engineers' and so on were all aimed at improving efficiency. Moreover, Taylorism, 'the idea of rational, scientific and efficient management and regulation', was soon 'extended beyond the work place to other social activities'. With roots in the period before the First World War, it assumed the guise after the war of a 'new social philosophy, a new principle of social revolution, and a new imaginary institution in society' (Webster and Robins 1989, 333). Webster and Robins point out that Gantt, taking Taylorism further, declared that 'society is to be regulated and maintained by social engineers' and that the 'legitimacy of technocratic rule … assumes "an objective and universal rationality based on superior knowledge"' (333).

For many Europeans, Taylorist scientific management was regarded as 'a characteristic feature of American civilization' and might be embraced – or repudiated

– as such (Maier 1970, 27).[3] Americanist teachings held that 'productivity, expertise, and optimalization' led to great social benefits in the form of the reduction of class conflicts and social divisions (29). The theory was that only a mechanist, rationalist approach to social problems would lead to a solution acceptable to all parties. Gantt was clear that 'what we need … is not more laws, but more facts, and the whole question will solve itself' (31) and that 'the era of force must give way to the era of knowledge'. In effect, engineers 'would be summoned to impose optimality upon society as they did in the factory' (33). With increased efficiency and a mutual focus on how best to improve productivity, management and worker would come together harmoniously, that is to say 'internal disputes about power would be sublimated into technical questions of optimalization'. Moreover, it was believed that with the creation through Taylorism of a new category of producers or 'an elite who arbitrated conflict', 'the hostile confrontation between classes' would become a thing of the past (43). This would require a change of thinking, 'a complete mental revolution', according to Taylor (34), but it was understood that his methods and the principles that underlay them were just what was needed to effect such a change.

The impersonal calculation of optimal solutions to technical and social problems in the Taylorist scheme of things involved identifying their smallest components so that they could be rationalized and incorporated by a disinterested managerial elite into efficient 'mechanized systems'. While these ideas had currency in Europe before the First World War, in Maier's view their major effect occurred after it. At one level Taylorist and Fordist ideas were designed to reduce workers to cogs in one kind of machine, an industrial machine of which their labor would be part, while they would live under conditions of optimal efficiency in another kind of machine, a housing machine. At the same time the authority of an essentially disinterested (at least theoretically) managerial elite would be strengthened as they planned, implemented and managed these 'machines'.

But at another level, beyond social engineering, lay something energizing and creative. Guillen suggests that 'the *Romance* (my emphasis) of modernism with scientific and organizational ideas and methods' led to a new aesthetic 'based on the efficiency of the machine and of scientific management'. European modernism 'insisted on the aesthetic potential of efficiency, precision, simplicity, regularity, and functionality … on designing buildings and artifacts that would look like machines and be used like machines,' and thus created 'a Taylorized sense of the beautiful' (Guillen 1997, 685–6). Table 1 sets out the key features of Scientific Management and how and why it appealed to European modernists (Guillen 1997, 689).

3 Maier is quoting a League of Nations, International Labour Office document on Scientific Management. I am indebted to Michael Buckland for drawing my attention to this article.

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Table 1.1 Key features of scientific management and why they appealed to the European Avant-Garde Modernists

Scientific management:	Basis of appeal to the modernists:
A. General features	
1. Perceived problem: Workers' soldiering, waste, disorder; management's arbitrariness and greed, lack of control	1. Traditional modes of thought (orthodoxy) are limiting economic rationalization and social liberation
2. Basic units of analysis: Individuals and tasks	2. Need to find alternatives to the 'old Individual work'
3. Predominant social relationships: Authority, hierarchy, subordination	3. Belief in artistic and social hierarchy
4. Formal knowledge bases: Engineering, psychology, ergonomics, physiology	4. Artists that most ardently supported scientific management had training in engineering
B. Ideological features	
1. Rationality assumptions: All actors can behave rationally	1. Belief in rationality and planning
2. Predominant conditions: Technical	2. Belief in technocracy
3. View of industrial conflict: Avoidable; increased surplus benefits workers, managers, and society at large	3. Technocratic elites (including artists) can help solve social and industrial problems.
4. View of workers: Blindly driven by self-interest	4. Need to change traditional modes of thought
5. How to manage workers: Tell them what to do and supervise them	5. Need to inculcate a new ideology of work
6. Social and Intellectual agenda: Futurism, human mastering of nature; material advance; the engineer as visionary	6. Desacralization of intellectual activity, permanent social change, elevation of public taste; the artist as visionary
C. Technical features	
1. General form of solution: Normative, one best way of organizing	1. Normative: one best way of designing and of performing production tasks
2. Methodology: Experimentation, time and motion studies, job analysis	2. Experimentation with forms, materials, and techniques: job analysis
3. Selection of workers: On-site, scientific psycho-physiological testing	3. Talent-based selection to arrive at artistic and productive excellence
4. Distribution of tasks: Task conception and execution separated; division of labor among individual workers, specialization	4. The artist designs the product, the components, and the production process; the worker performs prescribed tasks
5. Authority structures: Simple managerial hierarchy	5. Need to plan, administer, and control efficiently
6. Concentration of authority: Unity of command, control of supervisory authority	6. Need to centralize design activities and to control the production process
7. Organization of the process of work: Work simplification, mechanization, assembly-line work	7. Belief in planning, simplification, and standardization; prefabrication; 'artistic assemblage'
8. Preferred rewards: Piece-work wages, bonuses	8. Need to motivate and economize on labor
D. Evoked imagery	
1. Imagery: Order, system, objectivity, machinery, mass production	1. Regularity, continuity, speed, technology, mass production, machine aesthetic

Influenced by Taylor and Ford, Le Corbusier, for example, famously regarded houses as machines for living in and hoped to rejuvenate the architects of France into 'healthy and virile, active and useful, balanced and happy engineers' (Maier 1970, 36). In Germany and Austria, with rapidly increasing urbanization and industrialization after the war, there were critical housing shortages. The problem of how to provide housing for workers was strongly and explicitly influenced by Taylorist ideas. 'The challenge was to build large-scale low-cost housing as quickly and efficiently as possible' (Guillen 1997, 694). Le Corbusier and his modernist architect colleagues proposed to make houses 'by machine tools in a factory, assembled as Ford assembles cars'. Time and motion studies were used to design a 'Functional House for Frictionless Living'. 'Space in the Taylorized living environment was shaped by movement, by the prescribed tasks to be performed within it' (Blau 1999, 204). In Germany the idea was to provide the housewife with a 'well-equipped technologically advanced work station for performing her domestic tasks' and to take her out of the work force where, now that the war had ended, she was competing for jobs with men. In Austria, in 'red Vienna', the idea was to design efficient household spaces to reduce the burden on the housewife so that she had by contrast more time to give to political participation (205). Famous in this connection is the 'Frankfurter Küche' – the Frankfurt kitchen – designed by Otto Neurath's colleague Margarete Lihotzsky, which was 'profoundly influenced by the American system of Scientific Management' developed by Taylor (182–3). And at the first International Congress of Modern Architecture (CIAM) in 1928, Walter Gropius, Le Corbusier and Ernst May discussed how to use time and motion studies to determine 'the smallest possible apartment that an average family could comfortably in habit' (Guillen 1997, 692).

Modernist architects brought their scientific management philosophy to the factories and workshops of mass production. The dilemma for Le Corbusier was 'architecture or revolution,' but he believed that 'revolution can be avoided.' It could be avoided essentially by the social engineering of space. In the words of the Russian architect El Lisitzky:

> As a result of the precise allotment of time and work rhythms and by giving each individual an important role of responsibility, the factory has become the true home of education … The factory has become the melting pot of the socialization of the urban population; its architecture is not merely the wrapping for a group of machines but something completely new and different (quoted in Guillen 1997, 690).

Hannes Meyer considered that the architect was essentially 'a specialist in organization … building is only organization: social, technical, economic, mental organization'. And for Walter Gropius, one of the founders of the Bauhuas, given the right working conditions a happy worker 'will take more pleasure in his duties, and the productivity of the firm will increase' (Guillen 1997, 691). Lying behind these ideas is a philosophy of social amelioration and economic progress. 'The modernists and the scientific managers clearly viewed themselves as visionaries equipped with a "futurist" forward-looking agenda focused on achieving change' (691).

These Taylorist ideas may be related to Everdell's notion of 'ontological discontinuity' as an important characteristic of modernism. There is a common concern to identify fundamental units and to create new structures from them, what Paul Otlet in the new discipline of 'documentation' that he formulated in the first years of the twentieth century would call, borrowing from the chemist Wilhelm Ostwald, the 'monographic principle' (see below). We also see 'ontological discontinuity' reflected in the practices of a variety of other disciplines and artistic movements. Matter, for example, at this time is broken down into the unit of the atom. Biological organisms are now understood to be shaped by the gene. Pointillism in painting evokes light, perspective and shape by means of millions of tiny separate colored dots.[4] Chromaticism in music perhaps represents this process too. It also finds an unusual expression in Schoenberg's interest in writing very short musical compositions, his desire to 'formulate ideas in an aphoristic manner … [and] to link ideas together without the use of formal connectives, merely by juxtaposition' (Everdell 1997, 282).

The Information Society

Fundamental to these philosophies, organizational forms and artistic and design practices was information. Examinations of what has been called the information society reveal remarkable parallels with discussions about modernity and modernism. But these parallels are in part obscured by extravagant claims that an information revolution has taken place as a result of the relatively recent and accelerating developments in the technologies of networked computing, the internet, the World Wide Web and a host of related electronic communications technologies. So profound have been the social, psychic, economic and institutional changes created by these technologies, it is claimed that a radically new postindustrial, postmodern, even postcapitalist society has emerged to which information in its many formats and associated technologies is central (for example, Toffler 1981; Naisbitt 1982; Dyson et al. 1996; Kurzweil 1999; Kurzweil 2005; Drucker 1993).

In this new technological environment, the physical reality of 'knowledge' institutions and practices has been overlaid by virtual extensions and representations that are referred to in a variety of ways: web- and internet-based education programs, electronic journals, knowledge portals, digital libraries, virtual libraries, virtual museums, virtual knowledge communities or web-based communities of practice, and CSCW – computer supported cooperative work. Digital convergence of the media of communications has brought image, text and sound together in innovative ways not possible in the world of print or of unidirectional mass media that relied on previously unintegratable technologies. The impact of these more recent developments on individuals can be seen on every street and campus as ubiquitous cellphones enable new modalities of communication between individuals and groups and interaction with vast new data stores and online functionalities. One conjures with names such

4 Strictly speaking, this technique originated with Seurat in France in the 1880s, but it had a powerful effect on Belgian avant-garde artists well into the early years of the twentieth century.

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as Google, YouTube, Facebook, Amazon.com, e-Bay – the list is endless. It has even been suggested that we are on the verge of a kind of technological 'Rapture' when human and machine become one in a new kind of superhuman reality (Kurzweil 1999; Kurzweil 2005).

Less futuristically, it is clear that the new 'information' technologies have begun to transform the processes and formats of communication and all levels of the social, political and community interactions that they mediate. They have led to the development of new techniques for managing and using knowledge in particular fields and the creation of new 'informatized' disciplines that were once almost entirely laboratory-based such as bioinformatics, medical informatics and chemical informatics. Other disciplines and subdisciplines such as social, community and organizational informatics have emerged to study new information-mediated phenomena and their impact on individuals, communities and society more generally. [5]

But does all of this represent a radical break with the past, or are we witnessing an intensification and expansion of processes long underway, which are essential to modernity and modern capitalist societies? Black, Muddiman and Plant argue that this is so. To claim that a new form of capitalism is now emerging, such as 'cybernetic capitalism', relying on new electronic forms of information and communications technologies, and that this is somehow quite different from what has gone before, overlooks the extent to which previous capitalist formations were anchored in the need for, and the systems designed to facilitate, communication and access to information and information resources. They argue that Fordist approaches to production and 'the Taylorism and scientific management that underpinned it' that characterized the enormous economic development of much of the twentieth century, the period they describe as 'the second industrial revolution,' depended on information:

> Scientific management required a constant flow of data from the production and marketing processes upon which management could base its decisions. Information was starkly centralized in a bureaucratized hierarchy, workers' informational input into the production process having been brutally reduced by deskilling and a minute division of labor. The second industrial revolution was also marked by a realization of the importance of scientific and technical knowledge to production, thereby enhancing the value of research and development and of information sources and services (Black, Muddiman and Plant 2006, 27).

They describe some of the precomputer technologies that emerged to help create modern regimes of information as corporate and governmental environments grew in size and complexity. From the paper clip, file folder and filing cabinet to various kinds of office duplicating and recording machines, from high-speed printing presses to international postal systems, to the telephone and the telegraph, an information infrastructure has gradually evolved to support the expanding commercial and industrial enterprises and the government bureaucracies that characterize the modern period. As it became necessary in Britain 'to control, harness and understand industrial advance', Britain became an early pre-computer information society.

5 For a brief description see <http://www.lis.uiuc.edu/research/areas.html>.

As such it was characterized by 'rationalization of scientific documentation; the management of knowledge in firms; the establishment of company libraries; the harnessing of technical information by the British state; the diffusion of office and communications technologies' (Black, Muddiman and Plant 2006, 241).

In the view of Webster and Robins, Scientific Management 'as a philosophy both of industrial production and of social reproduction' actually unleashed the 'information Revolution' (Webster and Robins 1989, 345). The new information technologies, while of course responsible for profound social and other effects, they believe are effectively a 'refinement of what was fundamentally a political-administrative "revolution"'. What has changed is the impact of information and communications technologies on 'social management, planning and administration' and the 'surveillance and control strategies' that are 'absolutely central to the cohesion and reproduction of capitalist societies' (326–7). As economies have grown in size, interdependence and complexity, as huge, often multinational enterprises have begun to create and dominate global markets and as we have moved into an increasingly consumerist culture, information has become a 'key component of regulation in the modern nation state and in capitalist economies' (329).

In his analysis of the information society and its relation to modernity, reprising many of these sorts of argument, Black suggests that modernity encompasses a number of revolutions, 'the industrial, the democratic, the urban as well as the growth of empirical-analytic approach to knowledge' (Black 1998, 40). For him the information society is an aspect of modernity, developing and changing as the conditions of modernity developed and changed. He notes that the information society is sometimes called the 'knowledge society', but that it might also be called, after Weber, a 'surveillance society – an 'administrative watching' of individuals. Bureaucracy as defined by Weber involves 'the generation and strict control of information – or the files – by officials'. And Black remarks perceptively that because of the 'ubiquitous nature of the bureaucratic organization' we might well speak of a 'society of files', a 'dossier society' (41–2). Today these files are held by a variety of agencies and deal with almost every 'aspect' of the life and activity of individuals, groups and corporations. Most of these files are now in machine readable form and the ease of networked access to them and the potentiality they afford for surveillance in the digital era gives an ominous turn to what we might now refer to as the 'databased society' (Monahan 2006; Lyon 2003; Wood 2006).[6]

European Modernism and the Information Society

This book explores some of the interplay between the 'information society' phenomena discussed above and modernism in the period from the end of the nineteenth century

6 The US Patriot Act of 2001 has generated much controversy by authorizing such access and concealing it through the use of National Security Letters. For an early critique see Mary Minnow (2001), "The USA Patriot Act: Three Librarians Explore This Controversial Act and How You Can Protect Patron Privacy Without Breaking the Law," *Library Journal,* 1 October. <http://www.libraryjournal.com/index.asp?layout=article&articleid=CA245044> (accessed 5 May 2007).

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and during the first half of the twentieth century. It examines the work and ideas of a loosely knit group of European intellectuals who were deeply committed to exploring ways in which information might be better organized and disseminated in order to promote the progress of science, social welfare, industrial productivity, and international connectivity and harmony. They came from a wide variety of disciplinary and national backgrounds, but many of them were linked directly or indirectly at different times with the Belgian 'documentalist' and internationalist Paul Otlet in the course of his long life (1866–1944). Others worked in ignorance of each other and much of what they did was not consciously coordinated or cumulative. Their work, in many cases underway before the First World War, was influenced by the crisis of the war and the transformative after effects of that catastrophic event.

One might claim following Gluck that the nineteenth century extended to the outbreak of the First World War and that modernism in the twentieth century did not begin until the war ended (Gluck 1986, 877–8; see above). Nevertheless, it seems clear that no matter where their life work fell in the period, those who were centrally concerned with information, both pre- and post-World War I, were all responding to an awareness that a great formation of knowledge had emerged that was publicly available and that could be exploited in the service of a range of personal, social, governmental and corporate objectives. This apparently invaluable resource and the systems within which it was constituted and managed seemed to promise much, but everywhere there was evidence that knowledge was increasingly fragmented, duplicative and incomplete and that much of it either was inapplicable for various important tasks in the form in which it was currently expressed or was simply buried and inaccessible.

It is this awareness and the steps that those involved took to improve the effectiveness of systems for knowledge organization, dissemination and use that allows us to characterize the work of the individuals discussed in this book as constituting a modernist European knowledge project. In terms of the categories discussed above, they are among Toulmin's group of early twentieth-century modernists concerned with intellectual matters. The information that exercises their imaginations and minds is information that belongs in the realm of Hollinger's 'cognitive modernism', with what Webster refers to as 'theoretical knowledge'. This is knowledge that is 'abstract, generalizable and codified', obviously related to science and technology but also to all aspects of personal and social life in that it is 'central to decision-making, risk assessment and control' as they involve individual and community destinies. For Giddens, as mentioned above – and for Webster – the 'reflexive appropriation' of such knowledge is an aspect of modernity itself (Webster 2002, 271).

Among the 'information' issues that were under investigation in this period were the reconstruction of the system of scholarly publication; redefining the roles, practices and organizational arrangements of libraries and museums in collecting, cumulating, displaying, storing and retrieving 'informative' artifacts; creating worldwide 'documentary' networks; and developing collaboratively centralized depositories of 'scientific' data. A key problem was how fundamental units of information were to be identified, encoded in various ways, represented visually, and deployed educationally and in various planning contexts so that organizational

objectives might be promoted and social progress accelerated. Some of the solutions that were explored involved new technologies. One important new information technology development, for example, involved abandoning previous ledger-based systems for card-based systems. Cards of a uniform size, on which standardized data were transcribed, housed physically in card drawers and related furniture and organized conceptually by classification schemes of various kinds, in effect epitomized a new 'modernist' technology. As such, the files, the 'databases', the 'repertories', the catalogues that could be constructed from them offered advantages of flexibility, correctability, currency, cumulativeness, and cooperative formation, maintenance and use – Taylorist and Fordist ideas to a degree. In an era in which this technology of card-and-cabinet is now more or less completely superseded, it may be difficult to realize how powerful and how widely and rapidly diffused this 'technology' was at the time under review here, though aspects of it are kept alive metaphorically in the language of files, filing, cutting, copying and pasting and so on of word-processing systems. And it might not occur to one of the present denizens of the apparently endlessly ramifying digital space, how the simple limitation of card space, for all the promise of infinite file expansibility offered by the cards themselves, imposed enormous pressures for abbreviation, formal modes of representation (classification numbers for example) and standardization of the information a card was to contain – whether the card involved was the standard 3×5 library catalog card or cards of other dimensions used for other purposes.[7]

And of course, another information technology that, though Otlet had experimented with it in the early years of the twentieth century (Otlet 1906), was to become enormously popular in the period between the wars, was microfilm (see Michael Buckland's chapter in this book). As it found everyday use in offices and libraries, for H.G. Wells it was becoming so powerful and ubiquitous a technology that it heralded the possibility of realizing practically his vision of a world brain (see Boyd Rayward's chapter in this book). Inspiring a rhetoric almost as extravagant as that which is used to describe the revolutionary transformations that the internet and the World Wide Web have created, it was a technology whose development was in fact truncated and which has left a legacy of massive collections of microfilmed documents that are difficult to consult and of uncertain longevity. As a document preservation and reprographic technology, its replacement by digital technology has been greeted by relief, but in its day it was heralded with equal acclaim.

Some of the persons with whom this book is concerned, such as Paul Otlet, Patrick Geddes, Wilhelm Ostwald, H.G. Wells and Otto Neurath, struggled to find a 'world view' that would underpin the creation of new kinds of international organizations, a world view that would guide the deployment of information in both national programs of social change and the formation of a new world polity. But perhaps most important, all of the characters who populate the chapters in this book were committed in their different ways to a pervasive modernist belief in rationality, planning, standardization, mechanization, the value of the scientific method and the ideal – if not the inevitability – of scientific and social progress. They conceptualized and attempted to solve 'information' problems by creating complex socio-technical

7 For a history of the card and card catalog see Krajewski (2002).

systems for integrating discrete units of information into new 'wholes' for the own particular purposes.

Paul Otlet

Paul Otlet is a key figure in this book, and although some of the work discussed proceeded independently of him and the 'documentation' movement that he founded, some introduction of him seems useful. He was born in 1868 into a wealthy Brussels family and came of age with connections to all the leading cultural, intellectual, legal, governmental and commercial circles of the city then entering its glory days of the 'belle époque' (Rayward, 1975; Levie 2006; Block 1997; Roberts-Jones 1994).[8] In 1895, with the support of the Belgian government, he and his colleague Henri La Fontaine[9] called an international conference to consider the creation of a new kind of universal catalogue for everything that had been published, a 'repertory' which would allow mobilization of and access to knowledge in new, globally-based ways. As a result of this meeting an International Institute of Bibliography was founded to bring together all who were interested in exploring the problems of the international organization of bibliography. A semi-official International Office of Bibliography became a headquarters organization for the Institute.[10] There were to be follow-up conferences of the institute in 1897, 1908 and 1910 (and regularly after the Second World War until the demise of the organization). Gradually, through these conferences and the Institute's *Bulletin*, a strong communications medium in the pre–First World War era for discussions and news about all things bibliographic and documentary, a large European community of 'documentalists' was created.

Thus began a curious and eventually enormous enterprise that led to the creation of a universal bibliographic catalog on cards, which contained 16 million entries by 1930. Otlet was persuaded to adopt the 3×5 American catalog card format by an American zoologist, Herbert Haviland Field,[11] with whom he was to collaborate for the next 25 years. The system used for the classification of the catalogue was a highly elaborated version of the American Dewey Decimal Classification, the Universal Decimal Classification. For Otlet, the UDC in the form in which he proposed that it be developed would provide 'an immense map of the domains of knowledge'

8 For biographical accounts of Otlet see Rayward (1975) and Levie (2006).

9 La Fontaine, Belgian senator and indefatigable internationalist, was awarded the Nobel Peace Prize in 1913 for his work in leading a number of international organizations concerned with international arbitration and the peace movement.

10 The International Institute of Bibliography became the International Institute for Documentation in 1931; the International Federation for Documentation in 1937, with offices in The Hague; and the International Federation for Documentation and Information in 1986. It went out of existence under mysterious circumstances in 2000–2001.

11 Field had created the Concilium Bibliographicum in Zurich, an agency for the management of zoological and related literatures and the publication of bibliographical indexes for these literatures on cards as well as in the form of supplements to number of scientific journals. He was active in developing schedules for the Universal Decimal Classification in the areas with which the Concilium Bibliographicum was involved.

(Otlet 1918, 78). But its operational function was to provide a complex code for representing extended statements of what documents were about (Michael Buckland decodes a sample UDC number in his chapter). The collaborators in the project of elaborating the tables of the classification to the minute degree of detail required, especially in the period through 1907 when the first edition of the Universal Decimal Classification was published in a volume of over 2000 pages, constituted a roll call of prominent European scientists and other specialists, including a number of Nobel Prize winners.

It is not possible here to go into the extensive institutional elaborations that Otlet and his colleague undertook in the International Office of Bibliography in the period before the outbreak of the war other than to note that in 1910 Otlet and La Fontaine founded the Union of International Associations, which still exists. In that year they added an International Museum to their other collections and brought them all together with government sponsorship in a vast wing of the Palais du Cinquantenaire in Brussels, a locale which Otlet called first the Palais Mondial [World Palace] and later the Mundaneum.[12]

What is particularly important for this book are the ideas that Otlet developed over a writing career on bibliography and documentation, including museography and internationalism, that spanned 40 years.[13] For him, an increasingly expansive notion of 'the document' lay at the heart of this great centre, the Mundaneum, and the seemingly multifarious functions and services of which it was made up. The very key to the organization of knowledge and all that flows from it was the document. The document as Otlet conceived it, however, was not restricted to what is written. A document is anything that 'represents or expresses an object, a fact, an impression by means of any sign whatever'. Documents could be written or printed, pictorial or ideographic – the charts, plans, schemas, diagrams that held such a special place in Otlet's thinking. Three-dimensional objects of the kind found in museums, such as specimens, models and so on, are documents, and so are monuments in that they have representational and evidential functions (Otlet 1903).

Otlet had been concerned as early as 1891–1892 with the problem of the nature of facts or data and how the data of the social sciences might be firmly established, given the mass of literature in which they were embedded and in effect hidden. Was there a way of identifying them, extracting them and organizing them such that they were amenable to the same explanatory, law-like generalizations characteristic of scientific facts (Otlet 1891–1892; see Bernd Frohmann's chapter in this book)? The answer was to lie in 'documentation.' As early as 1903, Otlet coined this neologism to encompass his ideas about documents and the organization of knowledge. Documentation was a new field of study, he believed. But it was also a set of processes by means of which original observations of the world and other products of recorded intellectual activity would be taken through a series of transformations, a kind of spiral of representations and reformatting to create entirely new kinds of

12 This series of institutional elaborations is described in some detail and from various points of view in Rayward (1975; 1991; 1994a; 1994b; 2003).

13 For a comprehensive bibliography of Otlet's publications see Rayward (1990). This is also available at <http://hdl.handle.net/2142/652>.

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information products. Otlet foresaw the emergence from these processes of what he variously called a 'Universal Book', the 'Biblion', the Source, the permanent Encyclopedia, the Summa of each discipline and of knowledge in general:

> It will constitute a systematic, complete current registration of all the facts relating to a particular branch of knowledge. It will be formed by linking together materials and elements scattered in all relevant publications. It will comprise inventories of facts, catalogues of ideas and the nomenclatures of systems and theories. It will condense various scientific data into tables, diagrams, maps, schemas. It will illustrate them by drawings, engravings, facsimiles and documentary photographs … Readers, abstractors, systematizers, abbreviators, summarisers, and ultimately synthesizers, they will be persons whose function is not original research or the development of new knowledge … rather their function will be to preserve what has been discovered, to gather our intellectual harvests, to classify the elements of knowledge … Information from which all dross has been removed will be set out in a quite analytical way. It will be recorded on separate leaves or card rather than confined in volumes … By gathering these leaves together, and classifying and organizing them according to the headings of a reliable and detailed classification, we will create the 'Universal Book of Knowledge' … (Otlet 1903, 83–4).

Documentary work involving the cooperation of individual workers followed standard practices for the creation, internal organization, publication, restructuring and reformatting of documents. The objective was to facilitate the process of



Figure 1.1 Salle des Répertoires [Catalog room], International Office of Bibliography, Brussels c.1903 (courtesy of the Mundaneum, Mons, Belgium)

'division, dissection and redistribution of items of information'. This was the 'monographic principle', which Otlet had adopted from Wilhelm Ostwald and the Bridge with which he had been associated in 1911, 'pushed to its ultimate conclusion' (Otlet 1918).

But Otlet was also very much concerned with issues of knowledge representation, especially its simplification and representation in visual forms. This interest expressed itself in experimenting with the use of charts and diagrams and other forms of illustrations to present 'facts' or 'information', what we might today call 'data'. He experimented with microfilm to create what he called an *Encyclopedia Microphotica Universalis* (Rayward 1997, 297) and a great Encyclopedia Mundaneum Universalis, the sketches and plans for which Charles van den Heuvel has been studying extensively and reports on in part in his chapter in this book. Otlet's concern for visualization also led him to experiment with the design of museum exhibitions; this brought him into contact with Otto Neurath (see the chapters by Sybilla Nikolow and Nader Vossoughian as well as that by Charles van den Heuvel).

Gantt had observed, as mentioned above, that 'what we need ... is not more laws, but more facts' and that 'the era of force must give way to the era of knowledge', expressing deeply held Otletian sentiments. Otlet believed that if the practices entailed in his vision of documentation were accepted internationally, a Universal Network for Documentation could be created to 'ensure that anyone will be able to obtain what is offered with the least effort and with the greatest promise of certainty and abundance'. All around the globe scholars and others would be able to draw on and contribute to an ever expanding, carefully managed body of knowledge universally available to all. He was envisaging a kind of internet and World Wide Web. Finally, the Mundaneum centred in a World City would express the emergence of a new, peaceful, knowledge-based world polity (Otlet 1934, 1935).

In all of this, the use of the American standardized catalog card, the adaptation in Europe of the American Decimal Classification, the interest in new systems and technologies, the belief that accumulations of 'objective 'facts would encourage progress in science and society, the internationalist orientation ('universel' and 'mondial' are key terms in Otlet's vocabulary), and the new kinds of workers that would be needed to create the various repertories and displays in the International Center (mostly female with male supervisors and engaged in simplified, routinized, tasks of cutting, pasting, and filing) – all contributed to a Taylorist vision of knowledge production if ever there was one (see Figure 1.1 and Table 1.1).

The Chapters of this Book

The first group of chapters in this book are concerned with providing a general overview but from very different disciplinary perspectives. Frank Webster, a sociologist, has offered some of the most penetrating critiques that we have of the idea of an information society (for example, Webster 2006; Webster and Robins 1989; Robins and Webster 1999). In his chapter he reflects in a personal way on the light – or lack of it – that has been shed by research on information society–related issues by sociology and cultural studies. He notes 'the peculiar absence of history'

from these studies which he suggests are flawed by 'presentism and chroncentrism – hence, in need of history'. Why, he asks, 'has there yet not been a sustained historical analysis of the "information revolution?"' We might argue that this book provides some chapters toward such a history, though perhaps not of the kind outlined by Webster, and may serve as a European companion to the volume by Black, Muddiman and Plant on the early information society in Great Britain (2006).

Michael Buckland is concerned with 'the cultural and intellectual context of European documentation'. He suggests that the period of the late nineteenth and early twentieth centuries can be characterized as 'a Renaissance period' and as having a 'Machinic Zeitgeist'. He succinctly analyzes a range of characteristic developments of the times such as 'science and art combined; mind and body reconnected', new approaches to industrial design, the emergence of 'high capitalism and industrial consolidation', increasingly powerful state systems, and the transformation of information and communication technologies. Against this background he sketches some of the central concern of the documentalists: the development of reprographic and other technologies for documentation purposes; the elaboration and adoption of standards; attempts to create new systems and technologies for searching for stored information, and 'an expansive and integrative view' of documentation itself.

Steve Fuller offers a subtle discussion of the nature of library and information science (LIS, as it is often referred to in the US). He suggests that its distinctiveness as a field lies in the ways in which it is concerned with 'the production, distribution and organization of knowledge'. In his view it is 'really the only discipline explicitly devoted to the treatment of knowledge as a material resource.' He sees its root metaphor as 'the library' and suggests that theorists such as Otlet, Neurath and others in the US have developed an entire social epistemology based on this metaphor. He examines what he sees as two narratives of library and information science, that lead him to a critique of the *Science Citation Index* and of scientometrics in general and the 'accounting procedures' to which they have led.

The next group of chapters examines aspects of the work of Paul Otlet and some of his colleagues. In his chapter in this book Bernd Frohmann interrogates Otlet's notion of 'facts' and suggests, through a intriguing process of 'deconstruction', that there is a fundamental contradiction in Otlet's attempts through his ideas of documentary processing, including the application of the monographic principle, to bring facts into existence and under 'control'.

Nor were Otlet's ideas accepted at the outset without great resistance in certain European quarters. Otlet's adoption of and propaganda for the use of the Decimal Classification for his universalist bibliographical purposes were particularly offensive, though his larger aims were themselves subjected to scathing criticism from bibliographers and librarians, as Sylvia van Peteghem and Pieter Uyttenhove point out in their chapter. The Decimal Classification was criticized in part simply because it was American and redolent of the tool-based, efficiency-oriented culture that had so recommended it to Otlet (see Maier on Americanism and Taylorism above). For Ferdinand van der Haeghen, the aging chief librarian of the University of Ghent, and his colleagues it was completely inappropriate in the European environment.

Otlet and Patrick Geddes were both concerned with finding visual forms for representing the universe of knowledge and modes of conceptualizing access

to it. In Edinburgh, Geddes had create his Outlook Tower in the 1890s; Otlet his Mundaneum in 1910. For Pierre Chabard these represent 'spatial categories and knowledge-organizing forms; they mediated exchanges between the physical world of architecture and the abstract world of thought'. In his chapter Chabard explores these ideas and the ways in which they were expressed both conceptually and visually, drawing attention especially to the designs of Heymans and Le Corbusier for the Mundaneum, which reveal 'a paradoxical synthesis' between the 'two antithetical *topoï*'.

One of Otlet's last great projects was to design what he called the *Encyclopaedia Universalis Mundaneum*. Following some comments on Otlet's connections with Patrick Geddes, Le Corbusier and Otto Neurath, Charles van den Heuvel suggests that key aspects of Otlet's thinking about knowledge organization, documentary processes, the monographic principle and his fascination with the possibilities of new communications technologies,[14] were all represented visually and given a new signification in his sketches and plates for the Universal Encylopedia. Van den Heuvel provides an extended analysis of the ways in which Tim Berners-Lee's ideas of a semantic web and Otlet's approach to the globalization of knowledge resonate in unexpectedly intimate and interesting ways.

The French librarian and literary historian Suzanne Briet, known as 'Madame Documentation' (Buckland 1995) belongs to a second generation of documentalists and, as Ron Day shows in his chapter, she positions her ideas about what documentation is and why it is important in opposition to those of Paul Otlet. Writing after the Second World War, Briet made remarkable contributions of a theoretical and, in her work in the Bibliothèque nationale, of a practical kind to our understanding about how to organize and provide access to information. She was clearer, Day suggests, than Otlet about what a document was. She also identified an important creative information 'prospecting' function for the documentalist and argued that documentation was a new cultural practice that had become 'a necessity of our time'.

In England, modernism and the information society coincided in different ways from those outlined above, though there was a strong documentation movement in the UK, especially after the First World War. In the first of this group of chapters, Alistair Black, analyzing the 'material-spiritual, corporeal-metaphysical, ethereal-palpable' dichotomies in current discussions of the information society, points out that they are also revealed in 'one of the information society's major, but overlooked, progenitors: the library'. His study of the growth of interest in library networking and co-operation in the interwar years, what the Manchester Public Library's extraordinary librarian, Louis Stanley Jast called the 'library grid',[15] along with Jast's metaphysical and professional beliefs, are brought to a focus on the planning and

14 Otlet called radio, cinema and the newly invented television 'substitutes for the Book' and foresaw some technological combination or integration of these and other technologies as creating the 'future book'.

15 In this connection it is interesting to note that Jack Williamson considers the grid as a key aspect of modernism that 'has played a central role in the development and consolidation of the modern movement in twentieth-century graphic design' (Williamson 1986). I am indebted to my student, Abdulaziz Ali, for drawing this reference to my attention.

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construction of the new Manchester Public Library that opened in 1934, two years after Jast had retired. He makes the compelling observation that the design reflected not only Jast's concern for efficiency and material progress, but also Jast's 'mystical belief in a networked consciousness uniting humanity', and that it is this which links him to 'expectations relating to human connectivity in today's digital world'.

Alistair Duff suggests that the members of the early Fabian Society 'are the documentalists of socialism, evolving a kind of political expert system, a conception of an apparatus of facts and figure, duly codified driving social development'. He considers that their 'utlization and dissemination of … specifically social-scientific and technical knowledge as a strategic *public* resource' was integral to 'a practical sober tradition of institution-building'. Duff also introduces H.G. Wells, first a Fabian, then an apostate, but a modernist par excellence in his belief in expertise, planning and social progress made possible by science and its applications, and above all his belief in information. As Duff observes in his accounts of the need for a 'World Brain' or 'World Encyclopedia' Wells cleverly foresaw a world running on networked information. Alive to the faults of the Fabians, Duff nevertheless suggests that ultimately they left as a legacy for modern information society theorists a 'doctrine of informationalism' and a 'craft of social engineering'.

In a particularly far-reaching chapter, Dave Muddiman discusses the rise of an awareness in Great Britain of the importance of improving methods of scientific and technical communication, which led to the creation of new kinds of information agencies in the modern period. He shows 'how natural scientists, and especially those committed to … public science, came to play a crucial part in shaping [the] emergent early twentieth century sphere of information.' He discusses the role of planning, the Department of Scientific and Industrial Research, the research associations it sponsored with their 'aggressively active' intelligence bureaus and agencies such as Aslib (the Association of Special Libraries and Information Bureaux), and the British Society of International Bibliography (the UK arm of the Otletian European documentation movement) in the gradual creation of a British scientific, technical and industrial information infrastructure. He stresses the emerging awareness in the interwar period of the importance of the application of the scientific method to information problems, the mounting loss of confidence in the efficacy of the UDC in information work, and the need for new approaches to classification and information retrieval. He carries his story of the growth of public science and its informational consequences into the immediate postwar period and makes illuminating comparisons with similar development in a number of other countries.

W. Boyd Rayward examines in detail some of H.G. Wells's ideas of social progress through a combination of scientific, technical and evolutionary developments. He suggests that some of Wells's ideas of social engineering that today seem rather distasteful are explicitly based on eugenics ideas that were not uncommon at the time Wells was writing. Rayward believes that Wells's various accounts of the ideal society about which he wrote so much – the modern utopia, the new global order managed by experts – imply a corresponding vision of what we have begun to call an information society. A culminating expression of this occurs in his idea of a world encyclopedia or 'World Brain' which raises issues of authoritarian control, censorship and surveillance that animate discussions of today's information society.

Wells was familiar with the work of the British documentalists, and his description of the workings of his world encyclopedia and 'brain' drew on the currents of documentary thought of the time and on the much-touted potential of microfilm.

Three strongly complementary chapters examine the work of the Austrian philosopher, sociologist and social activist Otto Neurath. Frank Hartmann discusses the general development of Neurath's picture language ISOTYPE in the context of the work of his Museum of Science and Economy in Vienna and his desire to use pictorial representations as a process of 'debabelizing' business and science. Hartmann examines some of the conceptual issues that were solved as Neurath's initial ideas of a picture language were further developed and refined, especially identifying the role of Gerd Arntz, Neurath's graphic designer, in simplifying, standardizing and modernizing the images. Hartmann 'extracts' from Neurath's various observations an interesting set of rules that images of an effective picture language must meet, and suggests that these images create a new kind of 'information aesthetics'. Hartmann concludes that 'the international picture language is a genuine product of the laboratory of modernity' and is part of the modern 'culture of techno-images'.

Sybilla Nikolow in effect presents an extended case study of Neurath's use of his system of pictorial statistics and the rationalization for how they were used in his pictorial encyclopedia, *Society and Economy: an Elementary Work in Pictorial Statistics*. Driven by Neurath's strongly anti-metaphysical mode of thinking, this work was geared toward the education of the general public, with the objective of uniting 'accuracy of scientific representation and the clearness of popular images'. Nikolow argues that through the collection of plates that constitute the work, one can see how the early Vienna method of pictorial statistics was transformed into what was to become in 1936 ISOTYPE – the International System of Typographic Picture Education. She relates it to Neurath's ideas about the museum of the future, which were strongly influenced by the museological ideas of Paul Otlet. Neurath wanted to prepare statistical charts and museum exhibits in multiple copies for widespread distribution, because the museum of the future should be easily replicable. According to Nikolow, Neurath's 'model of production for the Vienna method was the modular assembly line'.

Many of these ideas are taken up and further developed by Nader Vossoughian who describes in some detail Neurath's background and early career. In the Museum of Society and Economy, Vossoughian sees Neurath responding to the presence of the cinema as an increasingly popular visual medium in the lives of working-class men and women. Neurath was also influenced by modern advertising techniques in suggesting how to use images to attract attention and convey information. Of particular interest are Vossoughian's account of some of the exhibits mounted by the museum at various international events (such as the International Town Planning Congress in Vienna), Neurath's ideas about travelling exhibits, the physical arrangement and lighting of displays, and the mechanization of the exhibit production process in the Museum of Society and Economy. Neurath allowed that he owed much to the ideas of Paul Otlet, though the projected collaboration between the two men never progressed very far. But Neurath adopted Otlet's term 'Mundaneum', for the 'museums of man's development' that he wanted to see appear throughout the world.

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Perhaps the strangest venture to be reported in this book is that of F.M. Feldhaus, who is the subject of Markus Krajewski's chapter. Feldhaus attempted to create a new discipline of the historiography of technology by a method of accumulation of clippings. His is a story of the mechanical operation of cutting, pasting and integrating slips of paper into what we would now call a 'database'. What Feldhaus was doing represented a kind of apotheosis of the card index system with its emphasis on standardization, its possibilities for rearrangement and so on. Feldhaus's life work was his index and he intended it to be so comprehensive and authoritative that it would blow competing scholars out of the water, so to speak. But what makes this so curious is that Feldhaus's factory was his house and his workers were his family. Krajewski mentions marriages based on the technical proficiency of prospective wives and the generation of children as workers. Theoretically Krajewski offers a carefully argued explanation of what Feldhaus was doing in terms of Serres's idea of the 'parasite'.

Finally, Thomas Hapke introduces the idea of a strong relationship developing in Germany between advertising as informative communication and documentation. He introduces the work of the Middle Swiss Geographical-Commercial Society and its attempts to create both a museum and an information system that would encourage trade and commercial development. A key figure in the work of the museum was Karl Bührer, who fervently adopted the card principle for recording items of information. This later became his system of 'Monos', a form of advertising that at the same time was generally educational. Bührer and his colleague Adolf Saager attracted the attention of the Nobel Prize-winning chemist Wilhelm Ostwald, who joined them in a society called 'Die Brücke' or the Bridge. Ostwald and his colleagues were interested in standardization (hence the idea of the monographic principle) applied to scientific publication and the idea of disassembling items in scientific journals so that the equivalent of individual Otletian repertories could be assembled to meet particular interests and purposes. Hapke discusses the creation of the Central Office for Technical and Scientific Teaching Materials that was set up after the war to improve the education and training of engineers. Important figures associated with this organization continued to be interested in the informative functions of advertising and the use of standardized and modular systems for organizing the text and graphic materials. Of interest here is Hanffstengel's 'living catalog' of 'drawings and photographs on standardized cards to be used by sales representatives with their customers'.

Acknowledgments

This book is not intended to be more than an opening of doors on a number of areas of potential interest to readers who might not be familiar with much of the material with which the book deals. Its gaps of coverage are obvious. It arose from a small invitational conference at the University of Illinois, 'European Modernism and the Information Society: Informing the Present, Understanding the Past', held 6–8 May 2005.This conference itself followed a small informal meeting of a group of scholars interested in Paul Otlet and the figures surrounding him that had been

organized in Mons, Belgium, at the Archive/Museum, Mundaneum, in 2002. The Illinois meeting in its turn will be followed by a general international conference with a much broader remit in Ghent in 2008. While the papers given at the Illinois conference are the basis of the chapters in this book, they have been extensively reworked, developed and reviewed.

Both the conference and the book owe much to the financial support of the The Gladys Krieble Delmas Foundation of New York. We were honored to have the presence of David Stam, himself a distinguished scholar, at the conference representing the foundation. Other support came from within the University of Illinois from its Office of International Programs, from the University Library, from the Graduate School of Library and Information Science, and most particularly from the European Union Center. I wish to pay tribute to my colleague and friend, Kieran Donaghy, who was at the time the director of the European Union Center. His encouragement, rigorous criticisms of my proposals, unstinting support and friendship are something that I will always value. He is *primus inter pares*.

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