

Real Estate & the New Economy

The impact of information and communications technology

Timothy Dixon

Director of Research, The College of Estate Management,
Reading

Bob Thompson

Consultant, RETRI

Patrick McAllister

Lecturer in Valuation and Property Management,
University of Reading

Andrew Marston

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The Authors

Dr Tim Dixon is Director of Research at the College of Estate Management in Reading. With more than 20 years experience in real estate research and education, he is a chartered surveyor, a Member of the Institute of Learning and Teaching, and a member of the Editorial Boards of five leading, international academic real estate journals. He is also a member of the EPSRC Infrastructure and Environment Strategic Advisory Team and RICS Research Policy Committee. He has written widely on the subject of ICT in property/real estate, and he is currently working with his team on major funded research projects concerned with both technology and environmental issues in real estate. He also co-authors a regular, Technology Trends column with Bob Thompson for *Property Forecast* magazine. The College is a member of the PIREC (Partners in Real Estate Connectivity) consortium.

Bob Thompson is a freelance consultant with his own consultancy, RETRI. Formerly head of research at King Sturge and Co., he undertakes a wide range of consultancy for clients across the business spectrum, contributing regularly to leading press and academic publications, and speaking at strategic conferences. He is former President of the European Real Estate Society, and is currently senior research associate at the College of Estate Management and a senior research fellow at the University of Reading. He is also a member of the advisory board of Property Economics and Finance Research Network (PEFRN). RETRI is a member of the PIREC consortium.

Patrick McAllister is a lecturer in valuation and property management in the Department of Real Estate and Planning at the University of Reading. He has published widely on a range of topics related to property investment and valuation. In the past he has researched the valuation implications of the generation of 'new economy' income streams by property investors from broadband and eProcurement. His research includes a project which investigated the consequences of property owners developing new business opportunities (including broadband) from their tenant base.

Andrew Marston is Research Analyst at ATIS REAL Weatheralls. From 1999 he was research officer in the Research Department at the College of Estate Management, where he worked with Dr Tim Dixon on a series of research reports and academic papers examining the relationships between real estate markets and the use of eCommerce and eBusiness technologies by retail and office occupiers. In 2004 he moved to ATIS

REAL Weatheralls, a leading European real estate property consultancy. He is also a Committee member of the Society of Property Researchers.

Jon Snow is Chairman of iX Consulting Ltd. Jon Snow founded iX Consulting in March 2001 as a niche research house focusing on the emerging relationship between Internet technologies and real estate. iX Consulting supply subscription services to over 150 companies in 13 countries. Prior to founding iX Consulting, Jon was a researcher in the School of Real Estate Management at Oxford Brookes University, and eBusiness Associate at international property consultants Weatherall Green and Smith (now ATIS REAL Weatheralls) where he headed a team developing business in the technology sectors.

Foreword

It is said that, with technological change, most people overestimate the short term impacts but underestimate the long term impacts.

Certainly it did seem as though the real estate market of the late 1990s was somewhat thrown into panic by the perceived threats of both internet retailing to the continuing viability of established retailing centres and of business-to-business and business-to-customer on the continuing requirements for office space. That neither fear has yet turned into the reality that property investors and landowners worried they might, has encouraged a more sanguine, some might say complacent, view about the impact of developments in information and communication technology (ICT) on the real estate market.

With this in mind, there probably couldn't be a better time than the present for someone to conduct a thorough review of these crucially important issues. Over and above this, there is also a need to get away from the one-dimensional perspective on the impact of ICT that dominated thinking in the real estate markets of the late 1990s. We need to understand how the straightforward economics of the emerging technologies influence and are, in turn, influenced by social, economic and political forces. Only when seen in the round will we fully understand how ICT will ultimately influence real estate markets at local, regional, national and international levels.

On both counts, the authors of this book are to be applauded. They have sought, through their 'socio-technical' approach, to look at the complex interactions between technology, society and economics. Instinctively we know that new technologies might well allow us to work from home, but we might look on work as a social activity and not want to do so. We might not be able to work from home given the nature of our homes. Local planners may not be keen to accommodate such changes to individual residences and employers might vary in their willingness to see staff work away from home. Similarly, we might well be able to shop from home, but might still want to visit shops to see and feel the merchandise before we buy. We might see shopping trips as a leisure and social experience that forms a focus to daily or weekend life. In short, we might well turn our faces away from the 'atomisation' of social and economic interaction that ICT could now facilitate. As such, at a micro scale at least, there is no simple read-off of the effects of new technologies on individual activities or the real estate market.

Meanwhile, we also need to consider at a macro scale how ICT can relocate entire work functions across countries, continents and time zones, creating significant impacts for local labour markets and triggering heated political debate (viz. the debates in the UK and the USA with respect to the economic and social impact of 'off-shoring' work to the Indian sub-continent and elsewhere).

Certainly, writing as someone who earns his living by advising one of the UK's largest property investors on which properties to own and where, this book is very timely. Developments in ICT, mediated through economic, social and political processes, will clearly impact the absolute and relative utility of different types of locations and different types of properties to users, causing some to appreciate in value whilst others depreciate. Understanding the nuance of how this will unfold is, therefore, crucial to me. However, it is not just investors that will need to understand these processes – tenants, planners and communities at large, also need to understand them well.

In writing this comprehensive and very fully referenced text, the authors have done us all a great service.

Paul McNamara
Director: Head of Research
Prudential Property Investment Managers

Preface

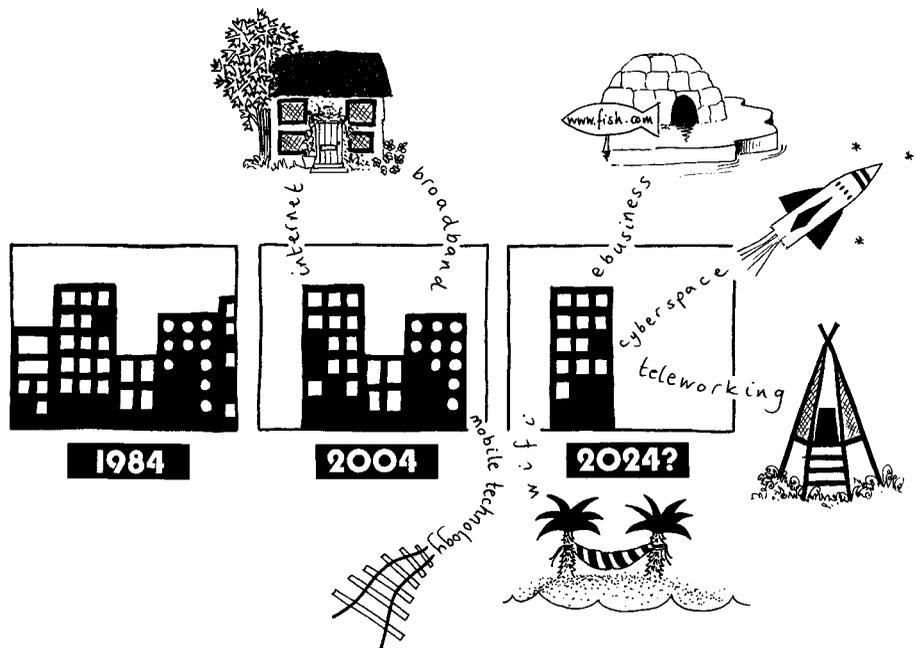
If you had walked around Reading 20 years ago, the shape and form of the town centre and the urban fringe would have been very different from the pattern we see today. In 1984, business and office parks were starting to take off, driven by the inexorable rise in car transport and desire for peripheral locations; the town centre shopping was of a conservative and traditional high street form, without a major shopping centre; and despite its Thames Valley location, Reading was still not really in the upper echelons of UK towns and cities in terms of economic growth and wealth. Twenty years on, things are very different: office and business parks pervade; the Oracle has launched Reading into the top 12 shopping centres in the UK; and the area has one of the highest wealth indices outside London, founded on the growth of hi-tech business, the knowledge economy and financial services.

Reading's growth and prosperity have been founded on its location, skilled workforce and transport links, but technological change, and the growth of transport and allied infrastructure, as well as the telecommunications and information and communications technology (ICT) that we so often take for granted, have all played their role in this transformation.

But what is the evidence for this? Today's offices, shops and industrial property may not look that dramatically different on the outside, but there have been changes on the inside. For example, shops have become bigger: electronic point of sale technology has driven down the amount of storage space needed and freed up more sales space. Also, office technology has shifted space demand requirements, and changes in process have provided a re-emphasis, as 'call centres' and other types of new real estate space have developed. Reading's role in the growth of the new or knowledge economy in the region has also been driven by the trend towards a service economy, as successive governments have emphasised the importance of knowledge and enterprise as tools for economic growth. In turn, as service and other companies have sought to become more agile, flatter and more responsive to consumer choice, this has led to a move towards shorter leases and a desire to outsource property functions. Similarly, more business and commerce are being 'virtually' conducted on the web than before.

In short, as Kevin Kelly observed in 1998: 'People will inhabit places, but increasingly the economy inhabits a space' (see cartoon). But what will such continued transformation hold in store for Reading and other cities and towns in 20 years' time? In 2004, can we even imagine what Reading

will look like in 2024? Will teleworking be the dominant form of working? Will Internet shopping have made major inroads into conventional shopping? Will manufacturing space be completely obsolete? What new types of real estate will emerge? What will be the balance and mix of real estate?



People will inhabit places, but increasingly the economy inhabits a space.

Our thesis in this book is that ICT is important, and does make a difference to the shape and form of real estate products and services that we see today, but what is also clear is that ICT does not act alone to transform real estate. Indeed, unravelling the effect of ICT from other forces for change in society is fraught with difficulty. As the Urban Task Force report, commissioned by the UK government in 1998, pointed out, the three main factors transforming our towns and cities are:

- Technical change, based on ICT and new networks connecting people at a global and local level.
- Ecological threat, including the role of sustainable development, on the future urban agenda.
- Social transformation, reflecting structural demographic and economic forces.

As we will argue, a full understanding can only be achieved by placing ICT in its social, economic and political context, or using a 'socio-technical' approach, and highlighting the importance of ICT within a conceptual framework that acknowledges the importance of this context. The book therefore seeks to steer a balanced path between the hype of the dot.com years, which, at its most extreme, suggested technology would lead to the 'death of real estate', and the more sceptical view that institutional and other barriers prevent ICT from influencing real estate demand and location to any large degree. In arriving at our conclusions we examine work from a range of disciplines including real estate studies; economics; spatial studies and geography; management literature and sociological studies. To that extent our approach is also multidisciplinary, and we also base our conclusions on continuing empirical research within our organisations.

Acknowledgements

The authors would like to thank colleagues, family and friends for their help and support during the course of writing this book. In particular, Tim Dixon would like to thank Rachel for just being there, with all her help and support including her cartoon artwork; and Bob Thompson would like to thank Jane for reminding him constantly why he bothers!

Table of Responsibilities

The writing of this book has been very much a joint effort between the authors. However, dividing the writing explicitly between us by chapter in terms of 'lead author' made sense from a project management point of view. We therefore outline below the responsibilities that were taken, and this may help readers who have particular queries over points raised in the individual chapters.

Chapter	Lead author(s)	Additional comments
1	Dixon	Thompson, Snow, McAllister, Marston
2	Dixon	Thompson, Snow, McAllister, Marston
3	Dixon	Thompson, Snow, McAllister, Marston
4	Thompson	Dixon, Snow, McAllister, Marston
5	Dixon	Thompson, Snow, McAllister, Marston
6	Thompson	Dixon, Snow, McAllister, Marston
7	Dixon, Thompson, Marston, Snow	McAllister
8	McAllister, Dixon, Thompson	Snow, Marston
9	Dixon, Thompson	Snow, Marston, McAllister

Book website

A website to accompany the book has been developed at www.cem.ac.uk/neweconomy. The website contains useful links, updates and other resources on real estate, the new economy and ICT.

Dr. Tim Dixon, College of Estate Management, Reading
(t.j.dixon@cem.ac.uk) October 2004

1

Introduction

Background

The overall aim of this book is to show how new technology (i.e. Information and Communications Technology (ICT)) is impacting on the shape and form of real estate in our towns and cities, and how it is influencing and is being influenced by other forces within what many commentators call the 'new economy', as part of an 'information society'.

UK private sector commercial property (office, industrial and retail) is a large and important asset, representing some £400 bn or 34% of total business assets. Business property also represents 17% of UK fixed tangible assets (Capital Economics 2002). Yet social and economic forces for change, linked with new technology, are leading owners and occupiers to question the very nature of property and real estate, and the purpose it should serve. The key question therefore arises: what are the implications of ICT impact for the amount, location, configuration and type/nature of real estate assets? In this sense, if ICT is improving productivity (in space and output terms), will this reduce the demand for real estate in certain sectors (i.e. retail, offices and industrial), and the overall demand for real estate floor-space? Will new and existing property be reconfigured?

Typically, linear models of technological innovation have highlighted the transformational aspects of technology and the key social processes from which it emerges. However, such models adopt a deterministic view of technological change and imply that science, technology, markets and organisations are linked in a linear and causal chain. The reality is very different: invention, use and exchange of technology operate in a cyclical and reciprocal way. If this latter model is adopted as a starting point, then ICT is also a product and a manifestation of forces, which include social,

economic and political factors, organisational change and business process change.

It is therefore dangerous to assert that technology operates in a vacuum, and the theoretical framework adopted in the book (which we term a 'socio-technical' model) views ICT as operating within the context of other factors, and as a product and manifestation of these forces. It acknowledges that these forces for change are shaping what may be called a 'new economy', and are also working together to influence real estate patterns and processes.

The book (and accompanying website, www.cem.ac.uk/neweconomy) is based on the authors' own research,¹ and a growing body of new, international research in the field. Drawing on the authors' extensive knowledge of research, and examples from the UK, USA and elsewhere, it addresses the following, related questions:

- How do new technology, organisational change and economic factors interact, and what is the impact of their interaction on working practices and demand for commercial and residential real estate?
- What are the resultant implications for real estate strategies (i.e. for landlords, tenants and other stakeholders) and for the provision of real estate services?
- What is the impact on the spatial form, geography, and specification of commercial and residential real estate?
- What are the changes in urban shape and form likely to be in the future?

This introductory chapter therefore sets the scene for what follows by:

- focusing on the key aims and objectives of the book;
- outlining the basis of the theoretical 'socio-technical' framework adopted (set in the context of a literature review of alternative frameworks); and
- highlighting the key themes which are explored in the book.

Aim and objectives

The key aim of the book is to examine how ICT, as one of a number of forces for change in property and real estate, is impacting on real estate markets and services.

The objectives are to:

- examine how new technologies, incorporating eCommerce and eBusiness, combined with organisational change and social, political and economic factors, are affecting the demand for space and working practices in office, retail and industrial real estate markets;
- analyse how real estate owners' and occupiers' real estate strategies are changing to reflect these trends. The effect on residential property through smart homes and teleworking is also considered as well as the effect on professional real estate services through disintermediation and reintermediation;
- assess how technology is impacting on the geography and space of commercial and residential real estate and the implications for infrastructure in our towns and cities;
- examine how urban shape and form are likely to change over the next decade and beyond, as a result of changes in demand for real estate and accompanying changes in the use, location, occupancy and type/nature of real estate.

It should be noted that the framework we adopt in the book highlights the interlinkage between ICT and other factors. As we shall see throughout the book, isolating and decoupling the impact of ICT from other factors are fraught with difficulties and, in fact, we adopt our framework because we argue that ICT cannot be understood in isolation from other related factors, which include globalisation, demographic change, flexible production and organisational change.

Definitions

It is important to examine how we define *technology*, *new economy*, *information society*, and *real estate* in this book. Historically, the Information Technology (IT) sector has been defined in a variety of ways. However, existing national and international statistical classifications and systems (see, for example, OECD 2000) have failed to keep up to date with a rapidly evolving IT sector. Computing and telecommunications technology has also converged and is now commonly referred to as 'the ICT sector'. In fact, in 1998 OECD member countries agreed to define the ICT sector as 'a combination of manufacturing and service industries that capture, transmit and display data and information electronically', and we adopt this definition in the book to include those technologies which underpin the sector. Therefore we use 'ICT' and 'technology' interchangeably, but our definition of technology is more restrictive than other definitions (see, for example, Green & Vandell, 2001 and Scarbrough & Martin Corbett 1992), which frequently include components beyond ICT.

As far as the most recent 'new economy' is concerned, Castells (2000) points out that this emerged in the last quarter of the twentieth century and is informational, global and networked. However, there have always been new economies (Rowlatt *et al.* 2002) and the concept is not tied to time or technology. Over the centuries there have been periods when changes in technology or social organisation brought about:

- radical changes to market boundaries, expanding the scope to exploit intellectual capital;
- access to new products and services for major sections of society;
- significant changes in the interactions and operating processes of enterprises; and
- a redefinition of customer–supplier relations.

Examples (also see Perez 2002; Gordon 2000) include printing; steam power; canals and railroads; mass media and more recently ICT. Each changes the structure of economies and relationships in society but none is purely economic in nature. Most proceed and succeed from an initial step providing limited intellectual capital to a small sector, to a point at which access is potentially available to all. Today the notion of a new economy is closely tied to the effects of technical progress on economic growth, and in the present debate the role played by information and communications technologies (ICT) on economic performance is vitally important.

However, in this book we adopt the following definition (Progressive Policy Institute, 1998: 8): 'a knowledge and idea-based economy where the key to job creation and higher standards of living are innovative ideas and technology embedded in services and manufactured products'.²

It is also important to note that the new economy is the driving force behind the emergence of the 'information society', which is explored in more detail alongside the 'new economy' in Chapter 2 of this book. A precise definition of the information society is difficult to pin down. For instance, a DTI/Spectrum report (1996: 1) suggested that the term could not be precisely defined, because it was still evolving and carried different meanings across Europe and elsewhere, but it conveyed a society that: '... uses information intensively and in a way that is not constrained by time or space, a society where transactions of all sorts can be processed electronically, a society whose working and living practices have been modified fundamentally by technology'.

Put simply, the term ‘information society’ stresses the societal, inclusive transformations of technology, whereas the term ‘new economy’ emphasises more restricted, economic aspects. The term ‘information society’ also stresses inclusivity: an information society is supposed to be enjoyed by all, and not just a particular group(s). In this book we argue that the information society is closely associated with the new economy, which is providing the engine for economic growth.

Finally, ‘real estate’ is used interchangeably with the term ‘property’ in this book and follows the *Dictionary of Real Estate Terms* definition (Friedman *et al.* 1993: 278) to ‘encompass in law, land and everything more or less attached to it and, in business, the activities concerned with ownership and use transfers of the physical property’. In the book we use the term ‘real estate’ to encompass the main sectors of retail, industrial, offices and residential. However, we also suggest that the hard and fast distinctions between sectors are becoming more blurred as ICT impacts on real estate. Also, the term ‘real estate’ is inclusive of new types of property and use being created by ICT transformation (for example, smart homes, co-location centres or server farms). Within our definition of real estate, we also investigate both the real estate and corporate property sectors and include a detailed examination of the impact of ICT on the real estate services sector. Finally, we are concerned with addressing ICT impacts within the key stages of the real estate production process: namely, construction, development and investment.

Technological change: alternative perspectives

Technology’s impact (in its widest sense) on society has been viewed in a variety of different ways and through different strengths of lens. In order to understand the rationale for the framework adopted in this book it is important to review the development of these views at four different levels within both non-spatial and spatial perspectives.

Within a ‘non-spatial’ perspective, two sets of frameworks have been developed (Table 1.1). First, frameworks of technological change which examine the impact on the economy as a whole and, second, frameworks of how the management, structure and form of organisations have been affected. Generally, this latter group does not consider the spatial aspects of technology explicitly (which would normally include the locational and space demand/supply dynamics at a meso/micro level).

Table 1.1 Perspectives on technology.

Perspective	Framework	Examples
Non-spatial	Economy-level	Schumpeter (1939) Beniger (1986) Gordon (2000) Perez (2002)
	Firm-level	Winner (1996) Scarborough and Martin Corbett (1992)
Spatial	Urban and regional-level	Berry (1973) Storper (1997) Castells (2000) Graham and Marvin (2001)
	Real estate-level	Borsuk (1999) Green and Vandell (2001) Gibson and Lizieri (2001) Dixon and Marston (2002a)

In contrast, ‘spatial’ views and perspectives have also been developed to assess the impact of technological change on the shape and form of our towns and cities, and on the real estate occupied or owned by organisations.

It is also true that a number of frameworks view ‘technology’ in the widest sense of the word, and in a way that includes Information and Communications Technology. An example is that adopted by Green & Vandell (2001), which is discussed in more detail later in this chapter. Our definition of ‘technology’ is more restricted (see above) referring simply to ICT, but nonetheless we draw on some of the key themes and principles from previous theory in developing our ‘socio-technical’ framework, which we discuss in further detail later in this chapter. Although there is a degree of implicit overlap between some of the frameworks, models and paradigms, the typology now discussed serves to identify themes, and to place our framework in the context of work by others. The intention is to provide an overview, and the discussion is by no means exhaustive. There have been a whole range of models conceptualising the impact of technological change on society from a variety of disciplines, and so space prevents a detailed discussion of all of these. The key perspectives from the fields of economics, geography, planning, sociology and real estate are therefore now presented.

Non-spatial perspective

Economy-level framework

Over the last hundred or so years, there have been several approaches to the study of technology and technological change at an ‘economy-level’ (Bruun & Hukkinen 2003). Perhaps the most popular of these was

developed in the field of evolutionary economics, which draws on the work of Joseph Schumpeter and sees knowledge as a connecting link between technological change and economic dynamics. In this sense, knowledge gives competitive advantage, but as technology diffuses throughout the economy prices fall, which means other firms start to innovate. Evolutionary economics increased in popularity because neo-classical economics had failed to explain technological change, which was seen as based solely on core assumptions regarding market equilibrium (sustained through the forces of demand and supply). Instead, evolutionary economics focused much more on an institutional framework of decision making, and based itself on a new theory of economic agency. The discipline was further developed in the 1980s to include 'innovation systems' which identified institutions and economic structures as important constraints and drivers for technological change. But technological change was also seen by many as systemic in nature, and so concepts in the field were developed further (Freeman & Louca 2001).

Although technological change was also important to proponents of evolutionary economics, previous theories, including those by Schumpeter (1939), had failed to recognise the vital role of institutions in shaping the outcome of technological transformation. Much existing theory was seen as being guilty of technological determinism, or the tendency to see technology and economic growth as directly linked. Instead, it was argued that economic growth can only be understood in the context of a sequence of eras corresponding to clusters of new technologies. Carlota Perez's work in 1983 on structural change and the assimilation of new technologies (see Freeman's Preface to Perez 2002) was therefore influential, because it demonstrated that big technology changes (for example, iron, coal, steel, oil or microprocessors) led not only to the rapid growth of new industries, but also spawned the rejuvenation of older industries over a longer period. These older industries found new ways of using the new technology and made changes in their organisation and management, brought about by technology. This comprised, in her view, a new way of thinking about the systems of production, including the organisation, techniques and interdependencies within what she termed a 'techno-economic paradigm'. The concept of a paradigm change at each technological revolution is fundamental to this view.³

Perez's work also emphasised the importance of 'meta-paradigm' changes which affect the whole economy and entailed the very widespread use of new inputs. These created economies of scale, leading to price falls, which made technologies more attractive for economic and technical reasons.

Her work also illustrated the fallacy of technological determinism, and she argued that transformation can only happen through an interactive and accompanying process of social, political and managerial change. She also showed that there is a great deal of interdependency between technology, management and organisation within the context of regulation and other societal forces. Paradigm change therefore has an impact at the firm level, but is also affected by the entire system of social and political regulation, and this is true of education and training, intellectual property rights and other legal frameworks in what many refer to as the 'information society' today.

Building on this work, Perez (2002) extended these ideas and those of Schumpeter still further in an attempt to develop a highly abstracted, interdisciplinary paradigm that linked long waves of technological growth to financial capital cycles. Schumpeter (1939) had referred to the 'creative destruction' of innovations, leading to progress but also recurring recessions. However, Perez argued that long waves of economic change could only be understood in the context of complex, society-wide processes. Such periods have frequently been the source of chaotic and contradictory social effects which meant internal re-composition, a redesign of institutions, markets and economic activity which could then lead to a new 'golden age'. She cites the example of the Victorian boom from the mid-nineteenth century which materialised some 20 years after George Stephenson's *Rocket* had run on the Liverpool–Manchester railway (Perez 2002: 24). This had followed the installation of a network of railways and occurred prior to (and during) a time of chaos and panic in the financial markets. The resultant boom was therefore founded on a new set of markets and institutions that led to more regulation, which, in turn, led to further expansion of the railway network and urban growth.

Perez (2002: 6) suggested that there were, in fact, three main features in the functioning of the capitalist system which interacted and determined the recurrent surges she identified:

- Technological change tends to occur in clusters of radical innovations leading to successive and separate eras that modernise the whole production system.
- Financial and production capital are interrelated but functionally separate, each following paths with different criteria and behaviours.
- Inertia and resistance to change are higher in the socio-institutional framework than in the techno-economic sphere, which is driven by competition.

She uses the term 'technological revolution' (Perez 2002: 8) to represent '... a powerful and highly visible cluster of new and dynamic technologies, products and industries, capable of bringing about an upheaval in the whole fabric of the economy and of propelling a long-term upsurge of development'. Inevitably, this includes a strongly linked 'constellation'⁴ of technical innovations, which comprises an important all-pervasive low-cost input such as an energy industry, but sometimes a raw material, and new products and processes within a new infrastructure. The impact of these revolutions spreads far beyond the original industries and sectors in which they occurred and each provides interrelated generic technologies and organisational principles that enable upsurges in potential productivity. This in turn leads to regeneration and modernisation of the whole system with a recurrence of the cycle about every 50 years.

Perez (2002) sees the process of diffusion of the revolution and its paradigm throughout the economy as a great surge of development. This builds on the work of Dosi (1982), who related technological change to various trajectories of growth. Each surge in the trajectory is seen as having two distinct periods, over a period of 50 years (Figure 1.1). The first 20–30 years

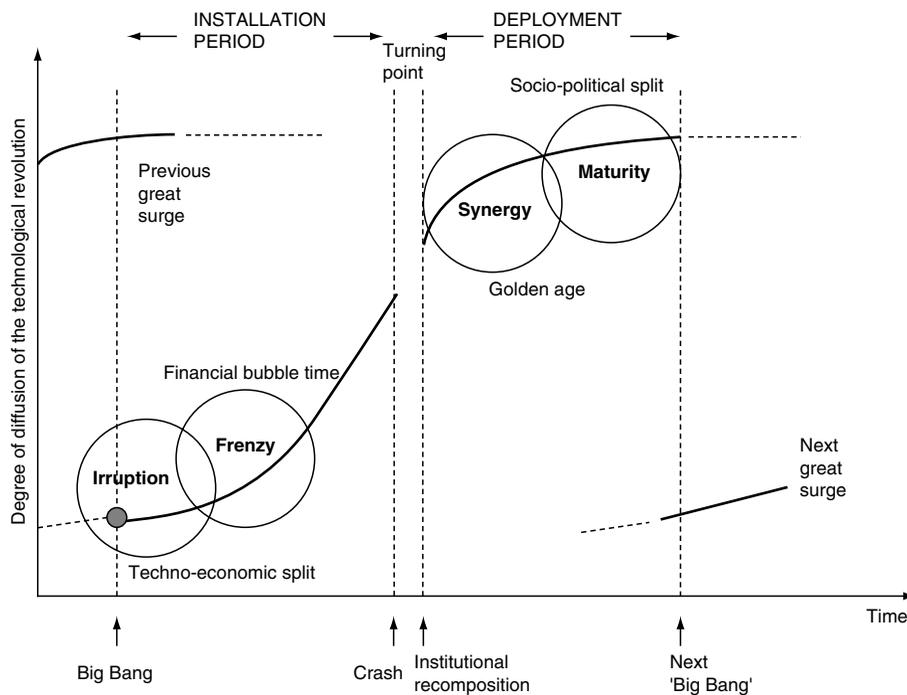


Figure 1.1 Technological revolutions: the diffusion process (adapted from Perez 2002).

are the period of 'installation', comprising a period of 'irruption' followed by 'frenzy', as a critical mass of industries and infrastructures develop, which seek to overturn the established paradigm, driven on by access to financial capital. After a mid-surge period there follows a 'turning point' when the tensions that have built up are surmounted and a period of deployment (also lasting 20–30 years) then follows. This phase is characterised by a spreading of the revolution throughout the economy, as 'synergy' and 'maturity' occur.

The framework developed by Perez links technological phases with new constellations of industries and infrastructures and paradigm changes to support and drive forward the change. This concept of technological revolution is also closely related to the ideas of Simon Kuznets (1971) who conceived the idea of 'epochal innovations' (over longer periods of several centuries), which were able to induce significant growth. Other authors such as Suarez-Villa (2003) have also used similar concepts to explain the evolution of technology, although Suarez-Villa employs the term 'techno-capitalism' to encapsulate the evolution of market capitalism rooted in rapid technological innovation and its supporting intangibles.

Perez suggests that since the end of the eighteenth century there have been five distinct phases of economic growth associated with particular revolutions (Table 1.2).⁵ These have been characterised by clusters of growth occurring in particular countries or even regions: Lancashire as the cradle of the first industrial revolution and Silicon Valley as the centre of the microelectronics revolution. All require some form of low-cost 'attractor' or 'big bang' in order to spark further breakthrough in the revolution. Just as Richard Arkwright's Cromford Mill drove the irruption of the Industrial Revolution, so the microprocessor in 1971 started the 'information age'.

Similarly, each revolution is founded on the linkages and synergy between various industries and infrastructures. But many of the products and industries had already existed, and each revolution's role was in bringing them together. Coal and iron had been used for a long period prior to the Industrial Revolution, but it was the steam engine that transformed their power: the same can be said for oil and the internal combustion engine and mass car production. Electronics had also existed since the 1900s but broke through in the 1970s because of the potential of cheap microelectronics. So each 'constellation' also reveals technologies developing at different rhythms and with feedback loops: for example, the information revolution began with a upsurge and explosion in microprocessors and hardware which led to rapid growth in software and telecommunications, followed by the Internet boom with each benefiting from the previous