Chapter 2
Domestic Photography and Technological Paths

2.1 What Is Domestic Photography?

In this book, we use the term *domestic photography* to describe the photographic activities of ordinary people taking and using images for non-professional purposes. Also, in our use of the term we focus on the kind of use in which photography is not a hobby as such but embedded in other activities. The word 'domestic' implies that the activities take place mainly in homes, and the home is the headquarters for this activity.[1] Many photographs are taken in the home of people who live or visit there. People go abroad and take photographs, then return home to view, show, share, and store the captured pictures. The cameras, photo albums, prints, printers, computers, mobile phones, television sets, and other photographic technologies can be taken out of the home space, but they do 'live' at home as much as the owners of these technologies. Their resting place is at home.

The ordinary activities performed with cameras and photographs are also related to the people living in the home. Traditionally this has been the family unit. The connection between photography and the family has been so strong in the past that *family photography* has become almost synonymous with domestic photography. It has often been the members of the family who are photographed and who do most of the photographing. It is through family relations and the home that photography is introduced to babies and small children. The home is the place and the family is the social context inherent in the photographic practices we are all so familiar with. Also, the concept of family photography hints at the family-centric values that are often present in domestic photography: depicting the stereotypical father–mother–two-children nuclear family as a single coherent happy unit with no domestic problems or friction between familial relationships. Nevertheless, in our use of the term, domestic photography does not assume a family – even a person living alone without a partner or children can participate in domestic photography.

A third term, again used synonymously with the concepts of domestic and family photography, is *snapshot photography*. Although this is a common term today, its

[1] Holland 2009, p. 130.

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origins lie in the way in which people took photographs with early cameras. The term 'snapshot' is a British hunting term from the 1860s referring to shooting from the hip without careful aim.[2] The very first consumer cameras, from the late 1880s, did not have a viewfinder; therefore, the photographers 'shot' these cameras without much aiming. The word 'snap' resonates with a simplicity of consumer cameras with which the operator of the camera needs only to point the camera and squeeze a single button: the image is captured in an instant with the sound of a shutter snapping.

A snapshot photographer (*i.e.*, a snapshooter) is a person who takes photographs with consumer cameras, and snapshots are the photographs created in the process. Not all family photographs are snapshots, though. Often some of the photographs on display in a home are studio photographs taken by a professional photographer to celebrate an event such as a wedding or a birthday. Family photographs can also include newspaper clippings about friends, family, or other relatives. In other words, snapshot photography is the part of family and domestic photography wherein the members of the family or their acquaintances (*i.e.*, amateurs or non-professionals) capture the photographs themselves.

In the following three sections of this chapter, we are going to look at domestic photography from three perspectives: the practice, the technology, and the business. We believe these three factors are central for an understanding of domestic photography and the way it gets transformed through innovation and domestication. In the rest of the book, we review the interaction of these factors over time to identify how domestic photography came to be the way it is today, and how it is changing.

2.1.1 The Practice: Constructing Positive Images

Domestic photography has traditionally been about constructing images as one has wished to see them – often wishing to see them at their best.[3] Home photographers (*i.e.*, snapshooters) hardly ever take photographs of friends or family members arguing, painful experiences, or unhappy people, and if relations and situations change after a photograph has been taken, the unwanted photographs are removed from frames or albums. As Don Slater points out, domestic photography is *constructed* by how we present ourselves to the camera; what we decide to photograph and how we frame it; and, after the capture, the selection of photographs to share, archive, or throw away.[4] In turn, photographs help us to construct our individual, family, and cultural identities as they appear to others.[5] Through domestic photography we create an ideal image, wherein happiness flourishes in everyday life, in holidays, and in travel with friends and family. If there are unhappy memories, they are sentimental and nostalgic in nature.

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[2] Coe and Gates 1977, p. 6.

[3] Chalfen 1987; Holland 2009; Musello 1979; Zuromskis 2009.

[4] Slater 1995, p. 134.

[5] Chalfen 1987; Durrant et al. 2009; Musello 1979.

The tools and technology for constructing domestic photography are the cameras and photographs, along with media for displaying the photographs: frames, albums, slides, photo paper, photo prints, photo books, mouse pads, Christmas cards, computers, phone and television displays, etc. The tools also include concrete tools for editing, selecting, organising, and transferring the photographs: scissors, software, boxes, pens for writing, envelopes, and so on. However, capturing photographs with the camera is a key activity in this process, and the content of those photographs the main material for construction.

Events and experiences are captured and documented, among them vacations, holidays, festivals, parties, and travels. Especially change, growth, and the passing of time are captured in photographs of familial rites like weddings, baptisms, graduations, and birthdays.[6] Also, children are photographed to capture the changes in them, often in an attempt to preserve a memory of them at a certain age and time. Richard Chalfen draws attention to how these documented changes are predictable and socially 'allowable',[7] such as via a child's first day at school, a cousin's graduation, or one's father's retirement. People do not photograph the progress of diseases, the changes propagated by a divorce, failed projects, or other changes that are perceived as not appropriate. And it is perhaps because domestic photography steers away from these negative and inappropriate memories and experiences that snapshots can trigger painful memories, sadness, loneliness, and trauma. A family portrait that is all smiles can trigger in someone memories of childhood trauma, such as domestic violence, alcoholism, or serious illness. The positive snapshot becomes an icon for an artificially constructed and unrealistic past.

However, not all domestic photography is done for reminiscing and recollecting the past. Photographs are also captured to communicate the present for the present. Photographs are captured and sent to distant relatives and friends to show 'how our life is here, right now'. Photographs are also taken and displayed to presents one's current self for wider audiences. A photograph on an office desk or a set of photographs in a wallet, a wallpaper photo on one's mobile phone, and profile pictures on social networking sites are all building blocks in constructing an ideal image of us. The audiences for these photographs range from intimate friends to total strangers who happen to catch a glimpse of these images.

The assumption that photographs are objective proof plays an important role in the documentation of domestic life. Proof of the way people looked, the places they visited, and the events that took place. Once these documents are put together and presented, for example, in a family album, the collection of photographs becomes a narrative of historical events, which is treated as truthful and objective. What we tend to overlook is the active selection process in the making of a family album, which can make the truthfulness of the narrative questionable: the family album may not be false as such, but it is a subjective perspective of what has taken place in a family's history.

As mentioned above, through framing, capturing, deleting, editing, selecting, organising, positioning, and sharing, we select only a fraction of the potential body

[6]Chalfen 1987; Musello 1979.

[7]Chalfen 1987.

of photographs to tell the past for potential viewers. We are all familiar with the rules and conventions of that selection process. We all know how to create and to identify appropriate snapshots, and the rules and conventions are learnt as part of our culture.[8] We learn the snapshot culture in the ways in which our parents, friends, and acquaintances use cameras and photographs; the ways in which these technologies are advertised; the ways in which news, magazines, operating manuals, and guidebooks present photography; and the ways in which the people and activities we idealise are depicted. Chalfen writes that the snapshot culture is introduced to us in childhood and in the process of learning we are introduced to social patterns and models of social organisation deemed acceptable and proper.[9]

In the process of learning to snapshoot, we are taught to capture photographs that are often criticised as visually banal, aesthetically challenged, or simply boring. Catherine Zuromskis describes how snapshots are framed centrally, people pose frontally, affection is demonstrated by obvious gestures, and more often than not people put on a smile.[10] A visually beautiful and exceptional snapshot is most probably accidental. However, as we discussed above, the purpose of snapshots is not to please aesthetically but to construct a positive representation of domestic life and to trigger positive emotions in people.

Typical of snapshots is that the emotions they stir are personal and private. A snapshot often remains banal and insignificant without a personal connection to the people or the context captured in the photograph. Roland Barthes[11] calls this personal relationship with a photograph the *punctum*: the piercing, prickling effect a photograph can have in bringing back personal and private memories and emotions. The counterpart of the *punctum* is the *studium*: the effect a photograph has for an average viewer, the more public and communal reading of a photograph. It is from the standpoint of the *studium* that snapshots are uninteresting and meaningless. From the personal *punctum*, the very same snapshot can be the most important image in a person's life.

In contrast to pre-planned studio photographs, snapshot photographs are often informal and spontaneous.[12] Perhaps the most obvious change in photographs that occurred once people started to take them themselves was the playfulness and informality captured. Previous photographs, created by professionals, lacked the close and affectionate relationship that can exist between a photographer and his or her subject. It is this relationship that gives the camera a function of bringing togetherness that does not even necessarily require the captured photographs: pushing the button of the camera signifies that the moment and the people present are elemental in constructing a positive image of the photographer's life.[13] 'May I take a photograph of you?' is a statement

[8] *Ibid*; Zuromskis 2009, p. 57.

[9] Chalfen 1987.

[10] Zuromskis 2009, p. 53.

[11] Barthes 2000.

[12] Coe and Gates 1977, p. 9; Holland 2009, p. 132; Zuromskis 2009, p. 53.

[13] Chalfen 1987; Musello 1979.

about the relationship between the photographer and the subject independent of whether the photographs will ever be displayed or looked at. Whether the purpose of a photograph is to communicate love, friendship, camaraderie, or mere acknowledgement, domestic photography's important function is to strengthen social relationships.

In a nutshell, domestic photographic has an inherent duality. From the point of view of the general public, snapshots and family photographs can be insignificant, banal, and visually uninteresting. They are trivial, inaccessible, and predictable, and perhaps the only interesting thing about them is that they do tell us about what domestic life looked like in the past. From the private point of view, and the point of view of immediate family and friends, the snapshots are probably the most important pictures in the world. They trigger rich memories and emotions (good and bad); they create togetherness, social bonding, and belonging; they capture and store personal histories for current and future generations; and they are building blocks for constructing a socially acceptable image of us. Another way of summarising this is to say that the core *values* of domestic photography are to support memory, communication, and identity.[14]

2.1.2 The Technology: Capturing and Creating an Image

The basics of a camera are simple: reflected light travels through a small hole and hits a surface, creating an image of what it initially reflected from. Ancient philosophers knew the principle, and the first dark room with a hole in the wall was built in the mediaeval Arab world. The Latin name for such a dark chamber is *camera obscura*, and the 'chamber' part of that term, *camera*, is the contemporary name of the device for capturing photographs. Before the invention of what we today call a camera, the *camerae obscurae* of the nineteenth century were small boxes with a hole in the front (or a lens) and a mirror in the back that would display the image to the viewer.

Mounting a lens and a diaphragm on the hole in front of the box made it possible to change the size of the hole (aperture), focus the image, and use different lenses to bend the light rays so that objects that are far away seem closer (a telephoto lens) and nearby objects can fit into a single image (a wide-angle lens). This is still the principle of any camera: by the use of a lens and changing aperture, to make a clear and focused image on the back of the camera.

The image at the back of the camera is recorded on a medium, which enables the picture to be viewed separate from the camera. It is the invention of the means to record the image produced by the *camera obscura* that is considered the invention of the photographic camera. The name that is most often mentioned in history books is Joseph Nicéphore Niépce, who, in 1822, was the first to successfully record a positive image on a medium ('positive' meaning that light was recorded as light and dark as dark, not *vice versa*, which is a negative image). In his case, the medium was a pewter plate covered with a mixture of bitumen (asphalt) and lavender oil.[15]

[14]Chalfen 1987; Musello 1979.

[15]Peres 2007, p. 130.

For the years to come, photography technology would be a combination of optics, chemistry of light-sensitive materials (mainly light-sensitive silver salts), and mechanics for getting the physics and the chemistry to work together to create an image.

After almost two centuries of producing photographs chemically, the process has become one of computation and information technology. As the captured image is digitised it becomes a set of numbers – computational data. Some practical effects of this fundamental change are already quite familiar: photographs can be stored in minimal physical space, there are hardly any costs for capturing thousands of images, the images can be copied indefinitely without loss of quality, they can be transferred over information networks over enormous distances in a very short time, they can be edited and manipulated in ways previously unimaginable, and they can be displayed immediately after capture on a variety of screen types. It is the digitalisation of images that has enabled the new domestic photography practices that use the internet, and it is digitalisation and digital technology that has enabled the creation of the new type of consumer camera: the camera phone.

However, perhaps the most basic change in domestic photography technology is that the photographs captured are no longer physical objects. Digital photographs always require some kind of device to view them, and the device has to have some kind of computational power to convert the numerical representation into an analogue signal visible to humans – often the image is converted into light emitted from an LCD screen. In contemporary society, this is not a problem: computers and displays are widespread, and the ways in which digital images are encoded into bits are standardised. Also, because of digitalisation, photography has become an integral part of information and communications technology: digital cameras and photographs are components of an ecosystem of computers, networks, hardware, and software. Photography as a practice, technology, and business is integrated into everything that current and future information and communications technology encompasses.

2.1.3 The Business: Camera, Film, and Service

Niépce achieved the recording of the image on the back of a *camera obscura* as early as 1822. Why was there a need to change his invention? And as it was changed, where did the requirements for new technology and design originate? The key driver of technological progress is the ways in which the technology is foreseen to profit its owner – to find a market for the new invention and turn it into a commercial innovation. In other words, domestic photography has responded to business needs as well as user needs down through the years. It has been a consumer business since its birth in the early nineteenth century.

The business of capturing and creating images was already familiar in Niépce's France. A painted portrait was an expensive luxury item, but miniature paintings,

silhouettes, and physiognotraces were within the financial reach of the rising middle classes. Whether the motives of Niépce and other inventors working with image-capturing in 1826 were of a commercial nature or not, they must have been aware of the existing market for producing images to be sold for a price. Geoffrey Batchen points out that there was already from the late eighteenth century a "widespread social imperative" pointing toward finding a way to record the image in a *camera obscura*.[16]

The consumer photography business in the nineteenth century was one of the two: the sales of publicly appealing photographs and the sales of photographic services in portrait studios. The former included sales of photographs, taken by professionals, of celebrities, exotic places and people, historical events (actual and enacted), beautiful landscapes, and even erotic imaginary. These images were produced in bulk and sold by the thousands. The latter business involved the familiar studio practice of taking customers' photograph and then selling the image or images to them. In the early decades of photography, studio photographs were more of a luxury item and only single copies existed.

In the 1880s, George Eastman invented the technologies and a business model to make the camera a consumer product, and the development and printing of domestic photographs a commodity business. The sales slogan for the first Kodak cameras summarises Eastman's business model for snapshot photography: "You push the button, we do the rest". For the next 120 years, the basic model for the snapshot photography business would be the sales of simple and inexpensive cameras (the capture process automated into a single push of a button), and the commercial service of turning the captured images into paper prints (the complex development process externalised into a simple service). To link these two parts together, the camera and the prints, a standard disposable roll of film was the medium for recording the pictures, and the sale of film was the business.

This model was challenged somewhat after the Second World War with the introduction of the first instant cameras by Polaroid Corporation. Polaroid cameras automated the development process in addition to the capture process. Nevertheless, the business model eliminated only one component from the Kodak model: the development service. What remained were the sale of the cameras and the special Polaroid film.

In hindsight, the Polaroid instant camera was a predecessor of the digital camera. Like the instant camera, the digital camera does not require an external development service in order for the photographer to see the captured image. However, digital photography eliminates also the need for a disposable capture medium – the film. Digital photographs are often stored on a separate medium, the memory card, but the same memory card can be used over and over again. Of the three main sources of revenue in the Kodak era (sales of cameras, sales of film, and the development service), only the sales of cameras remains a major business today.

As digital photography has become the dominant form of domestic photography, it is easier to see how the Kodak business model restricted and enabled a specific set

[16] Batchen 1997.

of practices. In the digital era, capturing a photograph is not separated from seeing the captured image: no longer is it necessary to 'wait until the roll is full' before taking it to a developing service and waiting for them to develop the prints; this was what Polaroid had already achieved. Digital photos have the potential to be of any physical size and shape, but it remains the legacy of the Kodak era that the prints are often the standard rectangular 10 × 15 cm. Gone are the paper envelopes containing developed prints, as are many of the 'one-hour' photo shops and mail-order services that produced them. But perhaps the most visible change is the possibility of editing photographs. In the Kodak model, the only influence the snapshot photographer had on the developed photographs was selecting from among a few standard sizes and whether the photos were to be developed on glossy or matte paper. In comparison, the possibilities now afforded by image editing software are enormous.

Perhaps the most iconic device of the post-Kodak digital era is the camera phone. It fulfils none of the three business models of Kodak: it is not sold as a camera, it has a built-in storage medium, and it requires no development process to produce the photographs. At the same time, it integrates the advances in information, communication, and media technology: it is a handheld programmable computer with an inherent network connection and a built-in camera for taking still and moving pictures. How will such networked camera–computers shape domestic photography? Will there be a dominant business model for snapshot photography in the post-Kodak era, and how will it shape the practices?

It seems that the turn of the millennium will show a similar milestone in domestic photography to the invention of the camera in the first half of the nineteenth century, and the birth of snapshot photography at the dawn of the twentieth century. Old and existing practices have been reshaped as new practices have emerged, and these practices are still being reshaped by people adopting new products and services made publicly available by commercial organisations.

How did domestic photography end up being what it is today, and how have the business, technology, and practices interacted to shape it? As we asked at the beginning of this book, what has changed in domestic photography and what has remained the same? To begin our journey into the history of domestic photography, we next describe and discuss our analytical tool for understanding it.

2.2 Technological Paths in Domestic Photography

Most previous histories of domestic photography have been written from only one of the three perspectives outlined above. Many concentrate on the technical inventions that made it possible.[17] Some focus on photographic content and practices.[18] Yet others outline the business drivers and models, and provide histories

[17] See, *e.g.*, Auer 1975; Benson 2008; Gustavson 2009; Lewis 1991; Wade 1979.

[18] See, *e.g.*, Bourdieu 1990; Chalfen 1987; Chambers 2003; Coe and Gates 1977; Czech 1996; Drucker et al. 2004; Goldberg 1991; Holland 2009; King 1984; Musello 1979; Van Dijck 2008.

of organisations that made certain forms of photography popular.[19] However, as we pointed out in Chap. 1, domestic photography can be seen as a socio-technical system involving various interactions between technology, people, and the social organisations in which they live and work. Furthermore its technology and business models have been in flux for over 170 years.[20] This has taken place in particular societal contexts and been subject to creative accommodation and misuse.

These two insights underpin work in Computer Supported Cooperative Work (CSCW) and Science and Technology Studies (STS) and suggest the need for a more integrated history of the area. This should combine insights from technology, practice, and business perspectives. To undertake this work, we draw on the STS literature regarding technology and business evolution and social construction of technology. We focus on the agency of technology in shaping practice and the agency of business in shaping technology. This is because our main audience is the builders of future imaging technologies and we want to alert them to the fact that the artefacts they create are not morally or politically neutral; they embody values, preferred uses, politics, presumptions, and business models.

We emphasise the role of technology also because often the technology is dominant in sustaining certain structures. However, we do not propose technological determinism, while we do draw attention to how artefacts favour certain uses over others, and often these more 'compatible' uses support specific business models. This is not surprising, given that practically all photographic technology has been made public by commercial organisations. Therefore, we also pay special attention to the business and commercial incentives of producers and users of technologies.

2.2.1 The Cyclical Evolution of Technology

Our view on the history of domestic and snapshot photography is based on the model of technological evolution paced by discontinuities and dominant designs. We refer to the model published by Philip Anderson and Michael Tushman,[21] but other literature from technology management research, such as the work of Clayton M. Christensen and James Utterback,[22] presents similar models. In our approach, we also refer to science and technology studies, and within STS we mainly reference work from social construction of technology studies (SCOT). These studies recognise the non-linear and cyclical nature of technology development and progress, and they bring into the foreground the heterogeneous actors shaping the process.

By cyclical we mean that the consecutive phases of technology development follow each other in a cyclical manner. An established and stabilised technology

[19] See, *e.g.*, Collins 1990; Jenkins 1975; Munir 2005; Olshaker 1978; Wensberg 1987.

[20] Lehmuskallio discusses how the 'technological logics' driving photography and image capture in general range back centuries (Lehmuskallio 2010 (unpublished work)).

[21] Anderson and Tushman 1990.

[22] Christensen 1997; Utterback 1994.

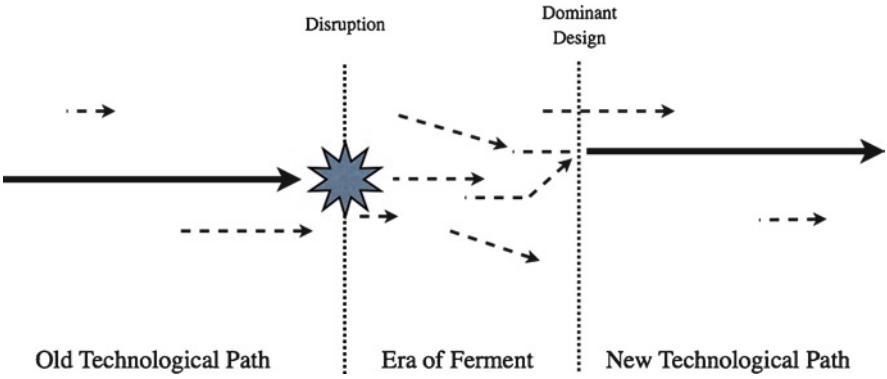

Fig. 2.1 The model of technological evolution used in this book. The *solid arrows* are dominant technological paths and the *dashed arrows* are alternative non-dominant paths (The figure is adapted from Fig. 1 from Anderson and Tushman 1990, p. 606. © Risto Sarvas, 2010)

can be seen to follow a certain *technological path*. At some point, this path is *disrupted* by a radical invention (or some other major change), which launches an *era of ferment* ending with a new stable and established technology path characterised by a *dominant design* (see Fig. 2.1). By non-linear we mean that in a 'Kuhnian'[23] fashion, technological evolution is not cumulative or incremental, but major changes happen in 'paradigm shifts' that shake the very foundations of technological knowledge, business models, and industry, and that pressure people to reconfigure their practices and invent new ones.

According to the model, a radical invention, at an unforeseen moment, disrupts the existing and established industry. Radical about the invention is that the new technology is not based on the existing business models and competencies in the industry, but is dramatically different from the norm of existing innovation in an industry.[24] Kamal A. Munir and Nelson Phillips go as far as to suggest that a radical innovation questions the whole concept of 'industry', since the idea of an industry assumes a central product and this becomes undermined.[25] Anderson and Tushman call this kind of radical innovation a *technological discontinuity*. Hughes discusses inventions in relation to a technological system, and a *radical invention* in his model is something that does not become a component in the incumbent and existing system.[26]

Inventions that are not radical or disruptive are *incremental*[27] or *conservative.*[28] Although they can be inventive, they support the existing, established business and industry structures, popular practices, and technological systems.

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[23] Kuhn 1962.

[24] Anderson and Tushman 1990.

[25] Munir and Phillips 2002.

[26] Hughes 1989, p. 57.

[27] Anderson and Tushman 1990.

[28] Hughes 1989.

In the Anderson and Tushman model, a technological discontinuity launches an *era of ferment* in which the old technology competes against the new technology (and different variations of the new technology compete against each other).[29] Typical of the fermentation era is that there is no clear combination of actors that is stable and dominant. The potential benefits of becoming the new dominant design make the era of ferment exceptionally competitive, as previous structures, models, power relations, and organisations are potentially all due for change.

According to W. Brian Arthur, in an era of ferment the competition between technologies that have increasing returns to adoption can be strongly influenced by small events and factors: in a competition between new technologies, one of them might get a head start on adoption and benefit from the snowball effect of increasing returns.[30] Photography technology for domestic use is a good example of a technology with increasing returns to adoption: the more people use a specific technology (*e.g.*, glass plates, 35 mm film, or JPG images), the more standard or compatible with others it becomes; hence, it grows more attractive.

The outcome of an era of ferment is non-obvious and complex. Bijker and Law explain that in technological change the heterogeneous actors (*e.g.*, businesses, regulators, users, organisational structures, and existing technologies) each have their own strategies for winning in the conflict and beating any opposition.[31] The strategies and actions are shaped by the actions of other actors (and their strategies); this makes the strategies and their consequences emergent phenomena, and, more importantly, it makes technological change contingent and messy.[32] Hughes draws attention to the processes that take place between an invention and its commercialisation: after the initial invention has been made, further invention and development continue as the new technology is turned into an innovation within complex systems such as manufacturing, marketing, logistics, and service.[33] As Anderson and Tushman point out, the initial invention that started the era of ferment will not itself become the final stabilised dominant design forming the technological path, because of the active shaping processes.[34]

The era of ferment is not only a business competition between the stakeholders of different technologies. The users of the old and new technologies also face change and have a critical role in influencing the outcome. Elizabeth Shove et al. discuss how the proponents of new technologies – namely, digital photography – have to capture, enlist, and engage practitioners.[35] People have existing practices based on the incumbent or old technology, and taking new technology into use requires reconfiguring these practices. It is these new and reconfigured practices

[29] Anderson and Tushman 1990.

[30] Arthur 1994.

[31] Bijker and Law 1992.

[32] *Ibid.*

[33] Hughes 1989, p. 64

[34] Anderson and Tushman 1990, p. 616.

[35] Shove et al. 2007.

that shape what the new technology will be. Shove et al. take as an example how photography itself is defined, constituted, reproduced, and reconfigured through participation – in other words, the 'doing' of practices.[36]

The stakeholders of a new technology try to influence the process of adapting old practices to better suit the new technology. Munir and Jones draw attention to the active process of 'problematisation' by the stakeholders: to frame actors' understanding so that they perceive themselves as having problems for which the promoted technology is the solution.[37] In other words, rather than consumers having pre-existing needs, consumer needs are constructed in a process by various actors (*e.g.*, consumers themselves, technology promoters, and public media), and these needs are elemental in motivating people to adopt new technologies and adapt existing practices to fit them.

The era of ferment ends when the relations between the actors are stabilised: the technologies, businesses, regulators, retailer organisations, people and their practices, advertisers etc. reach an implicit consensus on what the technology design is. The technology becomes a 'black box' the internal workings of which are not disputed or questioned but taken for granted.[38] Anderson and Tushman call the stabilised technology a *dominant design* emerging from the era of ferment as the norm and industry standard.[39] However, Bijker and Law emphasise that it is not only the technology or the industry that stabilises but all relations between the actors.[40] In other words, in addition to a dominant technical design (*i.e.*, technology), the business model and actors producing and profiting from the technology are stabilised, as are people's practices for using the technology, and also societal factors such as regulation and levels of income.

2.2.2 Technological Paths

The Kodak model in snapshot photography is an example of how a technology (rolls of film and a simple camera), a business model (selling film and a photo-finishing service), and practice (capturing images of family members and familial events) stabilised in the Kodak Culture in the twentieth century and remained the dominant form of photography for almost a century. The Kodak example also demonstrates that a dominant design can be surprisingly resilient. The time period in which the technological path described by the Kodak model was dominant was anything but stable: two world wars, economic depressions, major emigrations and immigrations, and unprecedented technological development. Quite surprisingly, the technological path set by Kodak was not disrupted until the 1990s.

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[36] *Ibid.*

[37] Munir and Jones 2004, p. 571, referencing Latour 1987.

[38] Latour 1987.

[39] Anderson and Tushman 1990.

[40] Bijker and Law 1992, p. 10.

Once a dominant design is established (*i.e.*, the stabilisation of relations between the actors), the era of ferment is over and technological development becomes *incremental* in improving the dominant design.[41] This marks the beginning of an era of incremental change,[42] which we refer to as a *technological path*. The technology, business models, and practices support each other, and changes occur gradually and do not diverge from the path. In other words, there is less opposition from other actors and stakeholders if a potential change follows the path rather than diverging from it. The actors and stakeholders benefiting from the dominant design and technological path have incentives in keeping the situation stabilised and dominant. Hughes discusses the incentive in organisations to avoid radical inventions that would make existing skills and structures obsolete.[43]

Anderson and Tushman make a distinction between *competence-enhancing* and *competence-destroying* discontinuities,[44] with the former meaning an invention that does not make the skills of an organisation completely obsolete. For example, the digitalisation of cameras was a competence-enhancing invention for camera manufacturers, who could still build on their knowledge of lenses, light-metering, exposure automation, automatic focusing, and so on. On the other hand, for businesses based on the sales or processing of photographic film, digital image capture was a competence-destroying technological discontinuity: it rendered the expertise required in film manufacture and processing obsolete.

The concept of a technological path is supported by Arthur's model concerning increasing returns, mentioned above: a technology that has achieved a dominant position has a clear advantage over the competition, even if the competition is in some respects 'superior'.[45] Following the technological path has advantages in compatibility and in existing knowledge and experience. An invention diverging from the path would have to overcome the critical mass of the existing path. Hughes discusses the 'momentum' of technological systems: organisations and people commit to a system (*i.e.*, a technological path) by means of various interests, fixed assets, and sunk costs.[46] In other words, once a combination of technologies, business models, organisations, legislation, and practices achieves a dominant position, it becomes difficult to overthrow the 'regime'. This is not necessarily because the *status quo* is somehow 'superior' to alternatives but because there are significant interests for established actors in maintaining the existing situation, and in the case of increasing returns, any alternative would have to compete against the head start of the incumbent 'regime'.[47] It is this 'regime' that we call a technological path.

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[41] Anderson and Tushman 1990.

[42] *Ibid.*

[43] Hughes 1989.

[44] Anderson and Tushman 1990.

[45] Arthur 1994.

[46] Hughes 1989, pp. 76–77.

[47] *Ibid*; MacKenzie and Wajcman 1999.

More precisely, we define a technological path as a network of stabilised relations between heterogeneous actors, and the stability is based on alternative paths requiring a significant disruption in the relations of the actors (*e.g.*, a technological discontinuity, a societal change, a major business change, or a combination of these). The reason we call it a *technological* path even though technology is only one actor among others is that the technology as a material artefact is a concrete representation (or an icon) for the path. As we discuss below in more detail, we do not suggest that the inherent qualities of the technology are the sole determiners of the path. Nor do we suggest that the path chosen is necessarily better than alternative paths.

Like any theoretical model, the concept of a technological path is not without its problems and pitfalls. Bijker discusses how historical analyses of technology often focus on successful technologies rather than failed ones.[48] The focus on successes runs the risk of suggesting that "the success of an artefact offers some explanatory ground for the dynamics of its development".[49] For example, often histories of cameras do not mention that the Kodak camera made public in 1888 was, in fact, the *third* camera put forth for sale by the Eastman Dry Plate Company, and that the first two cameras were commercial failures. The commercial failure of the first two cameras was elemental in forcing George Eastman and his associates to look for new markets for their film-roll cameras and to rethink the process of developing images.[50] Describing the Kodak camera (*i.e.*, the third camera by Eastman and his associates) as the starting point of snapshot photography technology would then miss the actual dynamics of development and failure that shaped the organisation's thinking and business models.

To balance our historical overview of technological paths, we describe products and services that did not become dominant but nevertheless had an important impact on snapshot and domestic photography.

The second pitfall in using technological paths as a tool for understanding history is reading it as technological determinism. A technological path may suggest that it is somehow only the technology and its qualities that define the path and that the technology of a path is 'the best' among alternatives. As we have mentioned above, we do not believe in such a simple and technologically deterministic view. The superiority of a technology or a technological system is relative to time, place, and actors. Bijker and Law explicitly call for caution in using concepts such as technological paradigms and trajectories because they often afford a technologically deterministic view.[51]

So how do we justify the use of technological paths in our overview if we are not proponents of technological determinism? First, it is hard to deny that technological paths have existed and do exist. As we will describe in the following pages, there are clear eras in the history of photography when a technology–business

[48] Bijker 1995, p. 7.

[49] *Ibid*, p. 7.

[50] Jenkins 1975.

[51] Bijker and Law 1992, p. 8.

combination was dominant: metal plate photography and studio portrait practice, wet collodion plates and mass sales of stock photographs, the Kodak business model, and snapshot photography. During these periods, alternative paths did exist, but there were dominant technologies that formed a technological path.

It is in the interpretations of these technological paths that the siren song of technological determinism lies. For example, often the first Kodak camera from 1888 is described as a success by referring to its technical qualities: small size, ease of use, and 100 images without reloading. However, as mentioned above, the camera formed only one part of the commercial success of Kodak and the birth of the snapshot culture. Without the invention of a photo-finishing service, the idea of marketing to unskilled amateurs, and the societal and economic situation of the American middle class, the Kodak camera would not have been a success. The two unsuccessful cameras preceding the 'first' Kodak further support this view. Nevertheless, this Kodak camera was elemental in forming the Kodak Path, even though it was not solely the technology that formed that path.

On the other hand, undermining technological determinism by emphasising the agency of business models, commercial incentives, and business actors runs the risk of suggesting business determinism. We hope to avoid this pitfall by discussing how these business decisions and factors were shaped by society, people's practices, and also the technology. Generally, in our use of technological paths we attempt complete avoidance of *reductionism* – that is, the explanation of historical events by reducing all actors and their actions to one event, person, decision, technology, artefact, and so on.

2.2.3 Three Technological Paths in Domestic Photography

In summary, on the basis of cyclical and non-linear models of technological development, we look at the history of domestic photography from the point of view of technological paths and dominant designs. We use the term *technological path* to describe a time period of incremental development of technologies, stable domestic practices (*i.e.*, not the practices of the professionals), and gradual change of relations between the actors constituting the technology. The beginning and the end of a technological path are defined by a significant disruption in the relations between the actors, such as a technological innovation that forces the actors to react. Once the relations between the actors stabilise and a new dominant technology emerges, a new technological path is formed.

In our historical analysis, we look at the actors and activities from a relatively broad perspective based on literature on the history of photography, and as we move closer to the twenty-first century, we include academic literature from visual culture studies, interactive systems design, and also newspaper articles and marketing reports. Approaching domestic photography as a history of techno-socio-economic changes enables us to look at it from a 'macro' perspective and to identify outlines and contours that could be overlooked from a more 'micro' perspective. From

this perspective, we see three paths, each of which began with a technological discontinuity (*i.e.*, a disruptive/radical innovation) and after an era of ferment stabilised into a technological path. These are summarised in Fig. 2.2.

The first path is the era in the nineteenth century starting with the parallel attempts at, and successes in, capturing a photograph in the 1830s and ending in the decade following the introduction of the Kodak camera in 1888. We call this the Portrait Path, and it is covered in Chap. 3. This technological path is characterised by the combination of photography technology (metal and glass plate capture and paper printing), the businesses of studio portraiture and stock photography, and the practices of having one's photographic portrait taken by a professional and of buying publicly sold photographs. It is this last characteristic that we use to define the path, because it is the domestic practice from the perspective of the non-professional consumer. Although technologies did vary within the Portrait Path, the domestic perspective of photography being associated with studio portraits and stock photography did not change until the late nineteenth century.

The second path is characterised by film as a capture medium, the selling of film rolls and photo-finishing services as dominant business models, and the practice and culture of snapshot photography (*i.e.*, unskilled amateurs taking pictures themselves, using their own cameras). This path started with the introduction of the Kodak camera in 1888 and the associated business model, both of which were elemental in the emergence of snapshot photography. As mentioned before, this path covers most of the twentieth century, ending in the 1990s, when digital image capture started to emerge as the disruptive technology. We call this second era the Kodak Path because the dominant form of domestic photography was snapshot photography and it was both invented and practically monopolised by Kodak. The Kodak Path is described in Chap. 4. Although camera and film technologies made huge advances during the time of the Kodak Path, and alternative technological paths competed for dominance, the basic model and process of taking snapshots persisted for over a century.

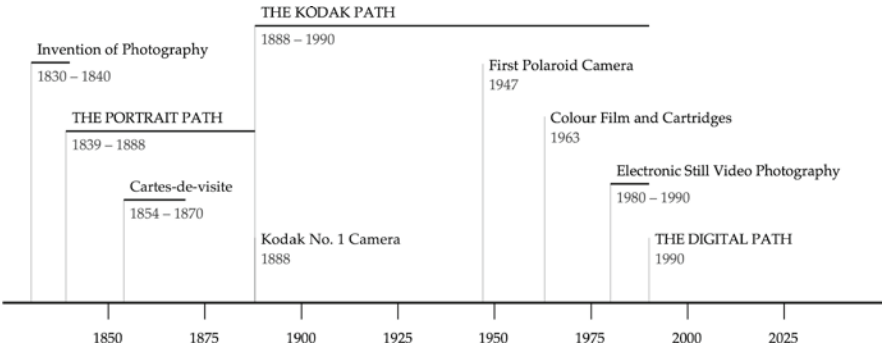

Fig. 2.2 A timeline of the three technological paths in the history of domestic photography and the six milestones we draw attention to in the chapters that follow (© Risto Sarvas, 2010)

Our third path is the Digital Path, which started in the 1990s and has, at the moment, no end in sight. On the contrary, we discuss at the end of the book how the Digital Path is still in an era of ferment. We go over the Digital Path in two separate chapters. Chapter 5 covers the stepwise transformation of domestic photography from a film-based infrastructure into a digital information and communications (ICT) infrastructure. Chapter 6 continues the treatment of the Digital Path by studying the digital photography literature in the disciplines of human–computer interaction, computer-supported co-operative work, and interaction design research to shed light on people's practices with the new technologies.

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