Time pacing strategy

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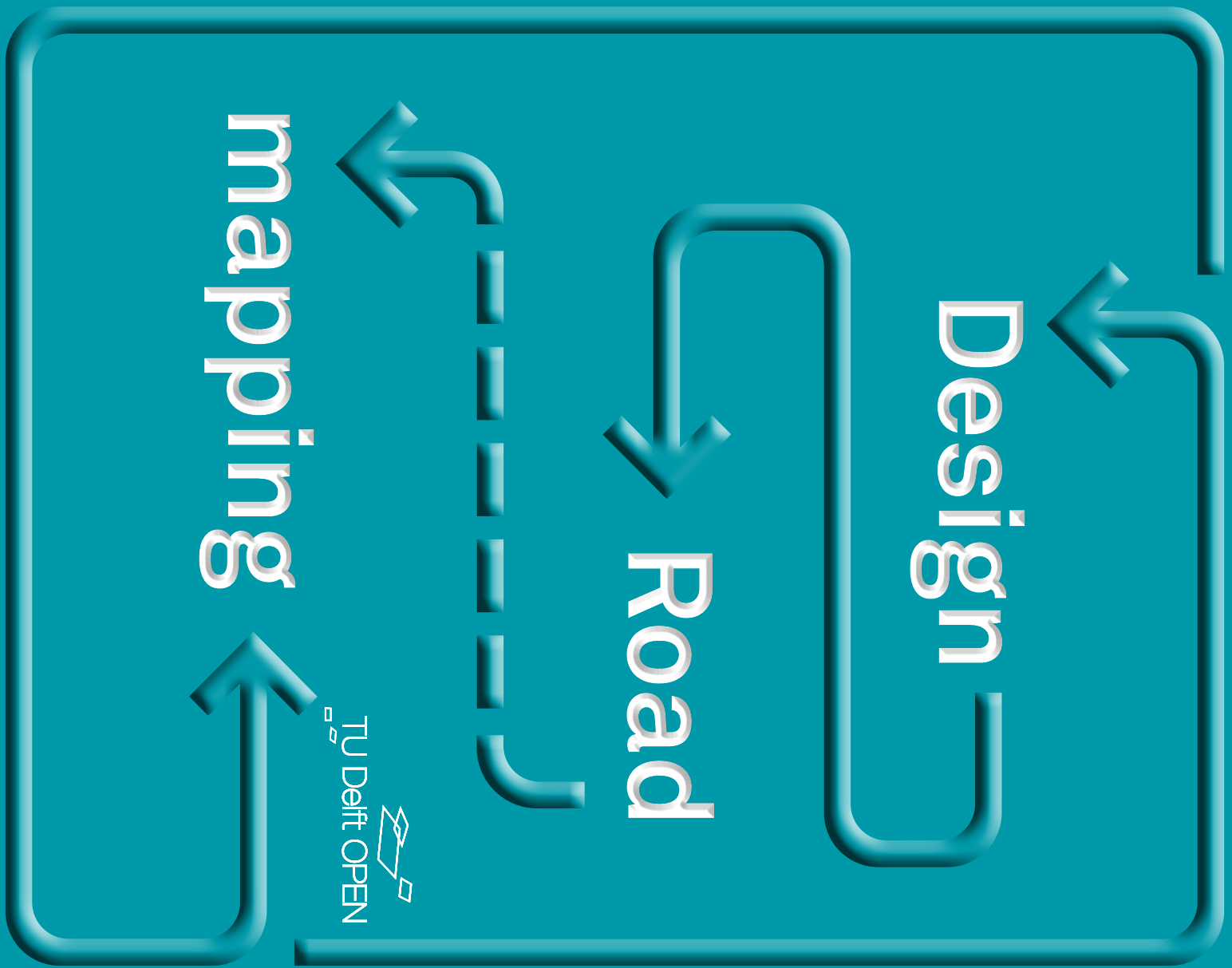
Design Roadmapping:

Guidebook for future foresight techniques

Lianne Simonse



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DESIGN ROADMAPPING | Guidebook for future foresight techniques

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TIME PACING STRATEGY

HOW TO DECIDE ON THE TIMELINE INTERVALS

In history class, timelines are introduced to enable storytelling about development and evolution. In roadmapping, the timeline design has a similar purpose, but instead of concentrating on the historic past, the timeline addresses the future. The timeline on the roadmap allows designers to create stories about development and evolution of future products and services.

Time in the classic period has been a favourite subject among philosophers. Aristotle talked about chronos as the sequence of time, the passing of time. He defined chronos as the 'number of motion in respect of before and after' in Physics 219B (IV xi)[1]. His notion of time can be measured, is dynamic, and has a chronology, a timeline. Plato, on the other hand, drew attention to time as kairos: a moment of opportunity in which choices can be made, the opportune time. Kairos, according to Plato, is the right time when something of importance can happen based on decisions concerning future action[1]. Both notions of time come together in roadmapping. The timeline in a roadmap focuses on the future chronology of chronos and the pacing of kairos opportunities of innovation. Rather than linear stories, roadmapping favours parallel stories about future scenarios that connect to the vision.

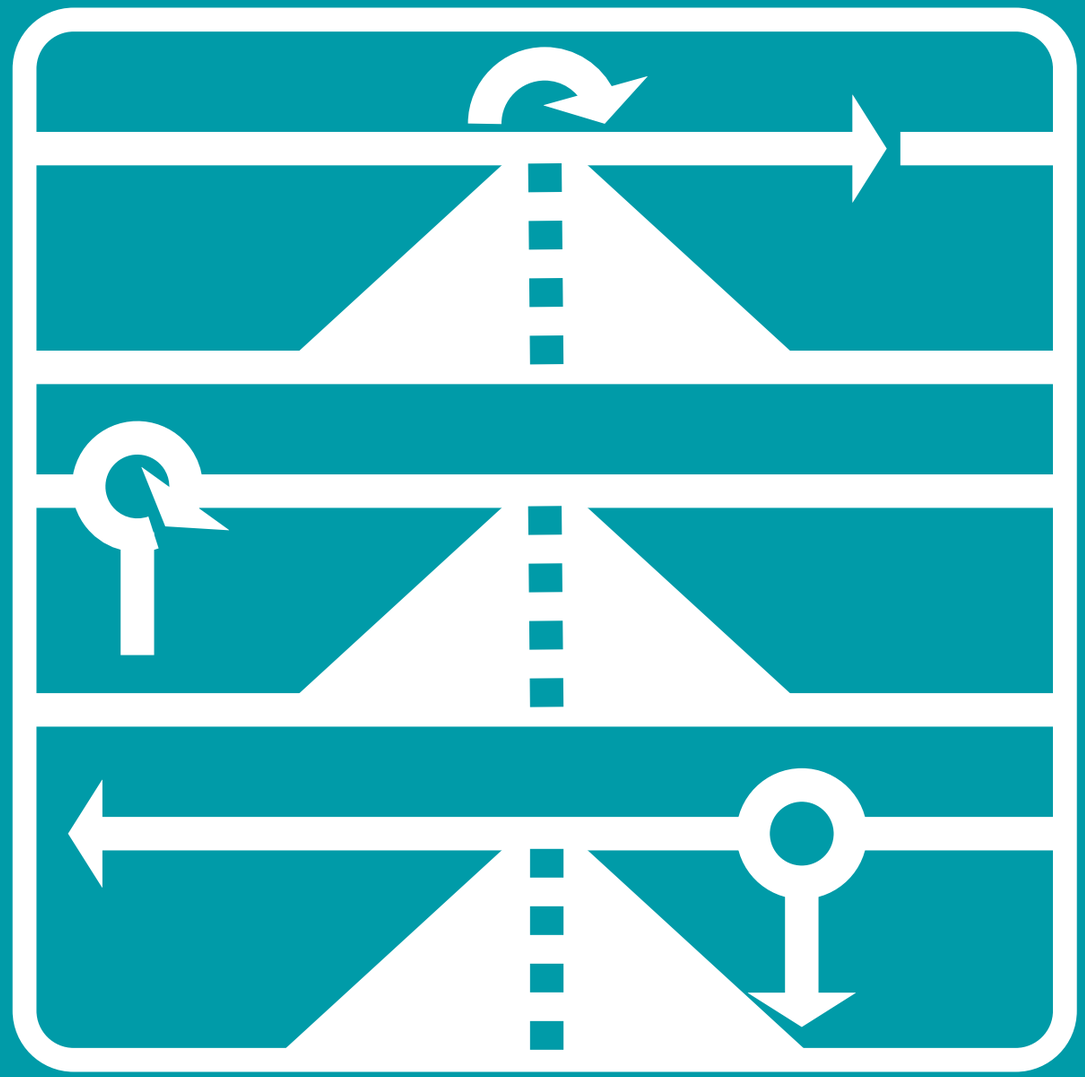
In the roadmapping undertaking, you need to decide upon the length of the timeline, how far the vision will be projected to a future point in time, and over what time intervals new design innovations are mapped. The scope of the roadmap, its industry context, and its strategic innovation cycles are important parameters in this decision.

In this chapter, the design of the timeintervals for the foresight of innovations is guided by three decisions on the strategic horizons and the moments of transition, the designed rhythm of innovation—the design clock—and the time performance.

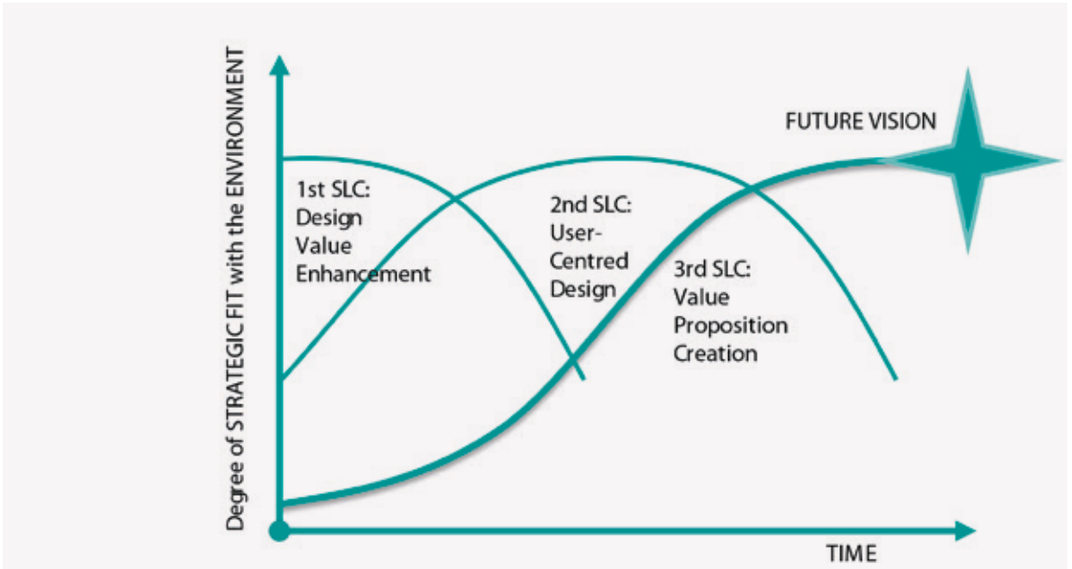
Horizons of Strategic Life Cycles

↘ Three Horizons

Of particular help in parallel storytelling is the futures technique of the Three Horizons model[2]. This technique comprehends three parallel scenarios based upon three different life cycles of strategic business innovation. These life cycles overlap, as modelled in figure 5.1, to create continuous innovation on the long term[3]. Each life cycle conceptualizes new business development. The first starts in a current business with existing market and existing technologies and concentrates on innovations of design value enhancements. The third, projects new value propositions in a new market with new technologies. The cycle in-between is the stepping stone towards either a new market by new user value segmentation or by totally new technology applications that are user-tested in an existing market. Ideally, these major strategic cycles are managed with a continuity of smooth cycle transitions, to maintain continuity in turnover[3].



HORIZONS mark transitions of the strategic life cycles of business innovations.



↘ Measured Life cycle curves

The schematic curves of strategic life cycles have also been measured in sales data. Figure 5.2 shows a reality check of the life cycle curves, measured by the Motorola roadmapping team[4]. The measured curves represent the actual product life cycles of car audio systems and resemble the schemtic ones quite closely, although they are a bit rougher and bumpier. Overall, the stages of growth, maturing, and decline are clearly recognizable.

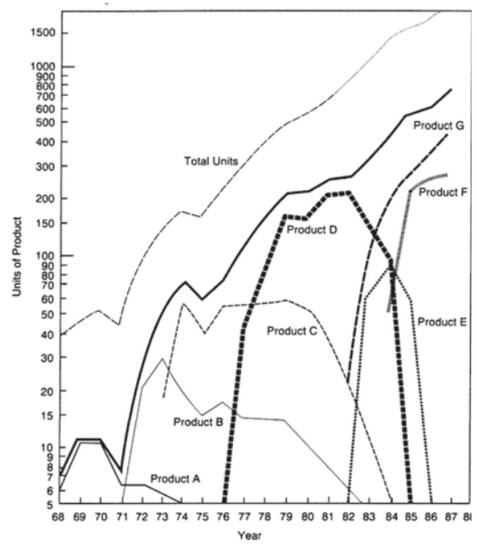
Motorola's roadmapping team measured the units of sales of different products in this car audio product line over a period of several years[4]. The first two data curves (A and B) in Figure 5.2 indicate that a sales dip occurred between product A and product B. The timing of the market launch of product B was a bit too delayed to enable a smooth transition in sales. The transition between products B and C was much better timed, while the transition between products C and D was excellent. For Motorola's roadmapping team, these historical data analytics were important in deciding on the time pacing strategy of the roadmap[5]. The team determined the starting point for the development projects of the next car audio products (H and I) by estimating the number of months before market introduction. Roadmapping smooth cycle transitions, is a cornerstone of the time pacing strategy[5]. When you start with roadmapping, doing a similar analytical exercise can be full of insights. You can analyse the past innovation cycles and project them onto the future timeline.

↑
Figure 5.1
Strategic Life Cycles model of Three horizons.

cc Simonse & Hultink, 2017[3].

↗
Figure 5.2
Motorola Life cycle curves show past product performance history, of units of sales, in order to project new product life's

cc Willyard & McClees, 1987[4]. Motorola Inc



↘ Three strategic life cycle scenarios

The 'three horizons' model focuses on three strategic life cycles projected to a future timeline[3]. The first concentrates on design innovation in a business that will mature over time (the current businesses). The second cycle envisions compelling new user value segmentations and transforms the current business into the newly envisioned business that follows into the third horizon of the disruptive new value proposition creation of a highly promising upcoming business. The scenarios are represented by strategic life cycles, as depicted schematically in figure 5.1.

HORIZON 1 → Design Value Enhancements

The first horizon envisions a strategic scenario of a continuous flow of enhancing design value to current product- or services lines. These value enhancements are for instance model changes in shape, colour, or extra features. Essential in this strategic scenario, is the reuse of existing modules and functions. Commonly, around eighty percent or more of the prior product remains unchanged. It's time pacing is focused on bringing new versions to the market by a certain update rhythm[5]. The design innovation effort continues the product line through maturing stages of evolution, until the moment arrives that signals a decrease in sales and profit. Eventually this scenario includes the strategic situation of decline in which the business will gradually lose strategic fit with its environment. The endpoint of the strategic life cycle of this business is

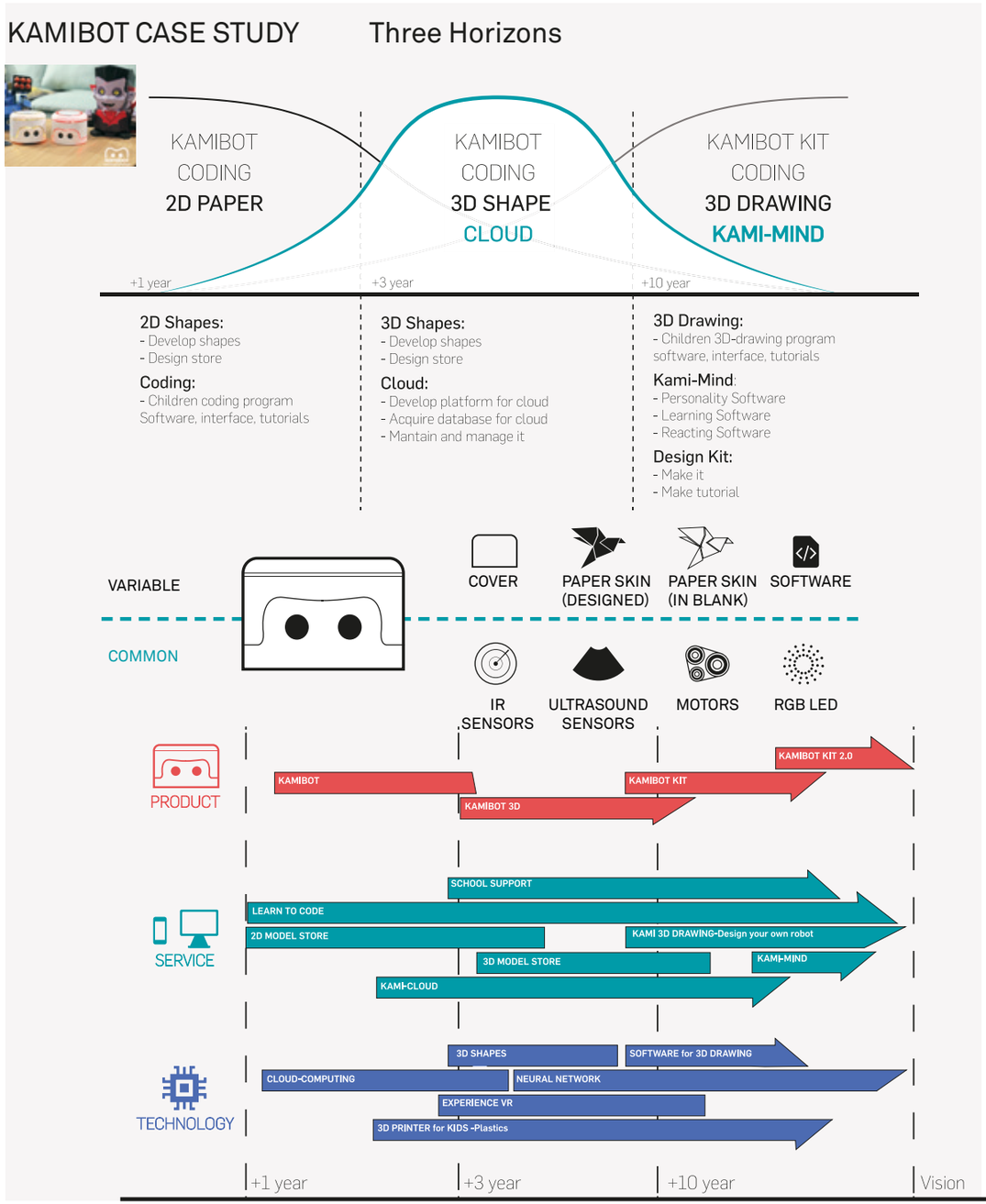
within view[3]. Innovation practice has shown that it often takes longer to accept the reality that a business is declining than would be rational and best for the company[6]. Apparently, it is quite difficult to change the mindset of people who have become accustomed to successful products. It is not uncommon that a roadmapping process starts in a situation of a business that loses strategic fit.

HORIZON 3 → Value Proposition Creation
The third horizon captures a strategic scenario with a state of growth on the long run. It is a disruptive innovation scenario with a new value proposition that inhibits the potential to displace the system of the first strategic life cycle. The future vision we discussed extensively in the third chapter, is the end point of this innovation scenario. The desired values of the imagined value proposition of the future are, at best, marginal in the present. Rather than a progression, this third horizon's scenario inhibit a disruptive change of new value(s) over time that potentially offers a more effective response to the external environment[3]. The time pacing is expected to be more long term, taking several years for the new business development of new value propositions that also might involve the creation of new business models[5]. The start of this strategic innovation scenario is in the present by seeking a strategic fit with emerging signals.

HORIZON 2 → User-centred Value Creation
This strategic scenario of user-centred value creation in the second horizon falls between the disruptive and the enhancement scenarios. It concerns growth and transformation and thrives on design research dedicated to insights about the desires and dilemmas of users[3]. New insights on emotional and functional values allow designers to create new markets with new products and services that differentiate from the existing product/market combination. Such a newly discovered value insight delivers new meaning for a new market segment[5]. Furthermore, the design of a next generation product, platform or service that incorporates the application of new technologies can be part of this scenario[3]. The user-centred value creation includes then the testing of the new technology application by users in the existing market. A major challenge in this strategic scenario is overcoming the dilemmas for reaching the third strategic life cycle. In this intermediate time space, the current and envisioned product lines collide. This scenario is therefore typically unstable and characterized by clashes of multiple values and directions of creative solutions[3]. It takes an entrepreneurial mind-set to identify propositions that enter the growth stage of critical market acceptance. Making sense of the lessons learned about user acceptance of new technologies is crucial for this scenario[3]. Therefore, in this scenario, several alternative paths of value

→
Figure 5.3
Kickstarter case study Kamibot

cc Joana Portnoy, Anne Brus, Ruben Verbaan & Marco Bonari, 2016. Lecture for the Design Roadmapping .Master Course Strategic Product Design Faculty Industrial Design Engineering, Delft University of Technology.



↑↗
Real Time Schiphol, 2017.

© Maarten Baas
Courtesy of the artist
Rob Hodselmans photography

“Real time is a term that is used in the film industry. It means that the duration of a scene portrays exactly the same time as it took to film it. I play with that concept in my Real Time clocks by showing videos where the hands of time are literally moved in real time” - *Maarten Baas.*

Real Time clocks show a video performance made by BAAS which takes exactly twelve hours to film and twelve hours to watch it in its entirety, thus creating a hyper-realistic representation of time.

creation are pursued at the same time until it becomes clear that one of them has been accepted by a critical mass of users and the unsuccessful alternatives can be discontinued.

On a roadmap, all three strategic life cycle scenarios can be mapped to meet simultaneously the short, mid-term, and long-term business development of strategic fit with its future environment. They offer three parallel options for design innovation efforts projected on the future timeline of the roadmap[3].

↘ Venture case example

To illustrate the three horizons thinking, a team of design students developed a case example based on the venture Kamibot (see figure 5.3). Kamibot is a venture that makes programmable papercraft robots for kids and has raised capital on the crowd funding site Kickstarter. The Kamibot robot teaches kids how to code in a fun way. They can customize their toy with their own code and colourful paper skins.

→ For the Kamibot venture, the first horizon scenario of incremental innovation involves updating the robot. To prepare it for future generations, the team considered that it is crucial to enhance it with coding software for children.

→ For the third horizon scenario, the team created a vision for Kamibot: 'Empower children to design and program their own toys'. As driving values in this vision, they defined (a) stimulate creativity, (b) learn 3D design, and (3) make the toy more personal. To enable this, the team selected promising technologies: 3D programming for kids and the launch of a new service for drawing your own robot in 3D.

→ For the second horizon scenario, the innovation concerns a next generation of Kamibots that makes use of 3D-printing technology for kids. This scenario includes the path of a new service: of a 3D model store. Another alternative path of innovation that will also be tested in this second horizon is the introduction of robot learning.

The team translated the scenarios of the three horizons into choices that captures the main product, service, and technology elements by plotting them on a 10-years-timeline on the roadmap as illustrated in figure 5.3.

Design Clocks

↘ Transition points on the timeline

On the roadmap, the envisioned launch of a new product or service is often demarcated with a specific point in time that relates to an

DESIGN CLOCK is the designed RHYTHM of innovation by modes of design innovation.

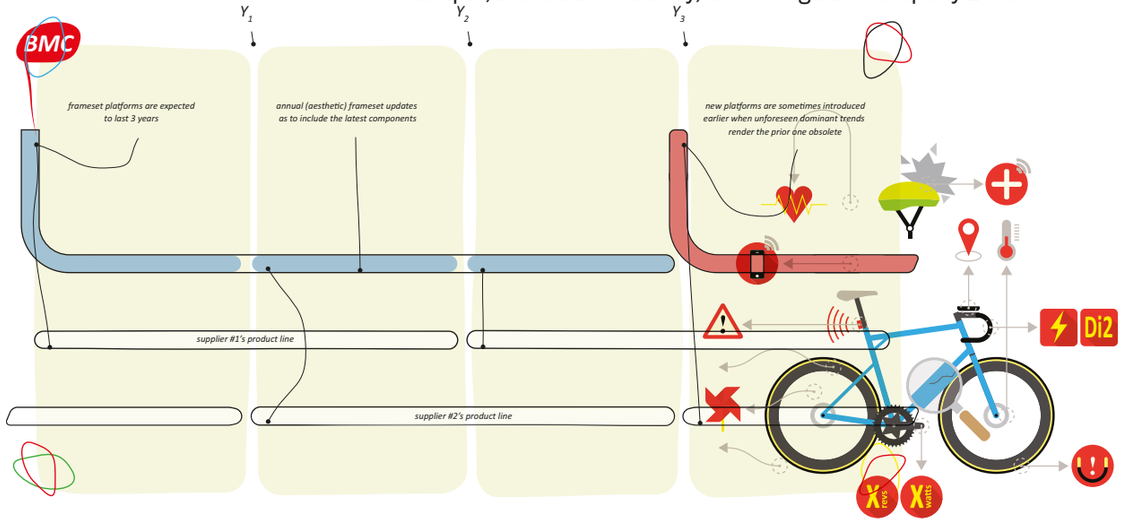
event or exhibition[5]. For instance, for roadmappers in the fashion industry, Paris's Première Vision event in February is important. For the bike industry, the Eurobike show is the gathering place of industry players, press, public, suppliers, and competitors. And for consumer electronics, these crowds gather at the global consumer technology tradeshow CES, which takes place every January in Las Vegas. These events mark the transition point in times from old products to new ones.

The new products and services are announced and shown to the press and public in these market arenas. When deciding at which event a product should be launched, roadmapping teams take seasonal transitions into account. For instance, PHILIPS' roadmapping teams choose launching in January at the CES to prepare for the availability of their products for Valentine's Day, spring, and Easter. And launching in the autumn, in September at the IFA, the trade show for consumer electronics and home appliances in Berlin, so that the new consumer electronic product will be available in retail channels before Black Friday and Christmas. The exhibition month is designated as the future point in time on the roadmap. These events offer a 'hard' deadline for the delivery of future innovation projects.

↘ Time pacing strategy per design clock

The time pacing strategy[7] decides the 'design clock' for the different types of design innovations per horizons. Design clocks determine the rhythm of innovation efforts by regular deadlines—time stones.

For example, in the bike industry, the racing bike company BMC releases a new bike each year. Many competing bike companies use the same release rhythm of annual 'model year changes'. In addition BMC also programs new platform innovations in which the same frame (the platform) accommodates a sequence of new module innovations. The time pacing used for launching every next platform innovation is three years. In the first year, BMC introduces the next generation bike. During the subsequent two years, they enhance the frame with module innovations. A third time pacing strategy plots the vision of a radically new type of bike, such as the digital racing bike, the D-bike, that integrates Internet of Things technology to provide completely new user services (see figure 5.4). The three time pacing strategies are associated with three design clocks. The design clock for the 'model year change' is one year, for new platform generation it is three years, and for radical innovation it is about ten to twelve years.



↙
Figure 5.4
D-Bike project BMC

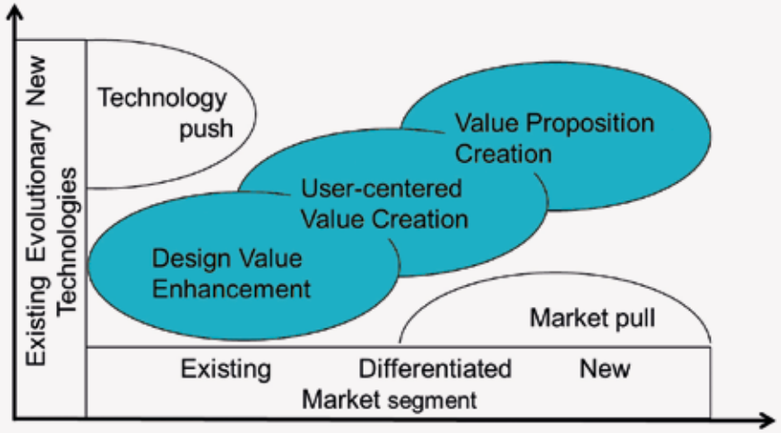
cc Wouter Aerts, 2016.
Master Strategic Product Design, Graduation project.
Faculty Industrial Design Engineering,
Delft University of technology

↓
Figure 5.5
Value creation by three modes of design innovation.

Simonse & Hultink, 2017[3].

Gazelle, a Dutch bike manufacturer, has similar design clocks as BMC for the model year changes of its racing bikes. However, for lifestyle bikes that people use for getting around in cities, the company decided to take a slower pacing of the innovation efforts, with a two-years design clock for model changes. They based this decision on differences in the user target groups of racing bikes and lifestyle bikes. The techy user group interested in racing bikes has much more interest in the latest performance-enhancing innovations. These bike enthusiasts read forums and magazines to keep up with the latest developments and they are therefore likely to replace their bike more often than the users of lifestyle bikes. The lifestyle bikers appear to be more interested in safety issues, comfort, and styling for which changes over a two-year design clock, seems to better match.

In figure 5.5, three modes of design clocks are modelled by two dimensions of technology and market innovation. The model presents



three modes of design value that bridges the market pull and technology push, bringing these two forces of innovation together[3]. The design clocks guide the time pacing of these value creations by design:

→ DESIGN CLOCK OF VALUE ENHANCEMENT
The value enhancement of model year changes often includes a new shape, colour, or extra features, each of which enhances the design value of the product or service. This type of design innovation thrives on incremental changes on a product line or service family positioned in an existing market with existing technologies. Its time pacing is fast, focused on bringing a new version to the market. The update rhythm accommodates this fast speed of innovating by design value.

→ DESIGN CLOCK OF USER-CENTRED VALUE CREATION
User-centred value creation thrives on design research dedicated to insights about the desires and dilemmas of users. New insights on emotional and functional values allow designers to create new market segments for new products and services that differentiate from the existing product/market combination. It's design clock relates to a new market segment established by a newly discovered value insight that delivers the new meaning. Its time pacing is moderate as this type of value creation concerns a next generation solution design that also might incorporate the application of evolutionary technologies. The update rhythm of new user-value solutions often takes a number of years.

→ DESIGN CLOCK OF VALUE PROPOSITION CREATION
The value in value proposition creation encompasses a broader impact, including the new organisation design of the value chain.Creating new value propositions often requires a new business model that integrates new technologies with new markets. The time pacing is therefore much longer, taking a rhythm of several years for new business development.

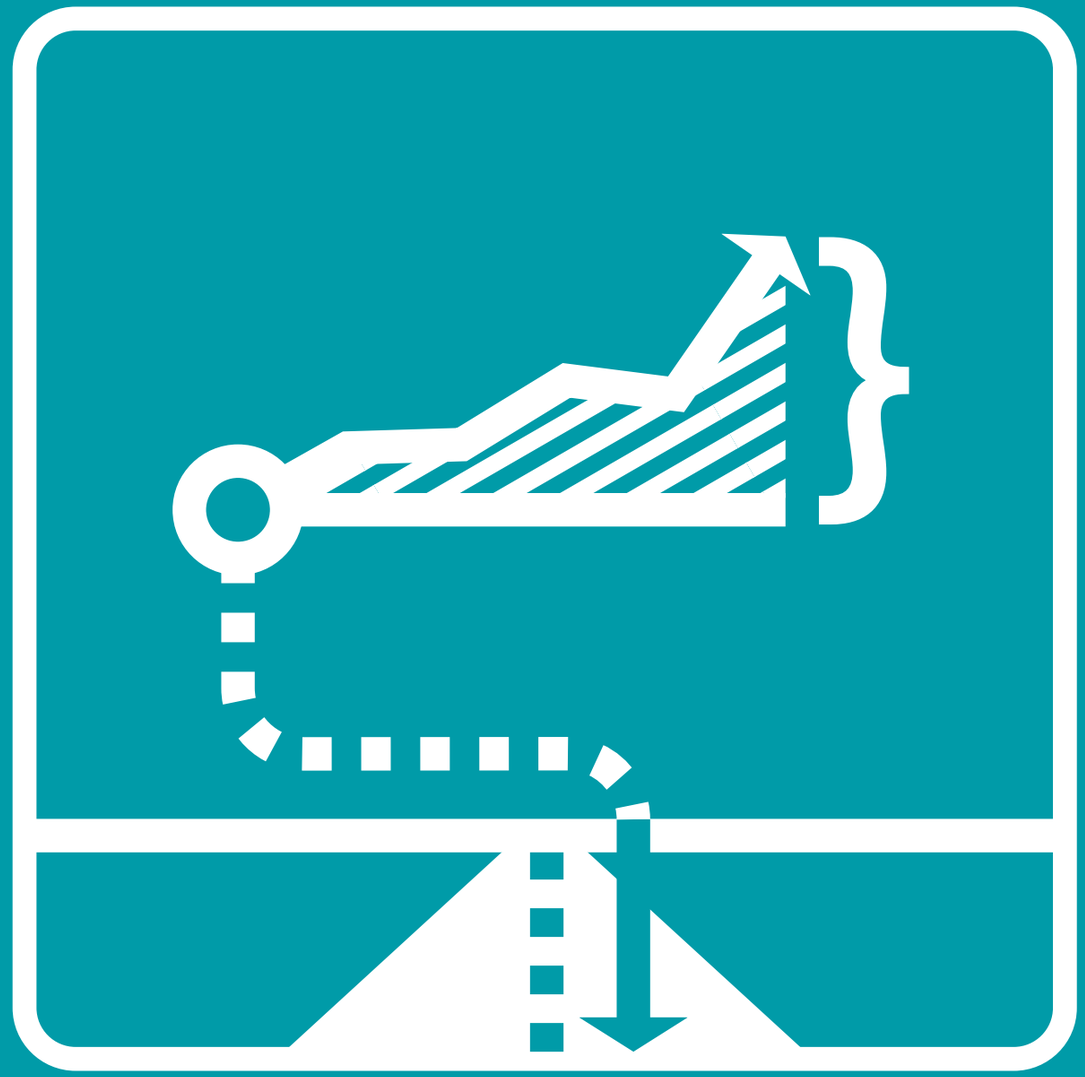
The three 'design clocks' for different modes of design innovation offer roadmappers options for the time pacing of different design innovation efforts in the roadmap[3]. For the rhythm of new products or services, time stones can be mapped on the timeline of the roadmap[5].

Time Performance

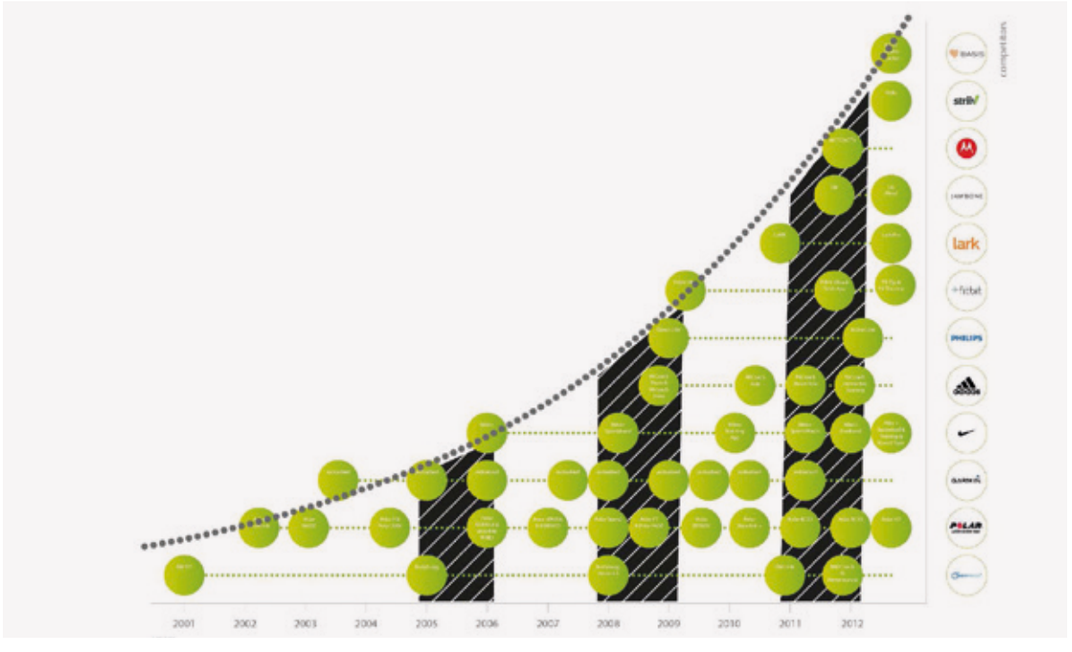
ERIK-JAN HULTINK AND LIANNE SIMONSE

↘ Competitive timing

Deciding on how many years ahead a next generation product or service should be paced also depends on the competitors in the



Measuring the launch PERFORMANCE of product visions with a particular future time point.



marketplace[5]. Figure 5.6 shows the emerging market of activity trackers. First, this graphical overview reveals that each company makes its own strategic choice on the design clock of innovation pacing. Some companies have chosen to introduce new products frequently (i.e. Polar and Garmin) and others have temporized their product introductions with a lower frequency of multiple years (i.e. BodyMedia and Philips). Second, the overall market pacing (visualised with the dark hatched columns) indicates a three-year design clock for new innovations. The highest number of products were introduced in the total market for activity trackers in the years 2005, 2008, and 2011. Third, it shows that the number of competitors in the market increased exponentially, schematically shown with the grey dotted curve in figure 5.6, resembling the emerging stage of the characteristic life cycle curve of the market life cycle. The market forecast, based on extending the curve , predicts an increasing number of competitors as the market develops. The roadmapping team expects that the industry's sales will further flourish. This was confirmed by quick Internet research, which revealed announcements of several new product introductions in the years to come.

↘ Industry synergy

In some fast-paced industries, such as the semiconductor industry, innovative organisations throughout the whole value chain come together to create an international industry roadmap. They discuss the roadmap such as for instance the International Technology Roadmap for Semiconductors (ITRS) does[8]. Organisations, such as INTEL, ASML, and Samsung, joined this initiative to discuss technology advancements and challenges on an industry level and make it possible to align scarce resources. With mainly engineers at the table, the common ground on the time pacing strategy was found in Moore's law illustrated in figure 5.7. George Moore found that from 1970 to 2001 the number of transistors on microprocessor chips doubled every two years. The ITRS roadmapping consortium projected this double density pattern on the future timeline of their IC roadmap. Figure 5.8 shows this in the ITRS roadmap regarding DRAM-chips. Interestingly, the ITRS consortium agreed on this two-year pacing for several years until the roadmapping participants began to discuss the fundamental technological constraints of geometrical scaling. They expected that the light wavelength that manufactures the chip with machines of ASML would become equal to the nanometer limits of chip function miniaturization. This constraint was expected to be reached within the future of the roadmap's timeline. Then, in 2007, by agreement of the roadmapping participants, the ITRS decided to slow down the industry innovation clock and change the pacing to three years (see figure 5.8). This exemplifies that although a technical performance measurement is used for an initial pacing, the innovation clocks are still an outcome of a strategic decision and not a mathematic measure. The future cannot be measured, only agreed upon.

To decide on the time pacing strategy for the design clocks, roadmappers can consider both the competitive timing and the industry timing[5]. The design clocks enable the long-term innovation rhythm of new design efforts.

↖
Figure 5.6
Time pacing analysis of product introductions by competitors in the activity trackers market.

cc Eva Frese, Niels Corsten, Robin Kwa & Robert Stuursma, 2013. PHILIPS Active Life Project report for the Design Roadmapping Master Course, Faculty Industrial Design Engineering, Delft University of Technology.

↗
Car desk of the Time machine car that could 'fly in the Back to the future' movie.

cc CNN still from the movie.

↘ Time Performance of product visions

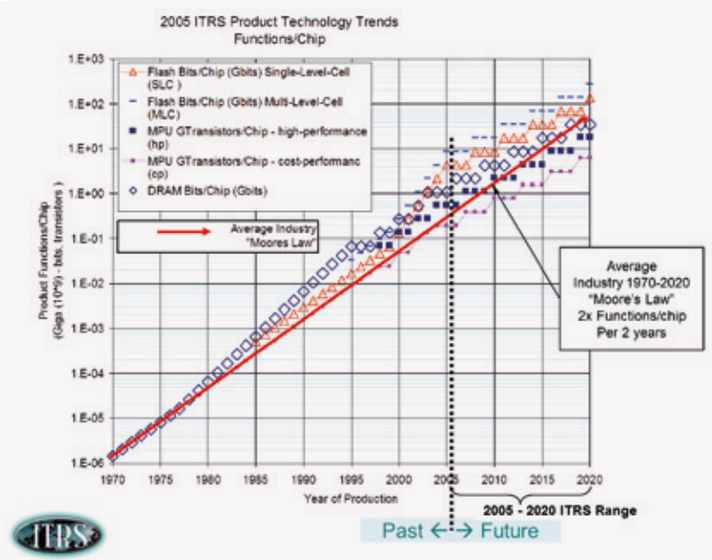
In the film Back to the Future, Marty McFly and Doc Brown travel to the future of Wednesday, October 21, 2015. This particular future point in time marked the future context with many fantastic products, such as flying cars, self-tying sneakers, and hovering skateboards. Some of these have come close to today's reality and others appear to be far beyond. Among the product visions from this 1985 film that have become reality by 2015, are 3D movies watched with VR goggles, fingerprint biometrics technology, and fax machines[9].

There are also product visions that have not become reality, such as smart clothes from which we see only some emerging signs today, but not the imagined adjustable size, self-drying, and programmable properties that were part of the film. Also, the movie's 'Dust-repellent paper' is not something we work with nowadays. Then there is another category consisting of product visions that have almost become reality, and might appear in some form in the future, such as hover boards and flying cars. So far, we have seen prototypes of these product visions, such as the P4 flying car of Dutch Design Studio Spark, and the Hoover boards, that now can roll, but might fly in the future[9].

Similar to this way of measuring the time performance of future visions, we carried out a research on product visions of 'old' roadmaps. The research focused on whether product visions with a particular future time point are more likely to get launched. We measured the launch performance of the product visions expressed on the roadmaps[10].

We 'travelled back' to investigate roadmaps originated in the years 2002 and 2006. Ten roadmaps and its reporting documents were collected from a balanced selection of business units' development programs of a multinational company in lifestyle appliances. We investigated 98 product visions that had been mapped to a particular future point of time. This total collection covered design value enhancements, user-centred value creations and new value propositions[9].

The research results show a high launch performance realisation of mapped product visions (see figure 5.9) - 74 product visions were actually launched – the relatively rate is of successful launches is 67 percent. This indicates that product visions that are mapped to a particular future point in time have a high probability of actually getting launched. This unexpected high realisation of the product visions, suggests that these product visions are more plausible. Only 24 product visions (24%) appeared not to have been launched at all; these were all product visions involving incremental value enhancements. Also, the launches with the longest delays—plus 2 to 5 years—were such product visions with value enhancements[9].



INDUSTRY ROADMAP

2007 ('07-'22) ITRS Technology Trends DRAM M1 Half-Pitch : 3-year cycle Update

Year of Production	2000 [Actual]	2001	2002 [Actual]	2003	2004	2005	2006	2007	2008	2009	2010	2012	2013	2015	2016	2018	2019	2020	2022
Technology - Contacted M1 H-P (nm)	180	151	130	107	90	80	71	65	57	50	45		32		22		16	14	11

2-Year Technology Cycle ['98-'04]

3-Year Technology Cycle

DRAM TECHNOLOGY YEAR OF PRODUCTION	2015	2017	2019	2021	2024	2027	2030
Half Pitch (Calculated Half pitch) (nm)	24	20	17	14	11	8.4	7.7
DRAM cell size (μm^2)	0.00346	0.00240	0.00116	0.00078	0.00048	0.00028	0.00024
DRAM cell FET structure	RCAT+Fin	RCAT+Fin	VCT	VCT	VCT	VCT	VCT
Cell Size Factor: a	6	6	4	4	4	4	4
Array Area Efficiency	0.55	0.55	0.5	0.5	0.5	0.5	0.5
V_{bd} (support FET voltage) [V]	1.1	1.1	1.1	1.1	0.95	0.95	0.95
Support min. V_{tn} (25C, $G_{m,max}$ V_d=55mV)	0.40	0.40	0.40	0.40	0.37	0.37	0.37
Minimum DRAM retention time (ms)	64	64	64	64	64	64	64
DRAM soft error rate (fits)	1000	1000	1000	1000	1000	1000	1000
Gb/1chip target	8G	8G	16G	16G	32G	32G	32G

↗
Figure 5.7
Moore's law,
past analysis and future
projection of functions/chip.

→
Figure 5.8
Semiconductor Industry
roadmap by the International
Technology Roadmap for
Semiconductors-ITRS

Industry Roadmap of DRAM
chips

cc Paolo Garini
Chair of ITRS.

We also measured the accuracy of the launch timing of the product visions (figure 5.10). These research results were less impressive. Only 28% of the product visions mapped to the timeline were launched on time. With a bandwidth of plus or minus one year, the user-centred value creations have the highest accuracy (62 %) and not the low risk visions of design value enhancements as could have been reasonably expected (46% time accuracy). The more disruptive new value propositions creation visions have a time accuracy of 27%[9].

Despite the seemingly impossible task of measuring future time in length and frequency (chronos time), the Back to the Future movie gave us the inspiration for this research. When you have an old roadmap and a future time scope within reach, we encourage you to do a similar performance measurement. To learn about the time journey a bit like the one undertaken by the teenager Marty McFly.

↙
Back to the Future Car
1981 DMC DeLorean Time Machine, replica of the flying car.

cc Jack Snell.

↓
Flying car, PAL-V
(Concept) flying car designed by SPARK DESIGN.

cc Robert Barnhoorn.
SPARK DESIGN, Rotterdam, The Netherlands.

PHILIPS CASE

Wake up Light Roadmap

The PHILIPS Wake-up Light simulates a sunrise with a gradual increase in luminosity at the speed of a sun rise. This product is designed to make users feel more energetic and refreshed as they face the day ahead. Since its successful launch in 2006, five next generations have been designed around this user experience, and it is now used by millions of people in homes all over the world. This story is about the roadmapping project that I carried out in the year of its first launch. It is a short story about a steppingstone towards the creation of a successful business with increasing sales growth. It all started with one product.

The initial product design (see figure 5.11) came from Taco, the lead engineer who had put a lot of attention into the proof-of-concept, the functions, and the testing of performance quality. Art, the product marketing manager, chose France as the test market and the immediate lessons learned from the consumer response, including the opinion leaders of the press, concerned the aesthetics of the product. For this reason, I invited the lead designer, Bart, from the design department of the PHILIPS Consumer lifestyle division, to join the roadmapping team. He started working on the roadmapping vision by doing design research along the lines of the research work of Taco and Art. To complete the roadmapping team on future foresight expertise, I asked more experts to join: two technology experts from the PHILIPS Lighting and Corporate Research lab, and one marketing expert from the Market Intelligence department. We all came together to co-create the roadmap in several one-day workshop sessions.

↘ Three Horizons roadmap sketched

In the first one-day session, we shared the state of knowledge in research. Bart took the sunrise as an inspirational source, presenting loads of visuals on the meaning of sunrise in areas such as art and architecture. At that time, he had uncovered that users were becoming more focused on listening to nature's rhythms, and linking this back to their biological clock. Based on this, and in combination with the consumer value driver formulated by Art, we conceived the overarching vision for the roadmap: to support the biorhythms of end users. Art had the insight that people have a strong desire to focus on seasonal changes and live a healthier life. The consumer research also showed changes in peoples' attitudes toward their bedrooms. Although the interviewed users still thought of the room as a very personal and intimate space, the team saw a change toward fashion and more frequent decoration, and an upswing in the importance of including aesthetic objects like vases and art. After having heard the

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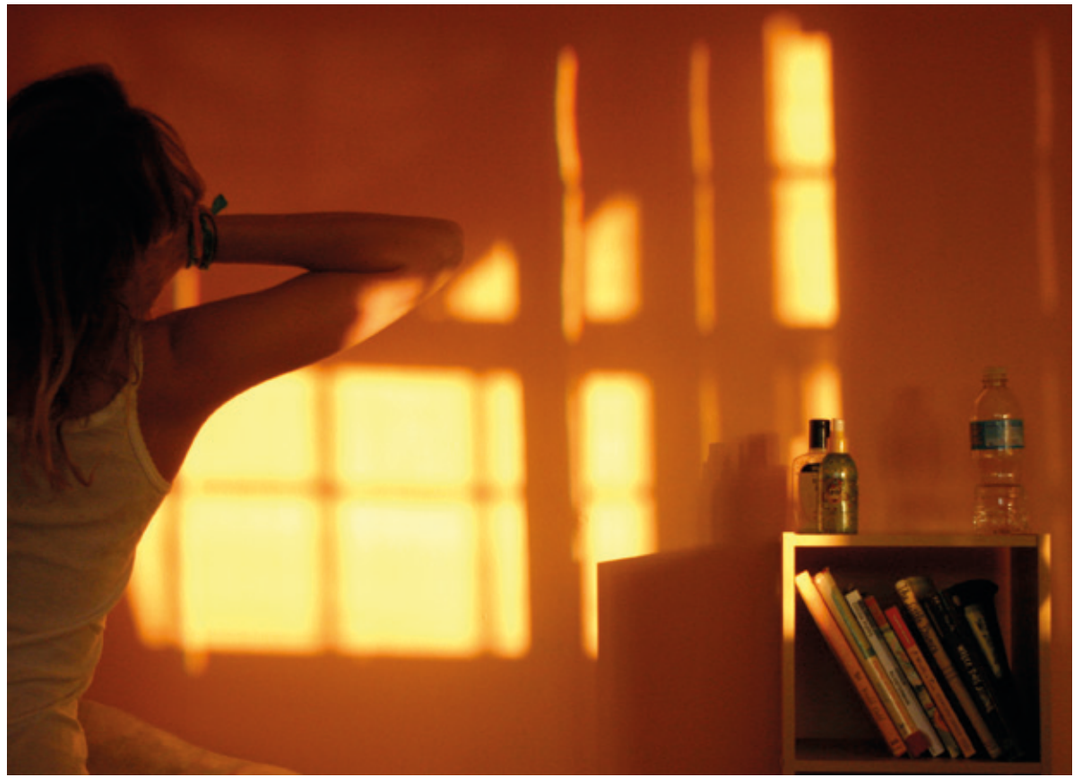
User Value Insight on waking up like in the summer.

→
Figure 5.11
Initial Product Design

cc Taco manager front end innovation
PHILIPS VITALIGHT

→
Figure 5.12
Second generation wake-up light

cc PHILIPS DESIGN



presentations of other experts, including future foresight concerning technological directions such as the prospects for the timing of white LED technology, we collected and clustered all ideas from the members of the roadmapping team that appeared through active listening to these multidisciplinary presentations. Based on this, our lead designer, Bart, sketched the three horizons roadmap (see figure 5.13).

In the first horizon of this design roadmap, the product's aesthetics are the focal point; simple shapes, real materials, and a hidden user interface and displays enhance design value in this horizon. In the second horizon, the different alternatives for new technologies, such as flexible LED surfaces, displays, and external controls, are sketched together with armature architectures. The third horizon connects to the corporate ambiance vision, focusing on the creation of end-user experiences in its context. In the bedroom context, we envision that the wake-up light will be connected to all the lights in the room to create an immersive sunrise experience.

The transition from the first to the third horizon includes changes from a pure, standalone design of a bedside lamp into a connected system of personally combined lamps that are universally controlled by the sunrise controller that we patented.

↘ Design clocks

As a result of the next roadmapping sessions, the product marketing manager, Art, created the product roadmap. We discussed the time pacing of the emerging business of the wake-up light and consulted Art's colleagues in more mature markets about this issue.

For reference purposes, we adopted the three-year design clock for next generations that Philips uses in its similar lifestyle businesses.

Furthermore, we decided together with the team to pinpoint the first horizon vision on 2008, the second on the next two to three years

(2010/2011) and the third four years after the first horizon, from 2012 onwards.

For the innovation clock of a new model that enhances the first wake-up light, we had estimated that it would take a two-year innovation effort to enhance the value of the wake-up light by creating a more compact and contemporary aesthetic for it. The three-year projections for the second horizon product visions concern new user-centred technology applications, such as market testing sales of a standalone controller called 'distributed light'. The longest-term innovation that we envisioned is an open-system innovation for an immersive sunrise experience in the bedroom.

↘ Time performance

The time performance of this design roadmap— in the sense of looking back to the future and measuring the launch performance of the product visions with a particular future time point —appeared to be surprisingly successful.

In 2009, one year later than projected in the roadmap, the second generation of wake-up lights was launched on the market (see figure 5.12). This new generation gained outstanding design recognition, with both the iF and red dot design awards. The design achievements in the leap from the first to the second generation include a simplified product design that removes the base section, effectively turning the entire object into a light. Also, a sound artist created a better range of noises for the alarm. Overall, by moving the display panel inside the product, this next generation product offers design value that both consumers and the industry loved.

Later, the user-centred innovations introduced in this successful generation were enlivened further in the third and the fourth generations, which were launched in 2011 and 2014, respectively. The time performance of these generations is also within the span of one year. Both generations again had a more functional focus, this time on energy savings and iPhone integration. For the realisation of the third horizon vision of the original roadmap, there are still design challenges to tackle. In the meantime, the original roadmap has of course also been adjusted and adapted to the new design research findings.

DESIGN ROADMAP

Wake-up-light PHILIPS

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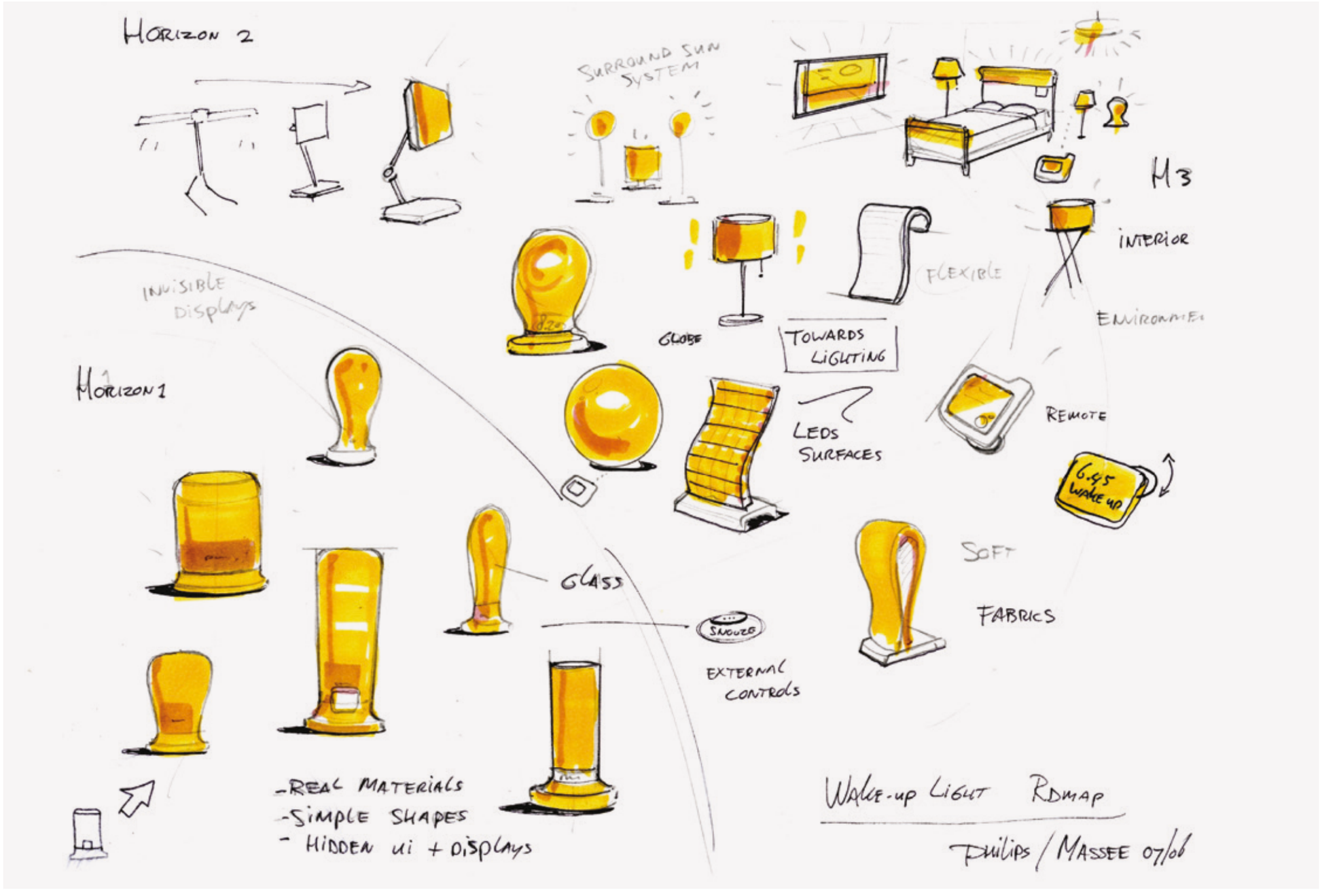
Figure 5.13
Sketched Design Roadmap for the Wake-up-light



LAB ↗

Map design clocks

MATERIALS NEEDED:

- → note book
- → laptop
- → large sheets of paper
- → sticky notes
- → pens

1 A good way to start the timeline design of your roadmap is with a historical timeline. Sketch or print out a large one and put it up in your workspace.

2 Now mark the key moments of prior product/service launches of the business you are working for or, if your business is just starting up, for a similar business category.

3 Answer questions like, What is the time interval between two incremental innovations of design value enhancement? What is the innovation clock for these model changes? What is the time interval between two new user-centred products/service designs and between radically new value proposition designs? Take these intervals as the starting points for your design clocks.

4 Now that you've got a sense of your design clocks, look at the past launches of one to three competitors. For instance, you may choose to study the market leader, an innovative new entrant, and a similar size company. Carry out the same retrospective analysis on the time intervals for the different types of design innovations. Fine-tune your design clocks with this market information.

5 Consider if the users you work for have expectations regarding critical new technologies. If they do, look at the suppliers of these technologies and analyse the innovation clock of subsequent technologies. Fine-tune your design clocks with this technology information.

6 Now sketch or print out the future timeline for the roadmap and put it up in your workspace. Label the start point of Horizon 1 on the timeline with the present year (and quarter if you like). Build it up with three horizon sections. For the endpoint, roughly indicate a year in which the radical new value proposition design, of Horizon 3, will be launched. For Horizon 2 indicate a year in between for user-centred design.

7 Decide on sensible time intervals for the design clocks of your future launches. Mark these key moments of first exposure of the designed solutions to the users on the future timeline. Consider the key moments for the different types of innovation, value enhancements, value creation, and value proposition development. The number of key moments you map may vary. Consider what might be most critical to the persons for whom you are designing.

8 Mark the key transition moments. They could be seasonal changes, important expos, public holiday dates, or recurring deadlines of budget reporting.

As you set out to design a roadmap, your first mapping challenges are the timeline and setting the speed of innovations by the creations of design clocks. This gives you a chance to do some research on the timing of the business you work for. Reflect on the historical timing of valuable innovations launched by the business, its competitors, and its partners. Getting a good handle on the design clock can set a structure and rhythm for the temporary activities of design innovation.
You can use this first mapping of design clocks as a starting point for building a more descriptive roadmap. Your roadmap will change as things evolve, and that's perfectly okay. You can always amend things.

Prof. dr. ERIK-JAN HULTINK on the subject of Launch Strategies and Roadmapping

SCIENCE INTERVIEW

LS Your product launch research shows that to time a launch successfully, it is important to make trade-off decisions with new product sales income[11]. What is the important takeaway here for roadmappers?

EJ The funny thing about the results of our research is, that although commonly people take into account the revenue for decisions on the timing of new product introduction, we looked at companies' actual performance data and found that for the optimal timing of new product introductions - the more relative account of both cost and revenue give the best chance of new product success. So, contrary to the common belief that speeding up your product innovations is always the best thing to do, we found that speeding up most of the times also comes with much more costs. And these cost need to be balanced with the expected revenue estimations. Hence we suggest to decide on the optimal timing of new product introductions, in the sense of a time pacing strategy. Our research also showed the differences - between really new products, improvements and line additions. Basically we evidenced that a too early launch timing can be equally bad as too late. Therefore, I would like to recommend that for any time pacing decision, you take into account both the cost and sales consequences of your timing .

LS In roadmapping, product visions are mapped on a timeline. How do we get the entry timing 'right' in relation to the new product's window of opportunity?

EJ David Bowie released Space Oddity, one of his most famous songs, just ten days before the first man landed on the moon. And his song was actually used in the BBC's coverage of that

unprecedented event. This was a matter of timing and opportunity. Basically, you do not necessarily have to be the first, but you shouldn't be seventeenth either. So there is this 'window of opportunity' in which you still can be in time, when the market is growing, and people are talking about it and are open to it and you also have access to the retail shelves. If you wait too long the window can be closed. If you launch too early, the window might not be open yet. But this does not necessarily mean that you always have to be the first. Take for instance the electric car. How many decennia have we been yakking about it?

LS Well, hybrids were introduced first.

EJ Launching the hybrid was probably needed to improve the chances that electric cars would be accepted. I believe Renault was the first to introduce electric cars way back in the 1930s, and in the 90s they launched the Clio Electrique. It was hugely expensive and only ran for an hour and a half off one charge. Back then, the timing wasn't right – the window of opportunity wasn't open yet. But I just recently saw an amazing video about – on why we all will drive an electrical car within the coming 30 years. In this video a traditional car and an electrical car were tear down in parts. . The screening of the traditional car – think about a BMW or the like- showed about 500 parts and the Electrical car – Tesla S or similar - showcased 20 parts. In one instance you grasp - without the 'proclamation' stories about saving the planet - that on the long run it will never be possible to be cost-efficient. You can never reduce the traditional system cost until the level of the more optimal system with also the additional benefits of easy of spare part replacement. It just cannot be. This example also showcases that it is much easier to do time pacing with less parts. When your product has a modular structure, it is easier to upgrade your product line, and it is also much easier to organise when you have 20 parts instead of 500+.

LS How do you explain the fact that so many roadmaps with product visions – 74 out of the 98 we studied[9]– successfully led to real products?

EJ I assume that working with visions and making them explicit, generates the management commitment to realize it. When you map the new product visions and eventually allocate people and money to it, it is not a 'free-floating' idea anymore. It becomes real, projects get started with a roadmap. When I consider that, over the 20 years that I have been doing research on innovation at organisations, I have never come across a situation with extremely few ideas. Always there were too many ideas for too little time and

too little money. Roadmapping supports the making of choices and priorities, in a way it makes an idea strategic – in the spotlight for the whole organisation, and 'making the idea happen' becomes serious business.

LS What is your explanation for the low time accuracy performance we found on the product visions versus the actual product launch timing[9]?

EJ Time-to-take-off for really new products almost always takes longer than estimated in advance. Often that is due to the fact that the introduction stage of the product life cycle is often a long uncertain stage. And from other research we know that radical innovations take more time to introduction due to more uncertainties. Incremental enhancements are variants on a known path. You have the overview of the steps you have to take, so you can estimate this more accurately. Remember 1999, the Prince song? -Tonight we are going to party as if it is 1999 - It came out in the early 80s.

LS Interesting music metaphor! Here's one more question: what do you recommend design roadmappers to do in creating a time pacing strategy?

EJ Make it visual. Do not only use text and numbers in a roadmap. In my experience from strategic workshops, one activity that always works out well is visualising the connections between the innovation project, or projects, and the innovation strategy. For this visualisation activity we used one set of cards to draw and write the projects on, and another set to visualise and describe the focus elements of the innovation strategy. This is often a revelatory experience for the managers involved – they actually see links missing, and there is often an overload of cards with cost reduction projects alongside only a few cards representing the heart of the strategy. Visual mapping really opens eyes.

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Figure 5.9

Launch performance of the product visions

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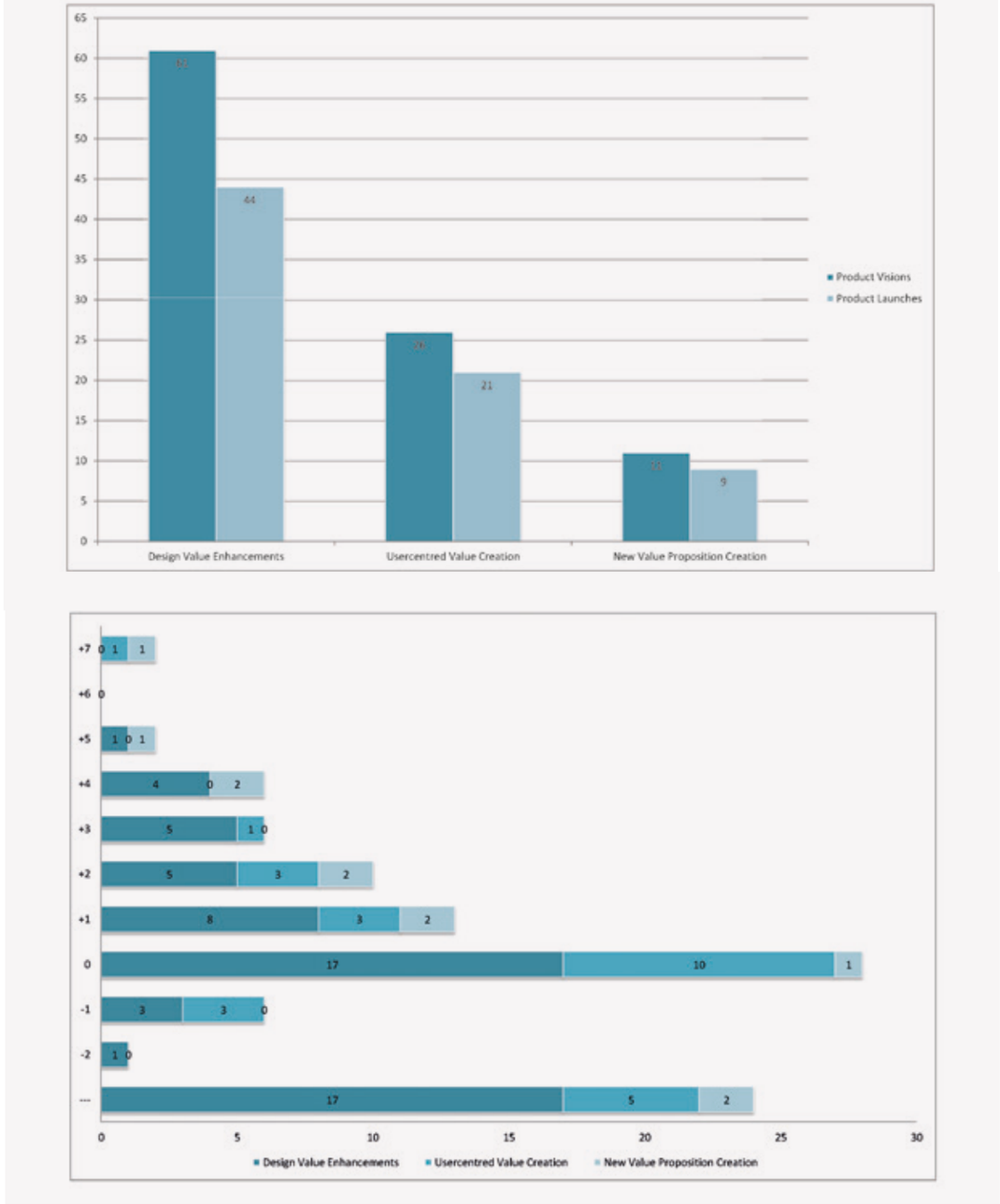
Figure 5.10

Time performance accurancy

cc Simonse & Hultink, 2016[9].



IN SUM

Coming back to kairos and perceiving time as opportune time, the Three Horizons concept offers such a mode of thinking about the future. The three horizons describe three different spaces of opportunity moments and focuses the attention on three parallel strategic life cycle evolutions. Furthermore, the key in the answer to the questions of how to decide on the timeline design is in the design clocks.

Design clocks include three types of pacing for different types of design innovation. Model changes have a cycle time of one year or two years, while platform innovation with new user value creation has a cycle that is two or three times longer. New business development by means of value proposition creation takes the longest, with a pacing time interval of six to fifteen years, depending on the capability complexity of the industry.

The pacing of design clocks in roadmaps is decided upon by user-driven target group expectations concerning model year changes, by technology-driven performance measurement indicators, or by design-driven value enhancements, depending on the type of design roadmap in question. In industry roadmaps, the engineers around the table prefer to pace with an exact technical performance measurement. In company roadmaps in the consumer electronics and appliance industry, the pacing decision is also based upon the pacing of competitors. In design roadmaps, these two tensions are bridged by user-centred pacing driven by target group expectations. Design-driven roadmapping thrives on value creation.

The guidelines of this chapter include the time-based framework of design innovation that frames the three design clocks with three horizons of evolutionary design innovation. Its use was showcased with the Philips wake-up light roadmap, also in a visual way by drawing the three horizons. The lab provides a short guide to experience the art of time pacing.

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The Long Now
Clock prototype, the interval.

The Long Now foundation
hopes to provide a counterpoint
to today's accelerating culture
and help make long-term
thinking more common.

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