In the past years the term "Agile" has attracted signification attention across industry and academia¹. There are a number of ways in which agile concepts are being applied to various enterprise disciplines and industry verticals such as agile software development, agile project management, agile supply chain, agile manufacturing, agile service management, agile process management² and the list goes on. Nonetheless, today, organizations are wishing to apply such agile principles to much more specific enterprise concepts, from planning, transformation, innovation, value ideas, business model concepts as well as their business architecture views. Before we however are jumping on all the good details of the agile enterprise in this book, it is important to understand why so many organizations need to consider applying the concepts. What drives the "Agile Enterprise"? What are the building blocks or principles underlying enterprise agility? What does it mean to apply agile principles within an enterprise? What is the difference between agile and traditional non-agile ways of working? Why do Enterprise independent of industry or business model need to consider the discussed approaches? Before we come to this ground breaking book, I would like to provide precise and practical answers to these fundamental questions.

Understanding the changes in the market

It should not be a surprise for many to hear that the market, consumers and even entire industries are changing in a faster rate than ever before. With the technological adaption of consumers and the organizations, we stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society. The changes organizations are going through is driven by the market and industry changes that are happening. If we look at it from an historic perspective. The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.

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¹ Larman, Craig (2004). Agile and Iterative Development: A Manager's Guide. Addison-Wesley. p. 27. Ambler, Scott (12 April 2002). Agile Modeling: Effective Practices for EXtreme Programming and the Unified Process. John Wiley & Sons. pp. 12

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Sliger, Michele; Broderick, Stacia (2008). The Software Project Manager's Bridge to Agility. Addison-Wesley. Rakitin, Steven R. (2001). "Manifesto Elicits Cynicism: Reader's letter to the editor by Steven R. Rakitin". IEEE Geoffrey Wiseman (July 18, 2007). "Do Agile Methods Require Documentation?" InfoQ.

Abrahamsson, P., Salo, O., Ronkainen, J., & Warsta, J. (2002). Agile Software Development Methods: Review and Analysis. VTT Publications 478

[&]quot;Guide to Agile Practices", the Agile Alliance.

Aydin, M.N., Harmsen, F., Slooten, K. v., & Stagwee, R. A. (2004). An Agile Information Systems Development Method in use. Turk J Elec Engin, 12(2), 127-138

² von Rosing, M., von Scheel, J., & Gill, A., Agile Enterprise, The Complete Process Handbook, Elsevier, 2014

There are three reasons why today's transformations represent not merely a prolongation of the Third Industrial Revolution but rather the arrival of a Fourth and distinct one: velocity, scope, and systems impact. As illustrated in figure 1, which was presented at the Keynote at the World Trade Symposium on 'Mastering the Fourth Industrial Revolution' and is based on the Global University Alliance research, the speed of current change through breakthroughs has no historical precedent of earlier industrial revolutions. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. Moreover, it is disrupting almost every industry in every country. And the breadth and depth of these changes herald the transformation of entire systems of production, management, and governance.

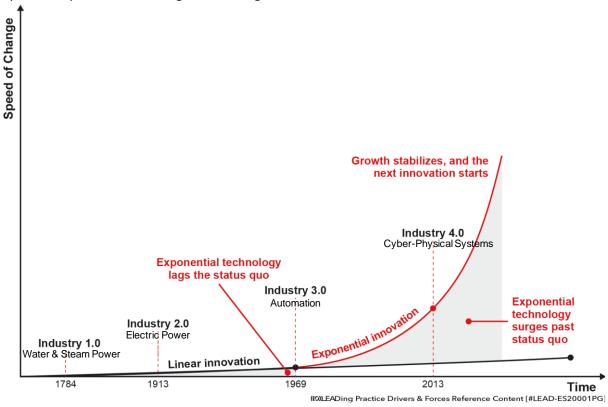


Figure 1. The four phases of the industrial revolution and the innovation potential³

We see these changes everywhere happing. Who would have thought that we would have a fully electric self driving car? Tesla Motors, Inc. ⁴ with their innovative technology adaption made it happen. We can't deny it anymore, it is everywhere, artificial intelligence is all around us, from smart phones you can talk to, smart fridge, smart TVs, smart virtual assistants and software that translate or invest to advanced drones with build in intelligence. Impressive progress has been made in AI in recent years, driven by exponential increases in computing power and by the availability of vast amounts of data, from software used to discover new drugs to algorithms used to predict our cultural interests. Digital fabrication technologies, meanwhile, are interacting with the biological world on a daily basis. One of the reason that this innovation is happening is that contrary to earlier industry revolution cycles, progressing from one cycle to the next, doesn't require all the

³ Keynote of the World Trade Symposium: 'Mastering the Fourth Industrial Revolution' Henrik von Scheel, LEADing Practice CEO. This Graphic is based on the emerging drivers and forces i.e. trends identified within market. The permission of the illustration is given by the enterprise standard body LEADing Practice, that has a specific standard around Drivers & Forces Reference Content (ID#ES20001PG).

⁴ Model S - Tesla Motors". www.teslamotors.com

components to be changed. For example, from working manual to apply 'water and steam power' requires 100% change of hardware as well as the way of working. Immense changes in the hardware are needed to go from 'water and steam' to 'electrical power' (see figure 1). The same is to the step of the third industrial revolution of automation, which was based on the electronics and information technology to automate production. Also there the change of technology is immense. However, the fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century therefore needs much lesser change in the organizations. Since it is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres, the adaption will be faster. As demonstrated in Figure 2, the convergence between the physical, digital, and biological trends, fuels the individual innovation cycles and combined provide an exponential innovation and thereby change in the market.

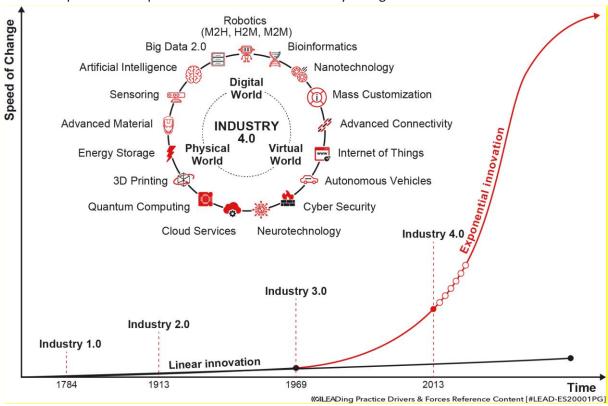


Figure 2. A high-level overview of the he innovation cycles of Industry 4.0⁵

Like the revolutions that preceded, the Fourth Industrial Revolution has the potential to raise global income levels and improve the quality of life for populations around the world. To date, those who have gained the most from it have been consumers able to afford and access the digital world; technology has made possible new products and services that increase the efficiency and pleasure of our personal lives. Ordering a pizza, booking a flight, buying a product, making a payment, listening to music, watching a film, or playing a game—any of these can now be done remotely. We are already seeing that the technological innovation is also leading to a supply-side miracle, with long-term gains in efficiency and productivity. Transportation and communication costs will drop, logistics and global supply chains will become more effective, and the cost of trade will diminish, all of which

⁵ This Graphic is based on the emerging drivers and forces i.e. trends identified within market. The permission of the illustration is given by the enterprise standard body LEADing Practice, that has a specific standard around Drivers & Forces Reference Content (ID#ES20001PG)

will open new markets and drive economic growth. Engineers, designers, and architects are combining computational design, additive manufacturing, materials engineering, and synthetic biology to pioneer a symbiosis between microorganisms, our bodies, the products we consume, and even the buildings we inhabit. What we are experiencing in the market is that the innovation cycles of the new trends are staring to merge and totally new concepts and solutions are emerging. For example, we see that a long discussed trend of the smart cities is being connected to multiple individual trends that have their own innovation cycles, such as smart energy, smart transport, smart manufacturing as well as smart economy. These innovation cycles are again connected to other developing markets, such as the smart buildings, smart drugs, smart healthcare etc. The convergence between the physical, digital, and biological trends are triggering multiple innovation cycles that as illustrated in figure 3 are connected across multiple touch points.

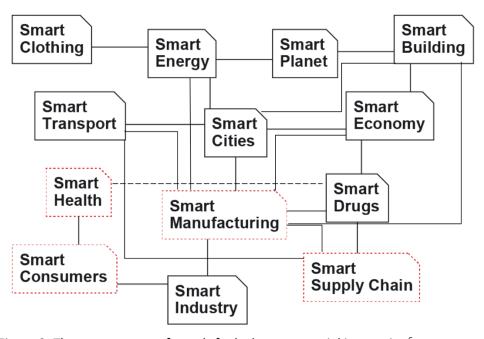


Figure 3. The convergence of trends fuels the exponential innovation⁶

An underlying theme when talking to senior executives is that the acceleration of innovation and the velocity of disruption are hard to comprehend or anticipate and that these drivers constitute a source of constant surprise, even for the best connected and most well informed. Indeed, across all industries, there is clear evidence that the technologies changes are having a major impact on businesses. Some of these changes are consumer driven, where individuals want "Smart Living", which includes both connected when needed as well as information when needed. But it can also include entertaining, leisure as well as the need to have independence through technology enablement. The consumers are expecting more advanced "Smart Buildings", that are connected, internet enabled and connected lightning, thermostats, HVAC, presence sensor, lockers, actuators, meters and even smart plugs. This on the other side is driven the utility organizations to push towards "Smart Energy" concepts with connected and internet enabled electric grid, voltage and power sensors, meters and breakers as well as faults detection. The "Smart Consumer" is however also influencing organizations to move towards a digital transformation, have Individual production

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⁶ This Graphic is based on the emerging drivers and forces i.e. trends identified within market. The permission of the illustration is given by the enterprise standard body LEADing Practice, that has a specific standard around Drivers & Forces Reference Content (ID#ES20001PG)

and services and enable consumer triggered crowd purchases. We see the innovation drivers across multiple industries and in numerous fields. From "Smart Manufacturing", that has advanced automation, digital infrastructure, data-driven operations, flexible operation, decentralized control, and collaborative network. All to enable smart products, solutions and services. There is actually no industry untouched even those industries that are more technology change resistant, such as governments, where through the citizens they are pushed towards "Smart Cities", that have connected communities, better monitoring and security and improved traffic control. Even lighting and water management are influenced. As voters we are even expecting politicians to use the technology for a 'Smart Planet". We are expecting automatic water and power leak detection, with environmental sensor as well as pollution and weather monitoring. All to bring us to a more sustainable environmental friendly planet. We are also expecting "Smart Healthcare", that have up to date connected bio sensors, probes, monitoring systems. Even the healthcare services are influenced where we expect automated and self service systems. We even expect remote health care enabled solutions. The "Smart Industry" with interrelated production control, interconnected and smart robotics as well as coupled security, actuators and even smart lighting is driving change. We have now illustrated how the innovation cycles are interacting to drive change in multiple industries and while we because of space can't list all forces, trends and drivers, here are few that are cross industry specific:

Smart Economy

- Digital economy, block-chain
- Security, global trading
- Crowdfunding and investment

Smart Transport

- ITS, HEVs and Evs
- Electronic mobility
- · High speed trains

Smart Supply Chain

- Extreme connectivity, digital infrastructure
- Data-driven operations, agile operations
- System integration, decentralized control
- Collaborative network

On the supply side, many industries are seeing the introduction of new technologies that create entirely new ways of serving existing needs and significantly disrupt existing industry value chains. As a matter of fact, these discussed mega trends when adapted to the right way and both incorporated into and organizations service model and value model. It can disrupt an existing market and value network so much, that it can displace established market leaders and alliances.

Disruptive Innovation & Transformation

In 2009, Milan Zeleny described high technology as disruptive technology and raised the question of what is being disrupted. The answer, according to Zeleny, is the support network of high

technology⁷. We all know that when Tesla Motors, Inc.⁸ created a fully electrical car they disrupted the gasoline automotive industry. As illustrated in figure 4, the entire gasoline automotive value chain from the component manufacturer, the engine manufacturer, frames manufacturer, the assembly organizations, to the dealerships where impacted. Even the Gasoline dependent industry, such as the gas and service stations are effected.

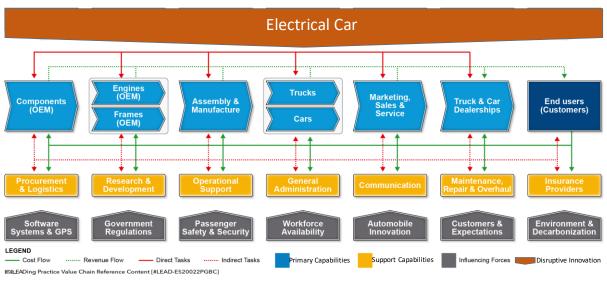


Figure 4. Gasoline Automotive Manufacturing value chain⁹

This is not a small thing, the Tesla Model S sales passed the 100,000-unit milestone in December 2015, three and a half years after its introduction. The Model S was the world's best selling plug-in electric vehicle in 2015¹⁰. It doesn't matter how large, big or international the organization is, the potential when there are so huge technology changes as there is in the industrial 4.0, exists, that whosoever uses the innovation and transformation potential best can become an outperformer i.e. outcompete the others. This can even get the great organizations to fail. For the most these organizations that are outcompeted by the outperformers don't even realize what is happening. For example, ultrasound technology was such disruptive technology, relative to the X-ray imaging. As demonstrated in figure 5, ultrasound was a new-market disruption. Actually, none of the X-ray companies participated in ultrasound innovation. They didn't even participate in the industry transformation until they acquired major ultrasound equipment companies¹¹. A disruptive innovation is an innovation that updates or even creates a new market and value network and

⁷ Zeleny, Milan. "High Technology and Barriers to Innovation: From Globalization to Localization". International Journal of Information Technology & Decision Making (World Scientific) 11: P 441.

⁸ Model S - Tesla Motors". www.teslamotors.com

⁹ This Graphic is based on the emerging drivers and forces i.e. trends identified within market. The permission of the illustration is given by the enterprise standard body LEADing Practice, that has a specific standard around Drivers & Forces Reference Content (ID#ES20001PG)

¹⁰ Jeff Cobb (2015-12-15). "Tesla Model S crossed 100,000 Sales Milestone This Month". HybridCars.com. Retrieved 2015-12-16.

¹¹ Christensen, Clayton M. (2003). The innovator's solution: creating and sustaining successful growth. Harvard Business Press. ISBN 978-1-57851-852-4.

eventually disrupts an existing market and value network, displacing established market leaders and alliances¹².

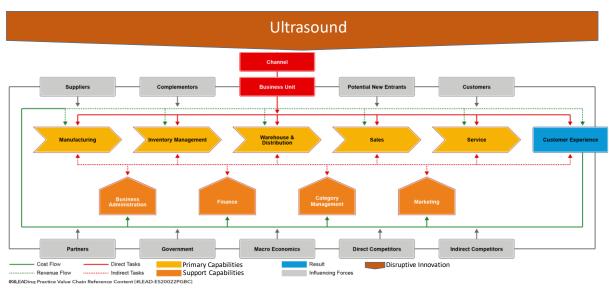


Figure 5. Medical Equipment Manufacturing value chain¹³

Disruption is flowing from the ability to use the technology potential in an innovative way to adopt to trends, or even to use the technology to create a whole new solution and thereby trend. Outperforming the others with a new business model. Christensen explained the process very well: "The technological changes that damage established companies are usually not radically new or difficult from a technological point of view. They do, however, have two important characteristics: First, they typically present a different package of performance attributes—ones that, at least at the outset, are not valued by existing customers. Second, the performance attributes that existing customers do value improve at such a rapid rate that the new technology can later invade those established markets." It is therefore a question of how good and fast one can adapt to the emerging and disruptive trends.

Why Agile is so important to the Enterprise

Most executives realize the importance of adapting is not only a question of survival, but how quickly this is done matters for the competitive advantage they are seeking. This is also where agile comes into this equation. While the basic "agile" term comes from the Latin word agilis and means to drive, do, and see. The basic meaning of agile means to move quickly, lightly, and easily. And this is what the executives want. They want to move quickly, lightly, and easily, making the agile enterprise concepts one of the most important topics for executives. The market changes are and opportunity, yes they will be highlighting the weaknesses in an organization, but they also provide rare opportunities to innovate and transform.

¹² Christensen, Clayton M. (1997), The innovator's dilemma: when new technologies cause great firms to fail, Boston, Massachusetts, USA: Harvard Business School Press, ISBN 978-0-87584-585-2

¹³ This Graphic is based on the emerging drivers and forces i.e. trends identified within market. The permission of the illustration is given by the enterprise standard body LEADing Practice, that has a specific standard around Drivers & Forces Reference Content (ID#ES20001PG)

¹⁴ Christensen, Clayton (January 1995). "Disruptive Technologies Catching the Wave". Harvard Business Review: P 3.

Many times we just see the specific disruptive innovation solution and don't think of how this will influence, shape and change the entire industry as a whole. As demonstrated in figure 4 and 5 a disruptive innovation can through the consumers, noticeably transforms and change an entire industry. The phenomena, is very well described by Bower: "When the technology that has the potential for revolutionizing an industry emerges, established companies typically see it as unattractive: it's not something their mainstream customers want, and its projected profit margins aren't sufficient to cover big-company cost structure. As a result, the new technology tends to get ignored in favor of what's currently popular with the best customers. But then another company steps in to bring the innovation to a new market. Once the disruptive technology becomes established there, smaller-scale innovation rapidly raise the technology's performance on attributes that mainstream customers' value." ¹¹⁵

Nobody, in no industry can escape this, the inexorable shift from simple digitization (the Third Industrial Revolution illustrated in figure 1) to innovation based on combinations of technologies (the Fourth Industrial Revolution illustrated in figure 1) is forcing organizations to reexamine the way they do business. The bottom line, however, is the same: business leaders and senior executives need to understand their changing environment, challenge the assumptions of how they go about adapting to the outside forces and trends. They need to reconsider their enterprise innovation and transformation ways of working (approaches and methods).

A discussion on Agile vs. Traditional Ways of Working

We just discussed that most executives realize the importance of adapting is not only a question of survival, but how quickly this is done matters for the competitive advantage they are seeking. We also elaborated on, that this is where agile plays a role. There are actually not so many options to the agile enterprise. Well, yes, in a way there are hundreds if not thousand options, but while most organizations understand the importance of innovation, they fall short when it comes to execution. There are today not very good concepts that help an organization to move quickly, lightly, and easily. This is confirmed by the following two studies:

- (1) The 2014 IBM Global CEO study concluded that 86% of executives say innovation is extremely or very important to their companies' growth strategy, meanwhile only 19% succeed. 16
- (2) The 2015 McKinsey study on transformation identified that 72% of transformation programs fail to deliver their actual targets, resulted in substantial economic and productivity losses of \$3 Trillion, which corresponds to 4.7 % of global GDP. 17

While there are not many good viable options, like any other change, the agile enterprise adoption is not always welcomed right away and also faces resistance. It is a different way of thinking and working. Something that must be introduces, learned and practiced in order to work. Our experience is that Organizations observe many types of frictions which reduce the momentum during agile implementation¹⁸. These frictions absorb energy because of the resistance at various levels. Friction is not a fundamental force but occurs because of the turbulence caused by the change. There are three main types of frictions which are applied to the strategy linkage, organization, processes, and

¹⁵ Bower, Joseph (May 2002). "Disruptive Change". Harvard Business Review 80 (05): P 95–101.

¹⁶Global CEO Study 2012, IBM Institute for Business Value

¹⁷The great transformer: The impact of the Internet on economic growth and prosperity; McKinsey Global Institute 2015

¹⁷The Global Information Technology Report 2012, World Economic Forum and INSEAD

¹⁸ von Rosing, M., von Scheel, J., & Gill, A., Agile Enterprise, The Complete Process Handbook, Elsevier, 2014

the technical agility. In this way, agile is referred to as a mind-set, change, flexibility, non-functional requirement (link to strategy and goals), culture, and the ways of working, approach or philosophy. One of the most used arguments is that this is not a proven method for enterprise innovation and or enterprise transformation. This is just a new hype, coming from IT, not really applicable to the entire enterprise. While it is true that agile concepts are being applied in the software development, this is not some new phenomena. IT oriented agile methods and practices can be traced back to the incremental software development methods as far back as 1957¹⁹ before falling out of favor for the heavyweight waterfall method. In more modern times the agile movement began to come back when, in 1974, a paper by E. A. Edmonds introduced an adaptive software development process²⁰. Concurrently and independently the same methods were developed and deployed by the New York Telephone Company's Systems Development Center under the direction of Dan Gielan. It was however first in the mid 1990s that the breakthrough came and agile principles and concepts where applied to IT heavy subjects including Rational Unified Process (1994), Scrum (1995), Crystal Clear, Extreme Programming (1996), Adaptive Software Development, Feature Driven Development (1997), and Dynamic Systems Development Method (DSDM) (1995). After the Agile Manifesto²¹ was published in 2001²² these have since been referred to collectively as "agile methodologies". So yes, while agile is now being applied and discussed around software development, the core of agile is however about the ability to structure organizations in such a way that they can embrace change and adapt quickly to service the customers in their ever changing needs. This is also where agile principles and concepts started. In 1930s the automobile industry introduced the first agile concepts through the introduction of optimization concepts and work splitting. Further, agile concepts have been applied within the lean manufacturing/lean consumption paradigms. With its growing popularity, other industry segments started realizing that agile principles are not limited to any specific industry segment or functional group. In the early 1970s, the concepts of Evolutionary Project Management (EVO), which has evolved into Competitive Engineering, got their roots in agile principles. These were developed as the carminative reaction against the waterfall-oriented methods, which were characterized by their critics as being heavily regulated, regimented, micromanaged, and having overly incremental approaches to development. Agile and traditional waterfall methods are two distinct ways of developing concepts. The Waterfall model can essentially be described as a linear model of product delivery. The reason this is so important is that most enterprise development methods are based on a waterfall approach. Like its name suggests, waterfall employs a sequential set of processes as indicated in Figure 4. Development flows sequentially from a start point to the conclusion, the delivery of a working product, with several different stages along the way, typically: Requirements, High Level Design, Detailed Implementation, Verification, Deployment, and Customer Validation, often followed with stages to cover the Running/Maintenance of the product/service, and to address the need for Continuous Improvement.

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Gerald M. Weinberg, as quoted in Larman, Craig; Basili, Victor R. (June 2003). "Iterative and Incremental Development: A Brief History". Computer 36 (6): 47–56. doi:10.1109/MC.2003.1204375. ISSN 0018-9162.
Edmonds, E. A. (1974). "A Process for the Development of Software for Nontechnical Users as an Adaptive System". General Systems 19: 215–18.

²¹ Agile Manifesto 2001,' Manifesto for Agile Software Development', http://agilemanifesto.org/. ²² Ibid

The emphasis of the various Waterfall theories is on the project plan and managing all work against the plan. For this reason, before beginning any kind of development there needs to be a clear plan and a clear vision. Because the Waterfall method requires upfront, extensive planning, this permits the launch of a known feature set, for an understood cost and timeline, which tends to please clients. This is also why the waterfall approach appeals to so many executives. They can break everything down, have organized it and can control the cost aspects. Furthermore, Waterfall development tend to fit better to executives because they are so plan oriented. For example, if a designer drops out of the project it isn't a huge problem, as the Waterfall method requires extensive planning and documentation. A new designer can easily take the old designer's place, following the development plan without a problem. As described above, agile offers an incredibly flexible design model, promoting adaptive planning and evolutionary development.

Agile might be described as explorative design to innovation and transformation. Workers only work on small packages or modules at a time, identifying the value. Customer value feedback occurs simultaneously with development, as does the testing and deployment. What executives, business designers and business architects need to understand is that this has number of advantages, especially in project environments where development needs to be able to respond to changes in requirements rapidly and effectively. By way of comparison, instead of a big bang waterfall development delivery, agile focuses on delivering early value in small increments, which is referred to as a minimum viable product or minimum marketable features. An agile project is organized into small releases, where each release has multiple iterations. Within each iteration just enough work is pulled off the stack, planned, analyzed, designed, developed, tested, integrated and then can be deployed in the production or production like environment such staging environment. During and at the end of the iteration the product is demonstrated to concerned stakeholders for feedback and commitments. Each iteration also involves retrospective activity, which is aimed at identifying and addressing the issues of the agile practices. In each iteration, different developers may work on different modules or requirements (a.k.a user stories) throughout the development process and then work to integrate all of these modules together into a cohesive piece of working software release. In summary this can be seen as a flow that consists of Analysis and Planning stages, followed by a rapid Design, Build, Test cycle all of which then ends with deployment.

In figure 6, we compare and contrast key elements of Agile and Waterfall Development. We see graphically the lifecycle of each development model. Below each of the portrayal of each type of life cycle are the key properties of each method and how they relate to the equivalent property of the alternative method.

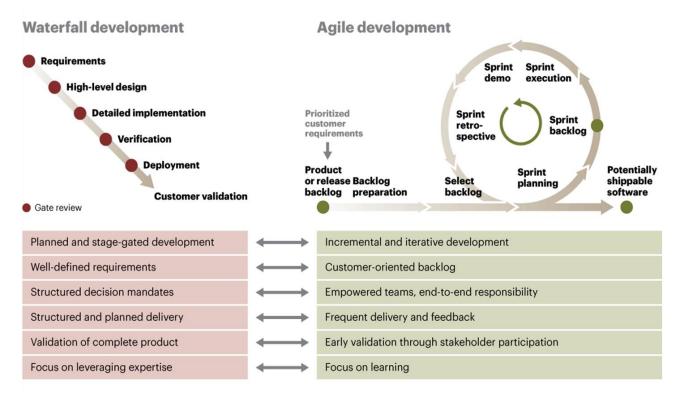


Figure 6: Agile versus Traditional Waterfall²³

Experience with the agile approach has shown that it can be especially beneficial in situations where it is not possible to define and detail the innovation and transformation project requirements, plan and design upfront. Agile is also an excellent option for experimental circumstances. For example, if you are working with a client whose needs, drivers, strategies and/or goals are not well defined or a bit loosely related, it is probably worthwhile to employ the agile method. The client's innovation and transformation requirements will likely gradually clarify as the project progresses, and development can easily be adapted to meet these new, evolving requirements. Agile also facilitates interaction and communication – collaboration is more important here than doing design in isolation. Because interaction among different designers and stakeholders is key, it is especially conducive to teamwork oriented environments.

Lessons learned around the Agile Enterprise concepts

While agile is not a silver bullet which can be applied to all problems, however it does provide ways of working that could be suitable to the circumstances where frequently changing business and customer requirements or other conditions of uncertainty force the organization to pursue quick wins for developing capabilities, services, or systems. As agile is about making complex things simple or simpler, this section of the chapter will highlight how the agile concepts can be applied to enable the enterprise in all the various areas and disciplines. We must however keep in mind that agility of for example the software development, project management or even the various processes is not in and of itself the Agile Enterprise and that in order to incorporate agility into the organization, it actually requires for the most a fundamental shift in the enterprises thinking.

²³ von Rosing, M., von Scheel, J., & Gill, A., Agile Enterprise, The Complete Process Handbook, Elsevier, 2014

To overcome the challenges of 'this is how we always have done it' and enable an organization to adapt Agile Enterprise must enable strategic alignment and provide the necessary link to performance and value expectations, requirement management, coordination with business impact and changes, and better quality and thereby value creation and realization. For this we need to augment the traditional agile approach to incorporate a stronger requirement management and an agile feedback loop in the analysis phase which considers all the layers of the enterprise i.e. business, application, and technology, thus allowing the use of these requirements in an Agile Way through the design Build and Test phase and to assess testing against the requirements prior to deployment.

Conclusions

You are starting on an exiting journey, and I hope that these words have helped unlock some important ways of thinking around the agile enterprise.