

The QUALITY STORY of LEGO

From *Learning by Sufferings* to *Learning by Play*

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1. SUMMARY

1.1. The quality history of the LEGO Group

The quality history of the LEGO Group could have been a fairytale – but it is a true story. The Kirk Christiansen family is passionate about the play and development of children and have invented an outstanding product – the LEGO brick. Through decades of strive for quality the LEGO organization developed it into a world class brand. The LEGO Group has experienced several successes and failures in the last decade. These are analyzed and the derived key learnings are described.

The DNA of the LEGO Group embodies a natural emphasis on quality. The views and attitudes of the founders combined with the nature of the product (toys for children) contribute heavily to this emphasis. The subsequent culture is one focused on delivering only the best.

1.2. The LEGO Group approach: Quality by Heart

A strong quality oriented culture is not enough when it comes to audits and certifications. Written evidence has to be provided and this was what faced the LEGO Group in 2008. A combination of ISO9001 re-certifications and audits by American and Chinese authorities would place bigger demands on the quality management system than previously.

The approach employed by the LEGO Group can best be described as “Quality by Heart” and the principle for dissemination of information is best understood as “Playful Learning”. *Quality by Heart* is when quality no longer relies on procedures and instructions but has become an integral part of the way things are done. This is not the same as absence of procedures and instructions nor is it negligence of quality. Rather is it a high level of focus on quality that is no longer explicitly enforced.

Playful Learning is an approach to dissemination of information which emphasises the importance of separating learning from the boundaries of everyday work. When play is separated from the reality, it is perceived as harmless and leaves us ready to acquire new knowledge. The reality is simple: We are all still children when it comes to learning something new. If it is interesting and entertaining, we will almost automatically make an effort at understanding it, and if it is not you have to rely heavily on the discipline of the individual. Once the application of play has helped to learn something new, the acquired knowledge can be related to real life and subsequently applied to the benefit of all.



1.3. The LEGO Group's quality journey in the years to come

Quality management is a key for the continued success of the LEGO Group. LEGO is one of the world's leading brands, and is therefore meticulously protected. The LEGO Group is now part of a global reality with continued change of production, ownership and sites.

In the development of its quality management, the company will focus primarily on its own reality and potential – and only use external systems or concepts as inspiration. The development will be based on the LEGO Group's historical and successful focus on product quality and on the LEGO Group's competence in developing the organisation from a very basic viewpoint: Minimize the filters and face the realities; play, learn and move forward.

The LEGO Group is continuously faced with explicit external requirements from governments and implicit expectations from quality management theoreticians and their disciples. Many of the requirements in systems and approaches are hard to relate to the real world. More people with the ability to bridge theory with practice are needed. To maximize the future performance of the LEGO Group, there is a continued effort to minimize the influence of external systems and concepts – without missing out on truly new ideas and fresh thinking.

2. The HISTORICAL QUALITY CULTURE of the LEGO GROUP

It all began in 1932 where the founder, Ole Kirk Christiansen, a carpenter from Billund in Denmark, began creating wooden toys. The company began calling itself LEGO® in 1934. He took the first two letters of the Danish words LEG GODT, meaning “play well”, and put them together – quite unaware that one meaning of the word in Latin is “I put together”.

When plastic came into widespread use, Ole Kirk Christiansen kept with the times and began producing plastic toys in the late forties. The use of plastic for toy manufacture was not highly regarded by retailers and consumers of the time. Many of the LEGO Group's shipments were returned, following poor sales; it was thought that plastic toys could never replace wooden ones. Despite such criticism, however, the Kirk Christiansen persevered. By 1954, Godtfred Kirk Christiansen had become the junior managing director of the LEGO Group. It was his conversation with an overseas buyer that struck the idea of a toy "system". Godtfred saw the immense potential in LEGO bricks to become a system for creative play, but the bricks still had some problems from a technical standpoint: Their “locking” ability was limited, and they were not very versatile. It was not until 1958 that the modern-day brick design was developed. The bricks were improved with hollow tubes in the underside of the brick. This added support in the base, enabling much better locking ability and improved versatility. That same year, Ole Kirk Christiansen died, and Godtfred inherited leadership of the company.





The quality history of the LEGO Group could have been a fairytale – but it is a true story. A family, the Kirk Christiansens, with a passion for children's play invented an outstanding product – the LEGO brick. Through decades of strive for quality the LEGO organization developed it into a world class brand.

Bricks, beams, axles, mini figures, and all other parts in the Lego system are manufactured to an exacting degree of precision. When snapped together, pieces must have just the right amount of strength and flexibility mixed together to stick together. They must stay together until pulled apart. They cannot be too easy to pull apart, or the resulting constructions would be unstable; they also cannot be too difficult to pull apart, since the disassembly of one creation in order to build another is part of the LEGO appeal. In order for pieces to have just the right "clutch power", LEGO elements are manufactured within a tolerance of 2 microns.

By a constancy of product quality and concept quality it is possible across decades, across continents and across different LEGO boxes to combine bricks. And the volume and the combinations are amazing. Approximately 400 billion LEGO elements have been manufactured since 1949 – and there are 915 million ways to combine six 2 by 8 bricks.

The more LEGO bricks you have, the more fertile your creativity can become, and there are hours of play in the LEGO brick that you don't find elsewhere. Child's play is an ever changing world, and the company's product development departments therefore work systematically with the evolution of familiar play themes and product lines based on research among children and parents into things like play habits, family patterns and housing conditions. Added to this is the fact that a combination of systematisation, logic and unlimited creativity activates learning through play in a very special LEGO way which – in an age of increasing demands upon the child's learning and ability to solve complex problems – caters uniquely for tomorrow's child. It is for this reason that the LEGO system is frequently cited by many leading organisations and pedagogical scientists as an especially creative play material used in learning contexts by institutions and schools throughout the world.

Today LEGO remains the idea behind the company, the name of the product and the name of the company. For decades the LEGO management has met this very vulnerable self-imposed branding policy. This has only been possible because the whole organisation is aware that only continued superior quality will secure the brand and the future.

True to its motto – *Only the best is good enough* – the LEGO Group has emphasised the importance of high quality throughout its 75 year history, ensuring that consumers return to LEGO products again and again. Despite variation in the design and purpose of individual elements over the years, each remains compatible in some way with existing elements. LEGO

bricks from 1958 still interlock with those made in 2009, and LEGO sets for young children are compatible with those made for teenagers.

2.1. Electronic toys – and difficult years for the LEGO Group

The child of the future will have plenty of things to play with. Consumer electronics is a tough competitor to traditional toys. As a result of the increase in consumer electronics the LEGO Group experienced a considerable decline in sales from 1999 to 2004. A lot of changes, restructurings and reductions were carried out. In the short term results increased significantly – but unfortunately it was at the expense of the long term development and results. And the problems were perhaps more fundamental. Cost management was too weak and standardization across the business lacked.

In 2004, a new management was installed by the family – new CEO was Jørgen Vig Knudstorp. Under the leadership of Mr. Knudstorp the LEGO Group has revitalized itself. Together with the rest of the management team a much more disciplined, change minded and focused organisation has evolved – without losing its historical experimental strength and uncompromising will to high quality. The LEGO Group firmly believes that in the future the LEGO brick will continue be relevant and appealing to children of all ages. It is the corner stone in a world of imagination. Putting two LEGO bricks together is intuitive and delivers the spontaneous joy of creation which can be supplemented – but never replaced – by electronic experiences.

2.2. Outsourcing – “Learning by Sufferings”

On June 20th, 2006 the LEGO Group announced a restructuring of the current production set-up – including the outsourcing of essential elements of the production work. The restructuring should reflect an important change: The production and packaging of plastic bricks in boxes was no longer the true financial driver for the LEGO business. The new driver was the continued understanding of the development of the market requirements and derived product and concept development and marketing. As a result the LEGO Group was expected to reduce staff from approximately 8,000 to 3,000 employees – and obtain significant cost reductions.

The LEGO Group announced the closing of the production facility in Enfield, Connecticut and outsourcing of this work to a partner in Mexico. The partner would also oversee the factory in Kladno in the Czech Republic. The Czech facilities would expand due to the planned closing of the Swiss factories in Baar and Willisau, which mostly manufactured TECHNIC and DUPLO elements.

In the leading Danish newspaper CEO Jørgen Vig Knudstorp on January 20th, 2007 announced that he was “deeply surprised at how difficult a process it was to move production and distribution out of the house” and later in the same article stated: “We expected that we could just give our new suppliers our manuals, and then lean back while they learned how to make our products. But that view holds no merit at all. We have gone considerably more in depth than expected”. A few months later, on May 20th 2007, the leading Danish financial paper (Børsen) announced that “LEGO outsourcing struck by problems” In the article senior vice president Bali Padda explained the complications and stated that: “Outsourcing is tougher than turnaround”.

On February 19th, 2008, the LEGO Group announced its plans to take back over operations of the Kladno factory from March 1st, 2008. On July 1st, 2008, LEGO announced their intent to take over plants in Mexico and Hungary and “phase out the existing outsourcing agreement with the partner during 2009”.



The many production transfers and production ownership transfers gave the following crucial learnings for the LEGO organisation:

- 1) *It is much more difficult to transfer production without losing quality than expected.*
- 2) *It is much more complicated to outsource production than expected.*

As explained later, the strong but also informal LEGO quality culture hurt the transfer and outsourcing process. It was difficult to move the significant amounts of silent or tacit knowledge and practice. Furthermore it was very difficult to dismantle and transfer isolated parts of the complex web of internal and external processes. It has to be emphasized that the loyalty of the LEGO organisation throughout the process was undisputed. To sum up, the third learning of the outsourcing project was:

- 3) *The reason for 1) and 2) was the deep knowledge in and connection across the whole supply chain, i.e. vendors, production, distribution and product development.*

Therefore, the only reasonable way forward was to focus internally on mobilizing the full potential of the supply chain across the LEGO Group and its suppliers. Subsequently existing programs have been strengthened and several further initiatives have been launched. To conclude the final learning has been:

- 4) *It is necessary to continuously strengthen the learning culture and improvement systems in the whole LEGO supply chain.*

Clearly, there have been a move from a quite technical, administrative inclined management style with focus on systems towards a leadership style focused on learning and improving centered on the employees.

Subsequently several initiatives related to standardization in its broadest sense have been realized. For example concepts like *best practice, simplification, modularisation, simply by the book, shared view* have become part of the daily communication and work. Among the initiatives which have been started as consequence are:

- A LEAN programme including the introduction of LEGO Production System.
- A process mapping initiative called ARIS.
- Project *New QMS* (see below).

3. PROJECT NEW QMS and “Learning through Playing”

Many challenges faced the operations of the LEGO Group. Certification, production transfers, a new factory, new legislation and continuous footprint changes just to name the most important. The LEGO Group strategy required a quality management system to be installed at all LEGO owned sites (five factories, three central functions and three logistic centres totalling 5,400 employees in Europe, Asia and America). Normally this would be unattainable in less than a couple of years. But by securing sound backing from corporate management, favouring improvement over perfection and de-selecting an IT solution it became possible to do in months.

Under the motto: “Simply by the book” the quality handbook was renamed “Global Management Handbook and gave a 50 pages overview of the business. The project team committed themselves to a time table in October and announced it in an internal newsletter leaving no way out: The decision had been made and the associated costs accepted. This part of the project is not covered in this paper. But a brief schematic of the key parts of the project can be seen in the table below:



Phase	Phase 1	Phase 2	Phase 3	Phase 4
Time frame	June 2008 September 2008	September 2008 April 2009	December 2008 April 2009	April 2009 August 2009
Participants	Top Management Global Quality	Global Quality Quality Professionals	Top Management Global Quality Quality Professionals	Global Quality External Auditors
Content	Defining objectives, attitude and master plan.	Develop and implement Global Management Handbook.	Basic quality and product safety training for all 5,400 employees.	External Audits, approvals and certifications

A pre-certification was obtained in record time: Just 63 days. At the same time the participants praised the energy level and continued progress.

3.1. Playful Learning or Learning through Playing

The entire project New QMS encompassed two main tracks; a system track and a training track. The system track was described briefly in the previous chapter. The remaining focus for this paper is phase 3, where we will practice learning through play, as our customers (children) always do.

Phase 3 of the plan would be the juncture of the two main tracks of the New QMS project. The system track dealt with the development of the new Global Management Handbook and the related global procedures. The training track dealt with the communication and teaching of the new quality management system. You cannot have one without the other and typically they are not developed jointly but rather in succession. This leads to inferior training because the organisation is already exhausted from working on the system track and has little or no desire to work on the training track. That explains why so many implementations of quality management systems fail at deployment: It is not taken seriously enough.

The training track had four phases: *Purpose, design, rehearsal and execution*. The *purpose* springs naturally from the design of the quality management system (the system track). Once you know the structure, content and underlying policies of the QMS it is possible to decide the key message(s) to be conveyed.

Knowing the key message(s) it is possible to *design* the exercises that will teach the participants the expected learning. Time and effort need to be spent making sure the exercises serve as wide an audience as possible. People acquire knowledge in different ways and there should be something for all styles of learning.

The key success factor when using exercises to teach lies in the *rehearsal*. It is important that the participant can focus on solving the exercise to the best of their ability. That calls for a well prepared instructor who knows not just what is supposed to happen, but also what to do, if something unexpected happens. The process of rehearsal is likely to reveal several changes to exercises. 92 % of the time spent by the instructors was spent rehearsing and preparing.

Execution of the exercises is a discipline of its own. Time is critical when executing the exercises. This explains the necessity of the aforementioned level of preparedness of the instructor.



In phase 3 the pivotal point was the Training in the Vingsted Center of 165 managers of the GSC organization. It was organized by Global Quality. The training was based on modern learning theory and on five key questions on Quality Management. The five questions are:

1. What is your place in the value chain – and who is your customer?
2. How do you know you are doing your job right?
3. What are the targets for your job and where do you see the status?
4. What do you do if you experience that a process does not comply with our quality and product safety requirements?
5. Do you understand the quality and product safety policies of the LEGO Group – and where to find them?

These questions are easily and rightfully perceived as defensive or reactive. Knowing that they are designed to prepare the employees for an audit, it becomes obvious why this approach was chosen. There are however elements of proactive thinking as well. The purpose of knowing the customer in the first question is not just to know who the customer is, but also to seek out the customer in order to jointly develop improvements. The same goes for question four. This is not merely a question of knowing the fire drill. Continuously improving the processes is a key element in question four.



On February 4th 2009 all 165 managers in the Global Supply Chain division received the first training. Staying true to the nature of the company, the managers would learn about the new quality management system by means of playing.

Initially the participants were lead to believe that this would be yet another presentation based on PowerPoint slides and a boring speaker. The reason for the deception was simple: It would make the contrast to what was to follow even greater.

The deception was revealed and the participants divided into 15 teams. Each team was given a guide who would make sure the team would get to the right location on time. This meant that the teams could focus on doing well in the five exercises designed to teach them the building blocks of any quality management system.

All exercises followed the same pattern. The instructor gave a brief presentation of the challenge and explained the rules. The participants were given between eight and ten minutes to complete the exercise and then asked to reflect on their experience. Finally the instructor would present the purpose of the exercise.

Learning something new is easier when you relax and play. This was the motivation for using exercises to teach the quality management system. It is however extremely important to take the reflections from the exercises and relate them to the everyday life back at LEGO. For this

reason all the participants were brought back to an auditorium, where an effort was made to relate the learnings from the exercise to real life and how to apply the lessons.

After February 4th 2009 it has become the responsibility of each individual site to make sure that any employee is able to answer all five questions. Quality professionals and management at each site are leading the way. An internal audit team from Global Quality visits the sites to follow up. The primary focus for the training was and is to enable all employees to pass an audit regardless of whether it's according to ISO 9001, the American TSCP, the Chinese CCC or any other certification or legislation. All audits so far have been passed without remarks.

4. The LEGO GROUP's QUALITY JOURNEY in the YEARS to COME

4.1. Foundation for the LEGO Group Quality journey

From the homepage of the LEGO Group the overall strategic intent of the LEGO Group can be read:

"The Future Direction

After a couple of difficult years, the LEGO Group has demonstrated with its latest accounts that the company is back on track. Over the next two years we shall focus on building a strong, profitable enterprise. This will be the foundation for growth in the years that follow.

The company's vision builds on a continuation of the LEGO brick. The very essence of play with LEGO bricks is the enjoyment of building – enabling children to release their creativity and develop new things, and in the process expanding their imagination. LEGO play is learning how to think in both structured and creative mode – simultaneously.

LEGO Group strategy for the period to 2010 goes under the name of "Shared Vision". The strategy is made up of many components – but its core remains unchanged.

We must:

- *Be the best at creating value for our customers and sales channels.*
- *Refocus on the value we offer our consumers.*
- *Increase operational excellence"*

It is clear that the development of the quality management within the LEGO Group must be based on the "Shared Vision". This goes for all the learnings and experiences described earlier in this paper. Finally, we have to remember:

- *LEGO is one of the world's leading brands.* The LEGO brand must continuously and persistently be protected – regardless of whether the products come from internal manufacturing, outsourcing or licensed items. The brand cannot be damaged or lost due to internal errors and mistakes or external attacks. Quality management plays a very crucial role in this defence.
- *LEGO will continue to grow.* The considerable success the last years in terms of market share, profit and the ability to develop the production setup combined with the stable ownership lead to expectations for continued growth. To succeed, efficient quality management is necessary, and we will continuously be loyal to our basic priority: 1) safety, 2) quality, 3) delivery performance and 4) cost.
- *LEGO is now a part of a global reality.* Production, ownership and sites will always be changing. Regardless of these changes, the customer must always experience the same high quality. Again quality management plays a crucial role.



4.2. The quality journey of the LEGO Group in the years to come

The LEGO Group's participation in the 2009 QMOD conference can easily be seen as the next logical step for the development of the quality culture of the LEGO Group. The LEGO Group was the main sponsor and took part in the first QMOD conference in 1997 in China. Since then we have had many practical experiences – good and bad. Now the LEGO Group returns to QMOD/ICQSS2009 to share its insights and to look for new inspiration.

The LEGO Group has decided to develop its quality management system in an approach where continued understanding of its own true reality and potential is paramount. External systems or concepts are used as inspiration only – never as a rule book.

Besides self confidence, an internally driven approach requires considerable skills in interpreting “the reality”. It also requires an agile and disciplined attitude towards implementation. Both of these have and will continue to require a continued development of the quality culture of the LEGO Group. The success of the project New QMS has moved this development considerably forward.

This development is and will continue to be based on the LEGO Group's historical success in product quality and in the LEGO Group's competence in developing human beings. We will build on our strong LEGO DNA. We do not fully understand this DNA yet, but it certainly includes “Only the best is good enough” and our hatred towards scamped work. We train ourselves from a very basic viewpoint: Minimize the filters and face the realities as they are. It seems simple – but in a modern world loaded with information and concepts it is not.

The LEGO Group perceives ISO 9000, TQM, EFQM and other quality management philosophies and standards as filters. Quite often we experience that external auditors, assessors and controllers only read the skin realities seen through the glasses of a particular concept or standard – they do not see the real realities. And the practical implications are enormous. You can see nice written instructions and get a “no deviation” – but what if the instructions are ridiculous and you were lucky that no one ever followed them? Or you can see truly committed people who know exactly what they are doing and who for decades have strived for perfection being punished by the external audit for missing a piece of paper.

At the LEGO Group the right attitude is always favoured over the right systems. We employ an offensive quality approach in which there is a continued strive for better and better quality. There is no point in the defensive quality approach where it is all about minimizing the risks and liability. We have no respect for statements like: “It was not my fault – I followed the rules and used the systems.”

We live in a complex modern world – but we believe that a lot of things have not changed for thousands of years: In the best organizations small teams face realities together and improve them using their intellects and tools.

We have decided to play, learn and move forward – without fear and without great shiny models. Just as shown with project New QMS – and as expressed by the five questions and the five related exercises.

As stated by CEO Jørgen Vig Knudstorp: “Many leaders mistakenly believe they can think themselves into a new way of acting. But it is the other way around. You have to act yourself into a new way of thinking”.

To grasp our idea and thinking you could perhaps give it a new, clarifying label: “Quality by Heart”. Through our culture and the LEGO DNA we know instinctively what is and what is not good quality. Years and years of experience allow us to continuously smell problems or even potential problems at long distance. A classic LEGO story is about the operator who



refuses to start the moulding machine because he feels something is wrong with the raw material. Hours and lots of lost production later the engineers agree and reject the raw material.

This is the kind of story about tacit knowledge and instinct based wisdom that is being told again and again showing decades of learning and reflection. The employees at LEGO stay for many years – the turnover rate for employee is clearly below average. Employee satisfaction surveys again and again document that people like the high quality requirements and expectations in a relaxed but serious atmosphere. Very often I hear: “In our company we must...” I never hear: “I am glad it is not my company”.

We will work from a profound understanding of the realities to improve on them. We will look at the defined methods, people’s behaviour, products etc. to improve them. Not sterile perfection – but for continuous quality improvement. Not only do we accept variation – we like it as long as it reflects independent thinking. It is considered a source for study and reflection – and for understanding and standardization, when appropriate.

The LEGO Group is in many ways a lucky and happy enterprise. It is owned by a patient family with deep veneration for quality, for children and for the society – with reasonable but moderate requirements for profit. As management we have the obligation to administrate this privilege to the benefit of our stakeholders, i.e. owners, customers, society and employees.

The LEGO Group is continuously faced with explicit external requirements from governments and implicit expectations from quality management theoreticians and their disciples such as many auditors, assessors and bright young minds who have just left your universities, business and engineering schools.

One of the labels that most often get attached to a theoretical approach is: “Too theoretical”. The statement is often put forward by those who have to comply with the theory for one reason or another. The problem is that it offends people when you try to reduce what they perceive as a complex reality to something that fits a limited number of boxes in a diagram. The dilemma is that for a theory to hold any merit it has to be applicable in general whereas for a theory to be practically useful it needs a fair amount of tailoring.

That is why there is a big need for people who can bridge the often very wide gap between theory and practice. Think of it as a never-ending 4×100 meter relay race. The first 100 meters are run by those who reflect on reality and the next 100 by those who put forward a theory that explains the reflections. The problem arises on the third of the four relays. There is simply no one there to pass the baton from the theoreticians on the second relay to the practitioners waiting on the fourth relay.

It helps to think of the person(s) who would be running the third relay as a mix between a tailor and a coach: Someone who understands the theory well enough to adjust it to fit the specific circumstances in the situation at hand and, at the same time guide the practitioners through the process of turning theory into useful practice.

As a quality professional, I have to admit that many of us practitioners have an important problem to fight as well. Very often I experience that quality professionals are obsessed with quality systems, quality management thinking and talking, writing and coordination with their quality professional colleagues. We like to impress our colleagues. Instead we should ask ourselves if an end user or customer would pay for what we are doing. If the answer is no then stop it immediately. Every activity has to be beneficial for the operation as well as the business.

It is plain to see, that the LEGO Group does not believe in elitist thinking. We believe in real life experiences and the derived reflection and learning. Subsequently there is a continued



effort to limit the influence of external systems and concepts. Only truly new ideas and fresh thinking get access to the LEGO Group and only when they fit to our realities.

Looking at the world through the glasses of the LEGO Group, the recommendation to the academic quality community is clear: Teach students both the self confidence that a theoretical approach gives and the humbleness that a practical understanding enforces. Teach them to read and interact with the real world. It is sometimes very complex and scaring but very often beautiful, organic and full of opportunities.

