

# Use of and experience with the A3-method in student education

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## Abstract

*The A3-method is developed at Toyota to structure improvement projects, enhance communication and develop the employees as better problem solvers. With the spread of Toyota's continuous improvement philosophy, the learning of the A3-method in higher education becomes more important.*

*Purpose of this paper is to explain how the A3-problem solving method is taught at the HAN University of applied science and, subsequently, how this method is appreciated by the students in their company assignments. We did a survey to gain the experience of the students with the A3-method. Eighty-nine (89) students participated in this survey. Isao Yoshino (a 40-year Toyota leader) was so kind to comment on the results of this survey.*

*Most of the students especially appreciated the structure of the A3-problem solving method helping them to systematically describe, analyze and solve problems and force them to think deeper. Many students also stressed the value of the A3-method in the communication with the stakeholders (company and university). The limited space of an A3 forced them to be concise and helped them to create a clear story of their project.*

*The limited space is also one of the problems experienced by students. It is time-consuming and difficult to select, sort and organize the information needed for a coherent A3. This is one of the main learning points for the students. By using the A3-method, they learn to develop a good improvement story. The background, implementation and follow up are the elements of the A3 that 63% of the students found most difficult to deal with. These are the elements where the project is connected to the company strategy (background) and where the company's ability to change plays an important role (implementation, follow up). In our observation, the difficulty of the students with these elements is only to a limited extent caused by the inexperience of the students with the A3-method. A major reason lies at the companies where improvement projects done by students are not embedded in a larger improvement structure.*

*In general, we can conclude that the A3-method helps students to become good problem solvers, and makes them able to communicate about their project with all stakeholders. The A3-method however requires training. Dry swimming in a teaching context is prerequisite for students to perform a successful company project. One of the comments of Isao Yoshino summarizes it best: "The limited space of an A3 is a great opportunity to learn how to distinguish necessary and unnecessary things. It is good that students get training. The more experience, the better people apply A3."*

**Keywords: A3-method, continuous improvement, teaching and learning.**

## 1. Introduction

The A3-method is a structured problem-solving method, introduced by Toyota. The method supports a structured approach of improvement projects. The elements of the A3-method as well as the visualization of findings during the improvement project are helpful in streamlining the project activities and the communication about intermediate findings during the project. The A3-method is described by several authors (i.e. Shook (2008), Sobek and Smalley (2008), Liker (2004), and Liker and Meier (2006).

In *Managing to Learn* John Shook describes A3 as a powerful tool that supports communication and leads to effective countermeasures based on facts. Moreover, he sees the A3 as a management process that produces organizational learning and hence gain a broader and deeper form of thinking. A3 works as both a problem-solving tool and as a structured process for creating problem-solvers. (Shook 2010).

In our bachelor semester course “Minor World Class Performance” at the HAN University of Applied Science (minor WCP) we introduced the A3-method seven years ago. The students use the A3-method in an extensive case study exercise and in a company project. Our aims are (1) to train students in structured problem-solving, (2) to improve the communication of the students with their tutor and company supervisor, and (3) to stimulate the learning attitude of the students. Hence making them better problem-solvers.

The difficulties and successes of the use of the A3-method in educational situations is only limited described in literature. Anderson (2011) described the results of a short survey among 22 students who used A3-reporting in a case analysis. The survey showed that most students were satisfied with using the A3-report and needed the same time or less to prepare the A3-report, compared with traditional reporting. The key features of A3-reporting, appreciated by these students, were the need to be concise and the encouragement for collaboration (Anderson 2011). Encountered difficulties were not questioned. Our study is more extensive and concerns the use of the A3 problem-solving method by 89 students who followed the Minor World Class Performance (WCP), a semester devoted to the Lean philosophy and methods.

In section 2 of this paper, we give a concise summarize of the key elements of the A3-method. Section 3 describes the way we integrated the A3-method in the teaching program and the didactics of our minor WCP. This explains the background of the students that are questioned in the conducted survey. Section 4 explains the methodology of our study. Section 5 presents the results of the survey. This gives insight is strength and weaknesses of the A3-method as it is used in company projects by the students. We discuss and summarize our study in section 6. In an appendix, Isao Yosino, 40 years manager at Toyota, comments on the use of the A3 method of our students.

## 2. A3-method

The A3-method developed by Toyota follows a structured approach to problem solving. Improvement teams that use the method have to put key findings, gained during the project execution, in a A3-format paper. The A3 stimulates the discussion with all stakeholders in the projects and keeps the noses in the same direction. The structure of the A3 is based on the Plan-Do-Check-Act (PDCA) cycle and its elements have a fixed sequence. Figure 1 presents the elements in the A3. On the internet, there are many templates of A3 available. These templates may differ slightly.

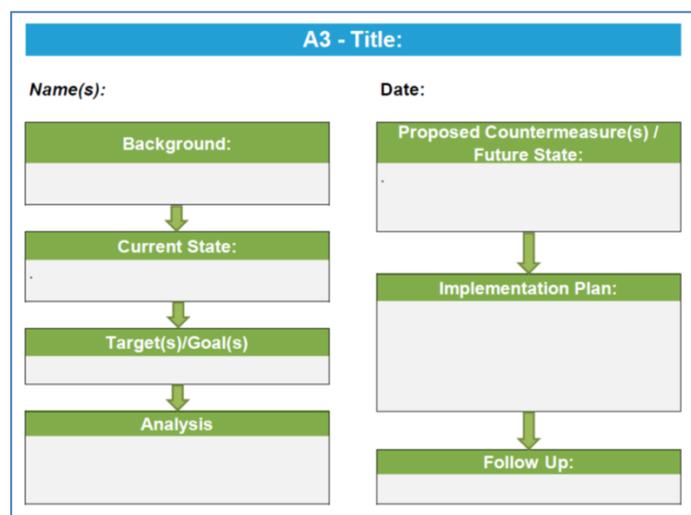


Figure 1: Structure of problem solving A3

The sequence in the A3 forces a desired logical way of thinking when developing and implementing improvements. An improvement project, however, is usually not straightforward. During the process, insights will develop which may lead to changes in all elements of the A3. Iterations are needed to create a final A3.

Therefore, a project team will usually develop several versions of the A3 during the project. Each version of the A3 is a timely source of information and discussion for stakeholders.

We will briefly explain the elements of the A3-method and how it is positioned on the A3. First of all, *the title* of the project is at the top of the A3. This makes it clear what the A3-project aims for: what performance problem is being addressed, what does the project want to achieve? Reduction of waiting times by 50%? No more complaints from customers about accessibility? Etc. The title should be appealing for the stakeholders of the project. The A3 also gives *the names* of the team members responsible for the A3 and *the date* of the A3. A next version of the A3 gets another date. The first basic element in the A3-method is *the background* of the project. *The background* makes clear what the business reason is to start the A3-project. How serious is the problem? Who are the problem owners? Who are not sleeping because of the problem? What is the current performance that need to be improved? What is it worth to improve the performance? Which process deserves key attention? Making the background clear, and validating opinions about the background, often requires a lot of research. It is, however, an essential part of the A3. It is the backbone of the motivation to work on the project. It determines the focus of the project team. The performance indicators described in the background will later also be used to assess whether the implemented measures have had the desired effect. The next element of the A3-method, *the current state*, concerns a description of the current way of working responsible for the problematic performance. In many cases, the current state can be made visible in a Value Stream Map, a process scheme, which shows the material flow and planning & control activities. A precise description of the value stream and a quantification of all elements are important for specifying the problems which need further attention. In case of too long throughput times of jobs (= background motivation), for instance, the queuing time before a particular machine may ask for further investigation. Understanding the current state, the project team may specify *the target(s)*, *the goal(s)* of the project. Here, the main goal of the project, mentioned in the background, is made more specific so that it may guide project members. It helps to find indicators to measure the success of the project or parts of the project. The next element in the project is *analysis*. What are the root causes of the problems detected in the current state? There are several tools to find root causes. An important tool is 'why-why analysis' (or 'the 5 Whys'), were we search for constraints which prevents us from realizing our goal in the current state. An example of constraints for long queuing times may be the high utilization of the machine and, related to this, the amount of time needed for change-overs. Root causes are be addressed in *the proposed countermeasure(s)*. Possible countermeasures for the high utilization of a machine, for instance, may be the purchase of additional machines and/or the reduction of changeover times. The SMED method can be applied to develop a new way of working at a machine so that less setup time is needed. Countermeasures need to be integrated in the *future state*. This is the future way of working in which the targets are accomplished. Developing the future state and specifying countermeasures require creativity and, many times, also experimentation to test an idea. There are several guidelines and methods, based upon the Lean philosophy, that help to develop a future state. It is important to understand that more alternative future states may be possible and to specify more than one option. The various consequences of each alternative future state, including the extent in which desired targets will be realized, need investigation. Selection of an alternative requires usually multi-criteria decision making. An *implementation plan* is needed to specify the sequence of activities needed for realizing a future state, including the responsible employees. Also expected intermediate results need to be listed in the implementation plan. It may be possible to focus the implementation plan on one particular future state. It may also be possible to use intermediate results of implementation actions to reduce the number of alternative future states. This is especially important if there is uncertainty about the effect of elements in future state. Creating an implementation plan requires insight in the dependencies between the required activities. Finally, the A3-method asks attention for *follow-up* activities. How and when are results measured, how does the project fit into the larger picture and what is a follow-up project? How to discover unintended consequences? The follow-up activities take care of ongoing PDCA.

### 3. Teaching and learning A3-thinking at HAN University of Applied Sciences

The A3-method is taught during the Minor World Class Performance at the HAN University of Applied Science. A minor is a half year course in the last year of the bachelor programs. Students are free to choose a minor of their own interest. The Minor WCP is followed every year by 120 students from more than 20 different fields of study. The students are trained in the theory and application of the Lean Philosophy. Our aim is to educate the students to become Lean problem solvers.

To become Lean problem solvers, the A3-method is the common thread in all elements of our teaching as well as minor program. During the 20-week program (6 weeks at the HAN and 14 weeks in a company) students are taught to use the A3 more and more independently. This is done in three steps. Figure 2 shows the steps within the minor WCP.

	STEP 1	STEP 2	STEP 3
	6 weeks at the HAN University of Applied Science		14 weeks at a partner company of the HAN
	Week 1	Week 2 .. 6	Week 7 .. 20
Topic	Lean introduction with Lean Game	Education in Lean Philosophy theory and the application on a case in teams of six students	Lean improvement project in a company in teams of two students.
Didactics	A3 used together with tutor during Lean Game playing rounds.	Theory is taught in order of and linked to A3-elements.  Students use A3 in their case assignment. The tutor learns the students how to give valuable feedback on their own A3.	Students use A3 in their company assignment projects and use the A3 as communication with the employees and their tutor.  Studentduo's review the A3's of an other duo and give each other feedback supplemented by the tutor when necessary.

Figure 2: Structure of the minor World Class Performance using the A3-method.

**Step 1:** In the first week of the minor, students play a Lean game in four rounds. After every round they get the opportunity to improve the process and try out the new situation in a new round. The A3 is explained by the game tutor and simple A3-versions are created together with the students.

**Step 2:** After the introduction week, students are further educated in Lean thinking and the A3-method, during a five-week period. This period is divided in two parallel tracks. In the *theory track*, students learn major Lean concepts and methods. The *application track* consists of an extensive case assignment in which students use information and data from a real case. We expect students to use Lean concepts and methods. Students work together on the case in teams of six persons. During the application track student teams must follow the A3-method and use A3 for reporting about their progress. The application track consists of working sessions as well as a few A3 feedback sessions. Feedback is coming from colleague student teams and is complemented by the tutor only when necessary. A peer review form, consisting of key assessment criteria for the elements of the A3-methods, supports student teams to give valuable feedback. The tutor helps them to give valuable feedback. During the application track students are asked to keep a portfolio in which they briefly describe the PDCA-circles performed in their A3-project. Purpose of this is that students learn to focus on the problem-solving process instead of only the result of the project.

**Step 3:** After the six-weeks at the university, students are assigned for 14 weeks to Lean improvement projects at partner companies of the HAN Lean-QRM Center. These partner companies embrace the Lean philosophy and already have some experience with Lean projects. This assures a good learning environment for the students. We suggest companies to assign the students to issues which really matter and for which they can use support. During the internship students report to the HAN-tutor as well as to the company supervisor. In the 14-weeks period the HAN-tutor visits the company twice. Once in the beginning to discuss the right scope of the student project and once at the end for the assessment. In between the students come back to the HAN three times for feedback. This feedback sessions are structured in the same way as is described for the application-track in the first six weeks of the minor. Feedback is now mainly given by colleague-students only supplemented by the tutor when necessary.

During the minor period, student gain more and more experience in problem-solving. The role of the tutor is changing from teaching to coaching to supporting.

#### 4. Methodology

The purpose of the research was to measure the effectiveness of the usage of the A3-method by identifying the difficulties and success of the use of the A3-method by students in industrial settings. In the previous section we explained the teaching and learning practice of the A3-method in the Minor World Class Performance at the HAN University of Applied Sciences. This makes clear what the starting situation is of students doing improvement projects at companies. Next, we will explain the survey we did among the students that participated in the minor. The survey identifies the difficulties and successes of using the A3-method by students in the industrial settings. Using this methodology, we gain evidence for the effectiveness of the A3-method as a tool that supports the students in becoming better problem solvers in practice.

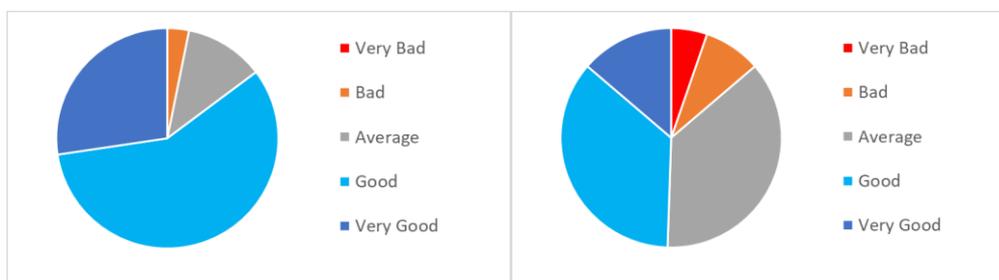
During two academic years 2016 and 2017, we conducted a survey among 112 students of the minor World Class Performance at the HAN University of Applied Science. In this survey we asked the students about their appreciation of the A3-method. We were interested in the strengths and weaknesses of the A3-method, as experienced by the student. We also asked students which elements in the A3-method were most difficult for them and why. Furthermore, we were interested to what extent the organizational environment played an important role in the use of the A3-method.

The survey consisted of 13 questions divided in two groups. One set of eight questions to get the opinion of the student about the usage of the A3-method and one set of 5 questions to get input about the degree of experience of the partner company with the Lean philosophy and the A3-method and the complexity of the project environment (number of stakeholders and departments involved in the project). The questions consisted of 5-point Likert scale questions and open text field questions. The survey was performed online. The response rate was 79% (89 of the 112 students responded).

Statistical tests (Chi-square and Yule’s Q) were performed to determine whether the appreciation of the A3-method by the students is dependent on the experience of the company with Lean and the A3-method.

#### 5. Survey results

The survey among students who finished their minor project in industry illustrates how they appreciated the use of the A3-method, see Figure 3(a). The majority (85%) of the student answered good (58%) or even very good (27%) on the question “how to you appreciate working with the A3-method after you finished the project?”. We also asked how they appreciated the A3-method as a support for communication, see Figure 3(b). About 50% answered the question with ‘good’ or even ‘very good’.



(a) appreciation in general

(b) appreciation as communication tool

Figure 3: Appreciation of A3 by students (96 students) who finished projects in industry

We asked the students to concisely explain the main reason for their general appreciation of the A3-method. Basically, two different types of reasons were mentioned. First, most students appreciated the structure of the A3-method. Some of their comments were:

Table 1: Comments of students about the power of the A3 method in general

<i>"Pleasant guide in finding out the core problem and the steps to be followed".</i>
<i>"Structure and clarity. Gives a good idea of how far you are in the project".</i>
<i>"Hold on to step-by-step research project and mandatory come to the core".</i>
<i>"It helps in getting a good line in the story. Consistency".</i>
<i>"An A3 has a limited space, the space that is available is just enough to use for the core and the core alone. It helps to keep focused".</i>
<i>"It brings structure in the project".</i>
<i>"You have a guideline for your research that you step by step to the result"</i>
<i>"Making progress in small steps and working with a living document. With this method you really saw the progression of your own work and that of others".</i>
<i>"The A3 provided a constant overview of the project status. The A3 also requires the completion of the steps during the project".</i>

It is interesting to note that these students appreciated the challenges of a systematic, step-by-step, execution of their project and the necessity to be concise. This helped them to keep focused and to bring a good line in their project activities. A reasonable number of students (50%) stressed the power of the A3 method to support communication:

Table 2: Comments of students about the power of the A3 method to support communication

<i>"The A3 supported the meetings with employees and management. It helped us to keep focus and it structured the meetings".</i>
<i>"The biggest advantage I found was that you could quickly and clearly explain to your company supervisors what you were doing and what the outcomes were".</i>
<i>"That you can briefly and concisely explain your project at a meeting without the listeners having to read a whole report".</i>
<i>"A clear means of communication and it ensures that the work is structured in a structured manner. It is easier to maintain consistency (compared to text documents only)"</i>
<i>"The A3 stimulates to talk about the project. Reason for discussion which leads to next steps, works really well!"</i>
<i>"Keeping overview and communication".</i>
<i>"It makes it easy to explain the project. This way different disciplines understand what is going on, it is easy to see in the A3".</i>
<i>"For the parties involved, it briefly indicated what was going on. The limited space was also pleasant because you had to make choices".</i>
<i>"Continuously think about what you put on the A3. It gives a clear story to your stakeholders.</i>

As can be noted: the structure of the A3-method was important for supporting communication. Some of the students mentioned some debatable advantages of the A3 method, such as *"This way you get an overall picture of the assignment"*, *"it is not needed anymore to write a large report"* and *"the structure helps to summarize my portfolio"*. It has to be said that these latter students did not give the A3-method a high appreciation. For them, the A3 was just a summarizing tool.

We also asked students to indicate briefly what the main weakness was of working with A3 in their situation. Several students couldn't mention a weakness. Most of the students mentioned the limited writing space on an A3 which asks a lot of thinking effort. There was a continuous desire to tell more. Few students mentioned that *"the limited space on the A3 is both a weakness and a strength because it also helps you to focus"*. Some other students mentioned that making a good A3 is time-consuming. It is difficult to select, summarize and

limit the amount of valuable information. One of the students said that *“the A3 can quickly become vague”*. Some students experienced the coherence of the elements in an A3 as a weakness: *“if you adjust something, it works through the other parts of the a3”*. These students experience this as frustrating. Few students thought that there was too much overlap between the elements of the A3. For them, it was not clear if something has to be mentioned in the background, the current state or the analysis. This gave discussions in the team and with the university coach. One student mentioned that *“your creativity gets limited because of the strict structure of the A3-method”*. Few students did have problems with the A3 as a support for communication: *“It is not possible to explain everything clearly by means of an A3, especially if people do not know the structure of the A3”*. Another student noted that *“it was not clear in the company how and when to communicate with the, continuously changing, A3”*.

Next, we asked students what the most difficult element was for them in the A3-method and to explain this. Figure 4 shows the division over the elements. 3 gives an overview of some relevant comments of the students on each element of the A3-method.

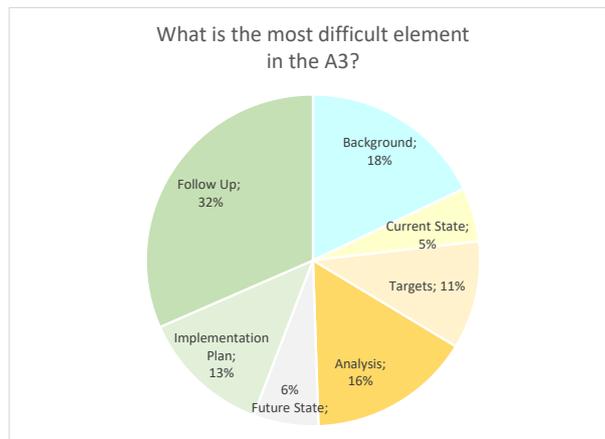


Figure 4: Elements of the A3 that are considered most difficult.

Students stressed the importance of a good start of the project and a precise description of the background of the project. It is interesting that this was the most difficult issue in several student projects. A substantial number of students (18%) mentioned that it was hard for them to precisely *specify the background*. Note that this does not mean that it was easy for the other students! 32% of the students said that *describing the current state* (5%), *setting goal(s)/targets* (11%) or *doing analysis* (16%) was most difficult. Several of the comments made on these elements indicate the absence of a precisely specified background. 45% of the students found *describing the implementation* (13%) and *giving a follow-up* (32%) the most difficult elements of the A3-method. The main comments on these elements indicate that real implementation of the findings of the student may be far away in the companies where they did their project.

Table 3: Comments of students on the applying the elements within the A3-method

Background	<ul style="list-style-type: none"> <li>• It took a long time to make the problem clear and tangible. We needed several iterations.</li> <li>• It was difficult to link the internal problem to customer value.</li> <li>• We needed more information in the background than expected beforehand. With a clear background, the remaining part of the A3-method becomes easier.</li> <li>• You need to be smart to get useful information. It is important to do this at the beginning of the project, but at that time we knew only little about the company.</li> <li>• A good description of the background, is key for getting consistency in the whole A3. It has to be formulated precise, which is a challenge.</li> </ul>
Current State	<ul style="list-style-type: none"> <li>• In my view, the most difficult phase is the current situation, especially to determine which analyzes are and which are not relevant and when you have charted enough to be able to continue.</li> <li>• It is difficult to determine what exactly should be in the current situation. Sometimes things happen in the background or analysis which asks for other information in the current state.</li> </ul>
Target(s)/Goal(s)	<ul style="list-style-type: none"> <li>• Difficult because you have not yet done any analysis, so you do not know what the key problem is for which targets have to be set.</li> <li>• It is difficult to make SMART targets.</li> </ul>

	<ul style="list-style-type: none"> <li>• Goals changed constantly in our project (also has to do with our assignment).</li> <li>• It was hard to specify the boundaries of the project and to find suitable objectives.</li> <li>• It was difficult to agree about the targets with the company manager.</li> <li>• We found it difficult to align the goals in our project with the strategy of the company.</li> </ul>
Analysis	<ul style="list-style-type: none"> <li>• During the analysis phase I came across a lot of information. It was hard to keep it concise and summarize it.</li> <li>• Integrating all the problem issues was pretty difficult. In the end, we did not reach the real root causes.</li> <li>• Figuring out root causes is not easy, especially when it is difficult to get information.</li> <li>• The solution for the project was clear at an early stage. Afterwards analyzing was difficult.</li> <li>• Analysis is subjective, it can be done in different ways.</li> </ul>
Proposed counter measures / future state	<ul style="list-style-type: none"> <li>• Drawing conclusions from the analysis and translating this to a future state was difficult.</li> <li>• We found it difficult to find different alternatives.</li> <li>• Finding the right solution which fits the interests of all stakeholders is difficult.</li> </ul>
Implementation Plan	<ul style="list-style-type: none"> <li>• If the future state is just a proposal, and implementation is not discussed yet, than it is hard to discuss about the required time for implementation activities.</li> <li>• Project was actually too big for the time frame of our assignment. Making a good implementation plan asks a lot of coordination with people from the company.</li> </ul>
Follow-up	<ul style="list-style-type: none"> <li>• How to assure that the activities will be done?</li> <li>• To integrate change management issues was difficult.</li> <li>• Change management is difficult and it is not easy to convince people that things have to be done.</li> <li>• It is difficult to implement measures which ensure that the company continues with the project. It should be avoided that the project result will be on the shelf.</li> <li>• Long-term changes cannot easily be implemented, so it is difficult to indicate how that can be safeguarded in the future.</li> <li>• We learned only one form of assurance during the lessons, namely the performance board. I am curious if there are more forms of assurance.</li> <li>• It is important. Good to understand this already in the initial phase of the project. In retrospect, I wanted to have more focus on this.</li> </ul>

Glancing through all the comments of the students, and knowing all companies, we think that many companies do not have a clear focus, their organizations are sometimes complex, and they have limited amount of useful information available. This complicates the execution of good A3-projects.

We checked to what extent the knowledge and experience with the Lean philosophy and A3-method of the company supervisor played a role in the appreciation by the student of the A3-method and the use of it as communication tool. We found no dependencies. Table 4 shows the six hypothesis that were tested and were maintained after testing.

*Table 4: Hypotheses that were tested on the appreciation of the A3-method by the students and the experience of company supervisor.*

1	<i>The appreciation of the use of the A3 by students is independent of the knowledge of the company supervisor of the Lean/QRM philosophy</i>
2	<i>The appreciation of the use of the A3 by students is independent of the knowledge of the company supervisor of the A3-method</i>
3	<i>The appreciation of the use of the A3 by students is independent of the importance of the project for the company supervisor</i>
4	<i>The use of the A3 as communication tool by the students is independent of the knowledge of the company supervisor of the Lean/QRM philosophy</i>
5	<i>The use of the A3 as communication tool by the students is independent of the knowledge of the company supervisor of the A3-method</i>
6	<i>The use of the A3 as communication tool by the students is independent of the importance of the project for the company supervisor</i>

We conclude that the appreciation of the A3-method as problem solving method and as communication tool depends mainly on the students themselves. It is not dependent on the experience of the company supervisor or the importance of the project for the company supervisor.

## 6. Discussion and conclusion

This paper concerns the embedding of teaching the A3 problem-solving method in the curriculum of higher education to develop students as problem solvers. We investigated how students appreciated the A3 method by using it in industry projects. In order to support our conclusions, we asked Isao Yoshino (40 year manager at Toyota, to comment on the use of the A3-method by students. We included his comments as an appendix to this paper.

The A3-method is appreciated by most of the students. It helps them to keep the right focus in their project. It gives structure. Furthermore, a substantial number of students especially appreciated the power of the A3-method in the communication with all stakeholders in their company project.

Many comments of the students about the weaknesses of the A3-method illustrate that training is needed to work effectively with the A3-method. Many of the weaknesses mentioned by the students show a lack of experience. It is not easy to cope with the space limitations of A3. In the appendix of this paper, Isao Yoshino stresses the importance for students, and employees of companies, to learn A3-thinking and to use 5S principles to cope with space limitations. He stresses that the importance of using the A3 to communicate with others and, especially, for getting advice from supervisors.

The survey among students shows that they especially struggle with the context, implementation and follow up part of the A3. In our observation, this is only to a limited extent caused by the inexperience of the students with the A3-method. A major reason lies at the companies where improvement projects done by students are not embedded in a larger improvement structure.

Isao Yoshino mentions the link between A3 and Hoshin Kanri, see Appendix. A3 is a powerful tool to be used in the necessary communication about improvements in the organizations. It helps to align the improvement activities in the organization. Using the A3-method in organizations without Hoshin Kanri will likely call for more vision and focus in an organization. Students, and other users of the A3-method, will ask about the context of an improvement project.

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## **Appendix: Comments of Isao Yoshino on the use of A3 by students and in companies**

*Isao Yoshino is a 40-year Toyota leader (14 years of which was in the U.S.) and a former NUMMI training manager based at Toyota HQ in Japan. In 1979 and 1980, he was in charge of the Manager Development Program (“Kan-Pro” in Japanese) for all the managers at Toyota headquarters. In 1983, he was assigned to the manager of a newly established training section for NUMMI’s shop floor leaders. During this time, he hired John Shook and other staff members from within Japan to develop a hands-on training program for American shop floor group & team leaders who travelled from Fremont, California to Toyota City to learn the Toyota Production System. In June 1984, Yoshino and his team started training American shop floor leaders for three weeks at Toyota’s plant. Yoshino has held management roles at Toyota in research, human resources, corporate planning and production control, and manufacturing. He retired from Toyota in 2006. Yoshino is currently a lecturer at the Nagoya Gakuin University and travels internationally to teach and speak about Toyota leadership, hoshin kanri and coaching.*

### **Students doing problem solving in companies**

It is a very good practice to put your students in an actual workplace and let them experience firsthand what happens in a company. They can learn what kind of thinking company people have in their positions each single day. Ten weeks is enough time for students to get to know what their future will be after graduation. It is also good to ask students to contribute to problem solving in companies. Your program is very practical. In Japan, we have internships, but not that widely. Companies are not comfortable to get students: “We have to train them....”. They don’t expect that students contribute to problem solving.

### **The use of A3 at Toyota**

A3 is already used for many years at Toyota. It started as a problem solving tool. Dr. Deming introduced PDCA at Toyota which gave more structure to the A3. People liked it so much. They extended it further for other purposes. It is now very common in Toyota.

A3 is also used for proposals and for status-update reports. A3 is a very useful tool to convey your idea or plan and to share it with others, so that everybody of the group is at the same page. It is a communication tool. It serves organizational learning in Toyota. It is an organization tool. I don’t think that PowerPoint can have the same impact.

### **Targets**

Sometimes targets should come after the analysis. But in general I agree with your sequence on figure 1. A target is what you want to attain. You have to set the target regardless of the analysis. It is a serious problem. If you set the target after the analysis, then you may get scared, and be too careful. The target depends on what you need, for instance zero defects, or what the current result is. The target is your challenge. Not realizing the target means that the problem is not completely solved yet. It may be the start of a new project.

I always search for the target in an A3. Without a target, your document is nothing. ‘Where is your target’ is often my first comment. You have to put it somewhere. Sometimes it is difficult to specify an indicator for the target. But that is no reason for not being clear about the target. You have to think about the target and an indicator. An indicator may not be perfect, but you have to select one. As long as the challenge is clear and measurable, it’s fine.

### **Don’t try to be perfect**

I don’t care if I am not perfect when I write A3. Everybody has its own opinion. It reflects your thinking. It is a good tool to show to your boss or subordinate. My advice, if you write something, put what is on your mind on paper. So simple as possible. Then you can improve. Don’t try to be perfect.

### **Development of people and the organization**

A3 is a very powerful tool to develop people. Without A3, only verbally, it is very difficult. Misunderstanding can happen. A boss can better give you advise, when you have an A3 in front of you. For groups it is even

more important. If you have ten people and they discuss the same A3, then they are focused to the same goal. I have been in meetings without A3, and the discussion went everywhere. With an A3 you can share your target. It strengthens the understanding of the own goal. It also helps to make faster decisions. All key points are on the A3 – everybody can see it.

### **Experience**

One of your students mentions that A3 limits creativity. Another student mentions the risk of becoming vague when you have to put everything in an A3. I understand their comments. They have to understand that A3 is just a tool. It is about 5S. If you are good in 5S, then you can sort out unnecessary information and arrange important things in your A3. It will focus creativity and it will avoid vagueness. Students also have to understand that you cannot handle everything. The limited space of an A3 is a great opportunity to learn how to distinguish necessary and unnecessary things. It is good that students get training. The more experience, the better people apply A3.

### **Focus on process instead of results**

I enjoy it that students are not always happy with the results in their A3. They experience the need to know what is going on in the company. To recognize this is very important. New learning for them. Not succeeding is ok, so long they know that they have to work harder.

It is also good that they understand the difficulty of making an implementation plan. That always needs coordination. Very good that they experience this. Coordination is so important.

Of course, the result is important, but to get it you have to do the processes. It is not good to focus too much on the results. Students and coaches should focus on the process, how to attain the goal. Important questions for coaches are: what kind of process is important, how can you do that, what are you thinking?

### **Easy way of thinking about A3**

The elements of A3 are important for problem solving, but I like an easy way of thinking about A3. If managers or university coaches take the elements of A3 too serious, then students will not use A3 too openly. It is good that students try. Coaches have to give them trust. Then the A3 will gradually improve.

### **Hoshin and A3**

Yes, there is a link between Hoshin and A3. Hoshin is the way to come to shared goals, action plans and timing. A3 is a tool to show hoshin, to communicate about it. At Toyota, we periodically review A3s. A3 is a very important tool to check if Hoshin works well.

A3 is not an order of the management. Sometimes it comes from a subordinate, they know everything. Managers do not know everything. So, subordinates may start with an A3. They may expect that the manager gives a good advice. A perfect A3 is not needed. It may just be memo to review.