The Affinity-Interrelationship Method AIM

A Problem Solving Tool for Analysing Qualitative Data

Inspired by the Shiba "Step by Step" Approach

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Introduction

The problem solving tool presented in this document, the Affinity-Interrelationship Method (AIM), is based on a systematic use of two of the **7 management tools**: the **affinity diagram** and the **interrelationship diagraph**. It has been inspired by Professor Shoji Shiba's 19 step-by-step approach, which we have used both at our university and in many organizations during those 20 years since Professor Shiba introduced the approach and provided us with his tool in 1989. There are many student groups and company groups that have learned to use this approach to analyze complicated or complex problems. This practical use of the method has over the years resulted in some minor modification of the way to conduct the analysis and in the way we have introduced and described the different steps. We have through our experience found that in order to focus on the most essential, it is easier to communicate the main message if we only use 10 major steps, where some of the original 19 steps have been combined into main steps and some sub-steps have been omitted. We have also modified the way we scrutinize possible interrelationships and the subsequent visual layout of the analysis.

The basic ideas for this method were developed by professor Kawakita Jiro and in literature it is possible to find different variants of this basic method under the heading **KJ-method**. Professor Shiba introduced the method into the field of quality management and a major contribution was to develop a step-by-step approach to secure the quality of qualitative data (words and sentences) used as the basic building blocs in the method.

Below the steps to conduct an AIM analysis will be described step by step, with additional comments to facilitate the process in separate boxes. In this manual there will be detailed instructions concerning how to conduct the analysis, including concerning the number of participants, how to sit, how to formulate a starting question to analyse, how to write data, how many pieces of data to include, how to combine pieces of data, etc. These instructions are pragmatic recommendations based on a large amount of practical experience of using the AIM (and the earlier Shiba Steps to KJ) approach – it will result in an analysis that both will be deep enough and will be possible to conduct within a limited time period.

If the recommendations are not followed, e.g. by adding more team members, by adding more data pieces, etc. – the complexity will increase and the time to conduct the analysis will be considerably longer. However, depending on the specific purpose of the analysis this kind of deviations from the recommended process can be motivated, keeping in mind the added time requirements.

For first time users, it is strongly recommended to **keep to the detailed instructions** in order **to learn** to use the method in the most time-efficient and quality-effective way – based on experiences not only from Japan, but also from extensive use of the method(s) in Europe and in North America.

For a beginner group following the instructions it will take 3-4 hours to conduct an analysis. For an experienced group it takes 1-2 hours, following the instructions, and allowing some time to discuss the next step after the AIM-analysis.

Preparation of team and space

Team Leader and Team Members

One person is selected as AIM team leader. The team leader leads the team through each step of the analysis, provides the material needed for the analysis and facilitates the work for the other team members. The role of a team leader can also include the task of putting the right team together, depending on the specific issue that is being analysed.

The team members are persons who have deep knowledge about some aspects of the issues or problems being analysed. The number of team members participating can be between 4-8 (not more than 8) and a suitable number is six members.

The team leader can make the issue/theme to be analysed known in advance, so the team members will have time to prepare. For example, if the issue/theme is cross-departmental, then it could be a good idea that the individual AIM team member consults with some of his/her colleagues to get added input concerning the issue/theme before joining the analysis group.

The team leader can also bring the team together physically or in a telephone conference (or Skype meeting) to discuss the specific formulation of the question to analyze one week in advance. Regardless of approach chosen, the result is that the quality of the data input is improved because the team members have more time to think about the specific question as well as to collect data from their colleagues who will not be present at the AIM analysis.

Instructor

The AIM method can also be used by an inexperienced group lead by an instructor who facilitates the process.

Material to be used

First, there is a need of flip chart sheets (each analysis will require 4 sheets). Second, based on our experiences we have found it useful to put the other material used in a box with standardized content. The boxes we have used have had the following content (these boxes have not only been used for AIM analyses but are also suitable for other kinds of analysis when other sizes of post-its are more convenient)

Content of box
1 large black marker (e.g. Staedtler Whiteboard marker 351B or Penol 750, medium line permanent)
1 large blue marker
1 large red marker
1 large green marker
8 black OH-markers F (or M)
1 red OH-marker F (or M)

1 roll of masking-tape (19mm)
1 roll of clear tape (e.g. Scotch Magic Tape)
1 glue stick
1 eraser
1 pencil

2 yellow Post-its no.657 (76mmx102mm) - suitable for AIM-analysis acc. to Shiba
1 red Post-it no.655 (76mmx127mm) - headings 1 (AIM, etc.)
1 blue Post-it no.655 (76mmx127mm) - headings 2 (AIM, etc)
2 yellow Post-it no.654 (76mmx76mm) - suitable for Ishikawa diagram, etc.
4 yellow Post-it no.653 (38mmx51mm) - suitable of Ishikawa diagram, etc.

Avery stickers (dots diameter 8mm) - red, blue and green (AIM, etc.)

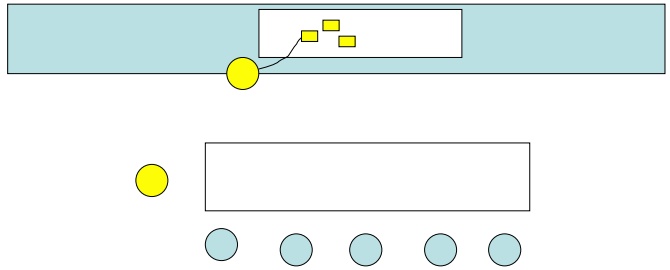
Room Design

Tape 4 flip charts on a wall in order to create a surface for an AIM-map. (if the flip charts are large size it can suffice with 2-3 flip charts instead of 4).

Put a table in front of the AIM-map - allowing the team leader to move behind the table in order to put post-its on the map, but close enough for the team members to read a sentence written on a post-it. Tape the flip charts together all along, in order to make it possible to fold the AIM map when the analysis is finished.

Organizing the space

•Group leader: step-by-step, easily move to use the board
•Visible: reading post-its from distance (full sentence max. 4 lines)



The 10 steps approach

The AIM-method consists of 10 main steps, which include formulation of a starting question, individual data generation, a process for developing a shared understanding of the meaning of data input, and group processes for organizing, structuring and prioritizing the data in order to provide a shared answer to the starting question.

10 steps

0. Prepararation of team and space
1. **Formulating question**
2. **Warm-up** - aligning
3. **Collecting data**
   i. Distribution of post-its
   ii. Recording the problem
4. **Clarifying the Meaning**
5. **Grouping** - affinity steps
   i. First level **grouping**
   ii. Check for omissions
6. **Higher level grouping**
   i. First level **titles**
   ii. Second level grouping and titles
   iii. Third level grouping and titles
7. **Show connections** - interrelationship step
   i. Preliminary layout for analyzing relationships
   ii. Add temporary arrows
8. **Final Layout**
   i. Outline first level groups
   ii. Outline 2nd/3rd level groups
   iii. Draw final arrows
9. **Evaluation**
   i. Voting
   ii. Highlighting the results
10. **Concluding**
    i. Summarize the analysis in one sentence
    ii. Pasting – permanent map

The 10 steps can be seen as four major stages, and if a group wants to go for a coffee break it is advisable to do this after having completed a stage.

STAGE I: IDENTIFYING THE ISSUE TO ANALYZE AND COLLECTING DATA (step 1-3)

STAGE II: SECURING QUALITY OF DATA AND 1ST LEVEL GROUPING (step 4-5)

STAGE III: HIGHER LEVELS OF ABSTRACTION (step 6-8)

STAGE IV: EVALUATION AND CONCLUSION (step 9-10)

STAGE I: IDENTIFYING THE ISSUE TO ANALYZE AND COLLECTING DATA

Step 1: Formulating the question

Write the question in the upper left part of the AIM-map (but decide upon the specific formulation before starting to write). *Use the large red marker.*

Write the question in this form:

- What was (is) the biggest problem in ..

The reason it can be an advantage using 'was' instead of 'is' in the question formulation is that it helps focusing on facts during the data collection.

The formulation of the question is a very essential step as it sets the scope for the analysis.

There is a need of considering how narrow or wide the formulation should be – and often it can be an advantage to test formulating some alternatives in order to agree upon the specific question to use for the analysis.

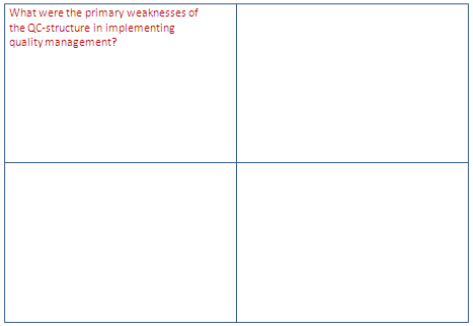
- **Narrow or wide alternatives**
  1. What were the main communication problems when working in a team? (too narrow?)
  2. What were the main problems when working in a team? (better starting point)
  3. What were the main problems working in product development? (too wide?)

For a first time group meeting the **question no. 1** may be too narrow as it is immediately focusing on communication problems, although other problems might be as serious. **Question no. 2** is a better starting point. However, if a previous analysis had pointed to that the main problem was "communication problems", then the question no.1 could be a good alternative for continued more focused analysis. **Question 3** could be an alternative, but it would not only include "working in a team", but also other issues that might occur in product development.

- **Only one aspect per question** – formulation such as the one below should be avoided
  - What were the advantages and disadvantages of …?

The alternative here would instead be to make two AIM analyses – one asking for the advantages and one asking for the disadvantages. (see also below – the use of AIM for evaluations)

Write the question in the upper left part of AIM-map. *Use the large red marker.*



- **When using AIM for evaluation** – use 2 AIM-maps, one for improvement areas and one for strengths (as it is also important to provide information on what was good and should be kept):
  - What were the main problems in the training course?
  - What were the main advantages in the training course?

Step 2: Warm-up

Spend 5 minutes for a warm-up. Each participant expresses what he/she thinks about the agreed upon theme/question. The rule is that the other participants are not allowed to criticize – only to listen during the warm-up.

In total 5 minutes means that for a group of 6 participants, each person gets 50 seconds to talk.

Step 3: Collecting data

Data is collected on yellow post-its. *Use the size no.657 (76mmx102mm).*
The leader distributes yellow post-its to the participants – the goal is to write between 19-24 post-its in total.

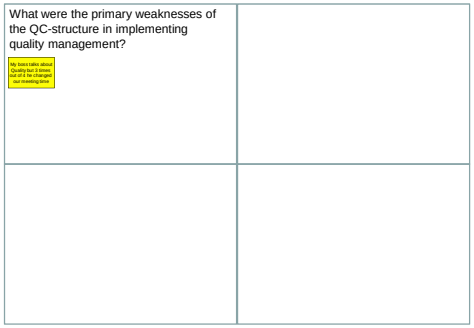
Each participant formulates answers to the question – only one issue/problem per post-it. The answer should be based on facts and as specific as possible: e.g. observations or own experiences. It is written as a full sentence – in maximum 4 lines on the post-it. *Use the small black marker.*

Post-it formulation

- **Facts** instead of opinions. Avoid inferences/opinions instead of facts. Write what you have experienced or what you really observed (not what you believe happened based on what you saw)
  - E.g. if you see your boss throwing papers from his desk up in the air…. You go to your fellow workers and tell: "Beware of going into the boss's office right now, he is very upset and mad". However, the only thing you really saw was that he was throwing his papers into the air and you don't really know why, and not if this was because he was mad.
- **Ladder of abstraction** – write on a more concrete level "than you feel is natural".
  1. I have trouble communicating with my boss
  2. I have very little time to meet with my boss
  3. I met with my boss for about 15 minutes last week, and only with other employees
  4. I asked my boss last week for specific direction about my project, but he said he had no time

  Level 3 or 4 would be the right level for AIM, while 1 and 2 are too abstract and closer to label level.
  - the method itself is a bottom-up process which builds up to more abstract statements (from post-its to labels)
  - asking why 5 times can assist in getting to real facts.
- **Multi-valued** instead of two-valued: e.g. use the temperature scale instead of just telling that it is cold or hot (it is 19^{o}C in the room vs. it is hot or cold depending on the individual's opinion). Other typical expressions that should be avoided are: bad/good, late/early.
- **Write a full sentence**, not questions or single words

When the post-it is written, hand it over to the leader who can put it up on the board. All written post-its are put on the left side of the board. Make the post-its visible for everyone so each participant can read the content of the ready-made post-its and can get inspiration from them.



This is a variant of brain-storming but instead of talking and getting an input where the most talkative have an advantage and the quiet persons remain quiet, this method is based on writing data ("brainwriting"). This writing approach secures that data is obtained from all participants, and by posting them one after the other on the board, one participant's post-it can stimulate the other participants in their formulation.

When you have 19-24 post-its on the board, the data collection is finished.

The result of steps 1-3 is data collected.

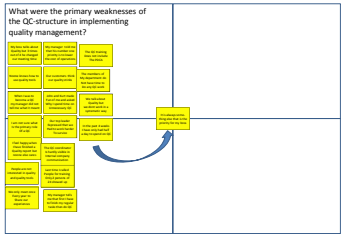
Finish-off stage ONE by standing up as a group and shout 'YO-ONE' and clap your hands once.

STAGE II: SECURING QUALITY OF DATA AND 1ST LEVEL GROUPING

4. Clarifying the Meaning

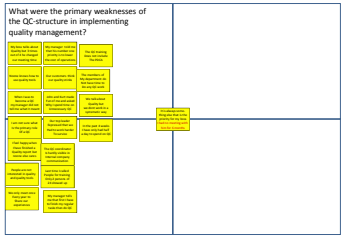
Clarifying Meaning is an absolutely essential step in AIM, otherwise there is a risk of ”rubbish-in rubbish-out”.

The leader takes a post-it from the left side of the board and moves it to the center. He then reads the content of the post-it and asks the author to explain what is meant. If the statement is clear for everyone the leader moves the post-it to the right side of the board. If it is not clear, the author is helped by the leader (and team) to clarify the statement until everyone understands.



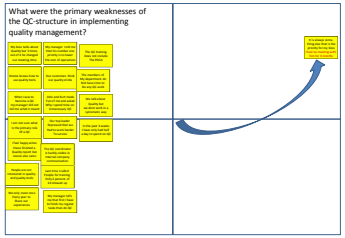
It is always some-thing else that is the priority for my boss

Participants are not allowed to argue with the author if the statement is right or wrong, only to help the author express his/her meaning as good as possible for the other participants to understand. One way of assisting is to ask: What did you think about when you wrote this post-it? or Can you exemplify what you mean? Improvements/corrections of the post-it should be added with a *red small marker*.

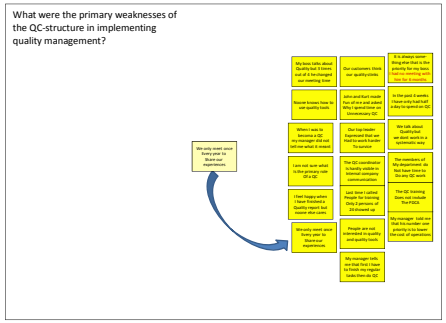


It is always some-thing else that is the priority for my boss
I had no meeting with him for 6 months

After the correction has been added the post-it is moved over to the right side of the board.



Then the leader takes a new post-it from the left side, moves it to the center of the board and the same process continues of making sure that every participant understands the meaning. When necessary corrections have been made the post-it is moved over to the right side.



This process continues until the quality of all post-its has been secured and there is a shared understanding of the meaning of all post-its among the participants in the AIM. When the process if finished all post-its are placed on the right side of board.

Step 5: Grouping

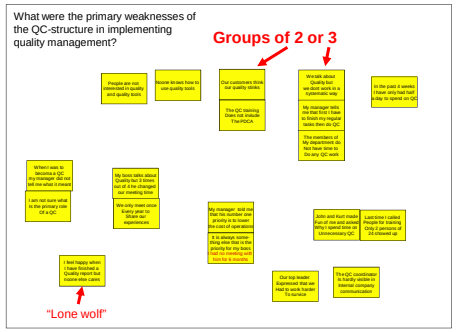
First the space is re-organized – the table is moved away to provide space for the whole group of participants to stand in front of the board.

This step organizes the post-its in groups based on the principle of “affinity”. This is done through a group process where everyone participates in finding which post-its belong together. This organizing is done without talking – each participant move the post-its together in groups based on his/her view of which belong together - then another participant might move the same post-it into a new position, and so on – this process continues until a shared view of the groupings has been reached, i.e. it is a consensus process.

1st level grouping

Put the yellow post-its together in groups based on that they have a similar meaning. The post-its should be grouped intuitively and Shiba advises the participants “to listen to what each label wants to say without any prejudice”. Specifically, the participants should avoid looking for logical connections or for apparent similarity between individual words or subjects across post-its.

The basic rule is never to put more than 3 post-its together in a group, i.e. it is possible to make groups of 2 or 3 post-its, or to leave individual post-its for later grouping.



Check for omissions

When the post-its have been grouped the team has an opportunity of adding a few post-its if they feel that something important is missing – e.g. something that has come up during grouping process.

The result of steps 4-5 is that the quality of data has been secured and the post-its have been grouped according to affinity.

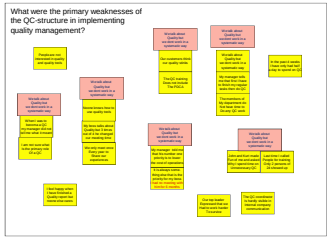
Finish-off stage TWO by standing up as a group and shout 'YO-ONE' and clap your hands once.

STAGE III: HIGHER LEVELS OF ABSTRACTION

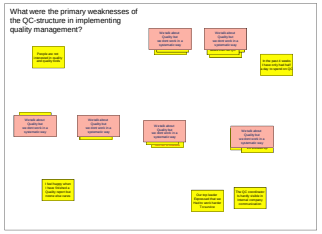
Step 6: Higher level grouping

Make Headings for 1st level grouping

Write a full sentence describing the content of the groups of 2 or 3 post-its. The heading should express the meaning of the post-its under it (one step up in abstraction level).
Use red/pink post-its for the 1st level headings.

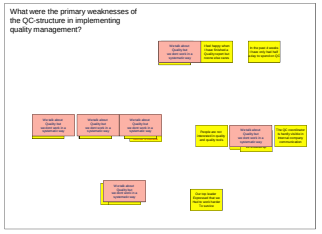


Put the yellow post-its behind headings (to prepare for 2nd level grouping)

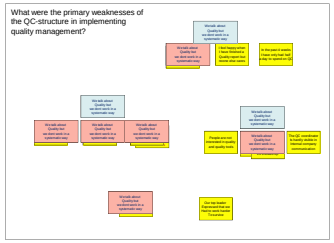


2nd Level Grouping

Continue grouping, this time you use both the headings and the remaining individual yellow post-its. The same rule as before that you can group 2 or 3 together (headings and/or post-its), never more than 3. And it is still OK to keep individual yellow post-its as "lone wolfs" if they don't naturally group together with other post-its or headings.



Next step is to write 2nd level headings. *Use blue post-its for 2nd level headings.*



3rd Level Grouping

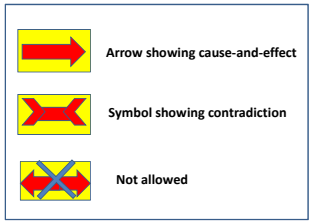
Continue grouping until you have 3-5 main groups (don't count the lone wolves). If you still have more than five groups (with 1st level and 2nd level headings), then you make a 3rd level grouping. However, mostly you reach 3-5 main groups already after the 2nd level grouping.

For the 3rd level grouping, follow the same procedure as before (this time you hide the groupings under the blue headings before you start grouping). *Use large yellow post-its around which you draw a red line for the 3rd level grouping.*

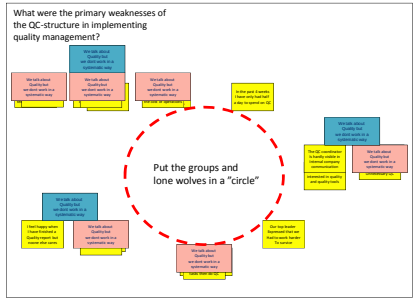
Step 7: Show connections

Prepare red arrows drawn on post-its to be used for the analysis of possible interrelationships. *Use the small yellow-post its (no. 653) and the large red marker to draw the arrow symbol.*

The arrows can only go in one direction, i.e. they indicate cause-and-effect. An arrow can never point in 2 directions. In some rare instances you can use the contradiction symbol, which indicates that two groups contradict each other.

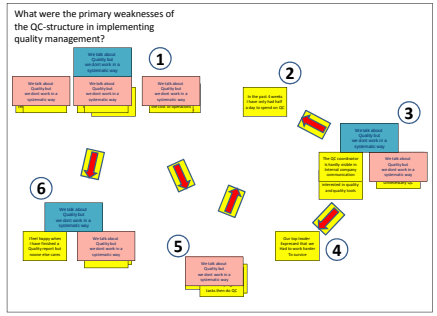


Put the groups and remaining "lone wolves" in a "circle" to facilitate the analysis of possible interrelationships.



Look at all possible interrelationships – start in a systematic way by asking: Is there a relationship between the first group (1) and the lone wolf (2)? If there is a relationship, which direction? *Use the arrow on the small post-it to indicate the direction of the relationship.*

In the picture below it turned out that there was no relationship between (1) and (2). Then continue to check if there is a relationship between the first group (1) and the next group (3). Then check relationship between (1) and lone wolf (4), between (1) and (5) until all possible relationships between group (1) and other groups and lone wolves have been checked. In this specific case it was not until (1) and (5) that we identified a relationship and the direction was that (1) influenced (5). Also there was a cause-effect identified between (1) and (6).



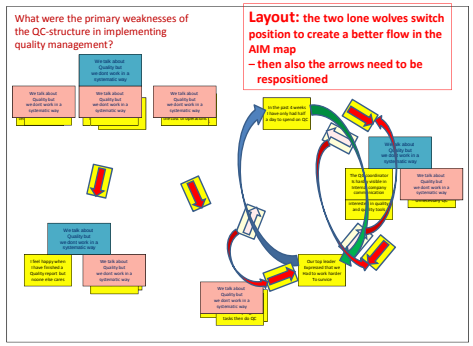
Next continue in the same systematic way to check lone wolf (2) relationships to group (3), to lone wolf (4) and so on. And continue systematically to check all possible relationships, i.e. group (3) with (4) and so on, lone wolf (4) with (5) and so on, and finally group (5) with (6) until all possible relationships (and contradictions have been analyzed).

Step 8: Final Layout

The next step is to organize the picture in a way that will contribute to the understanding of the question. One good rule is to try to avoid arrows crossing each other. Another is that it usually feels more logical if groups with many out-going arrows can be placed in the left corner and groups only with in-coming arrows can be placed on the right side of the board.

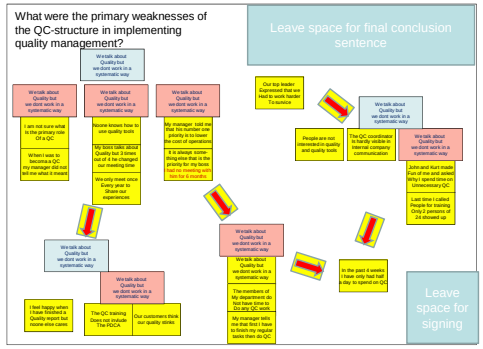
In the illustration below, there was one major change done in order to get a better flow of the arrows (two lonely wolves post-its switched location).

If the picture is very complex with a lot of relationships and there is a need of major restructuring of the groups it is advisable to number the groups and lone wolves (illustrated above) – and then to indicate from where (no.) to where (no.) on each individual arrow post-it.

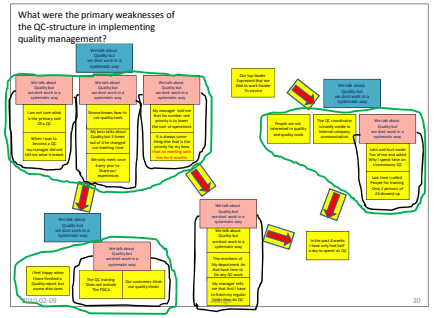


Also there is a need to adjust the position of the groups slightly in order to make room for the yellow post-its that are hidden under the red/pink 1st level headings.

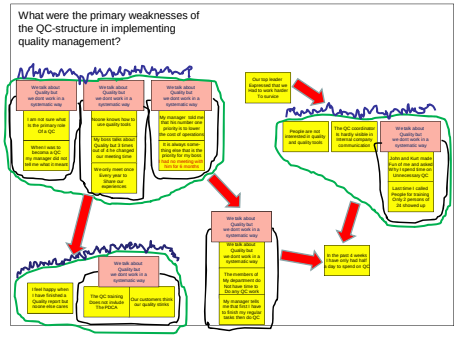
While doing these adjustments it is important to leave space in the upper right corner for the final conclusion sentence and in the bottom right corner for the signatures.



Circle the yellow post-its under the red 1st level headings with a *medium sized black marker*. Make sure that there is some 'empty space' around the post-its.
Circle in a similar way the 2nd level grouping under the blue headings with a *large green marker*.
If needed circle a 3rd level grouping with a *large red marker* (not illustrated bellow).



Remove the blue post-it and write the headings with a *large blue marker* so it is easy to read the main headings from a distance.



Replace the arrows on small yellow post-its with larger visible arrows. *Use the large red marker to draw the arrows.*

The result of steps 6-8 is that data has been grouped and organized and the interrelationships are clearly visible.

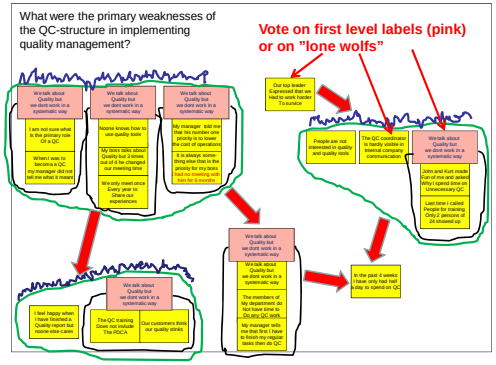
Finish-off stage THREE by standing up as a group and shout 'YO-ONE' and clap your hands once.

STAGE IV: EVALUATION AND CONCLUSION

Step 9: Evaluation

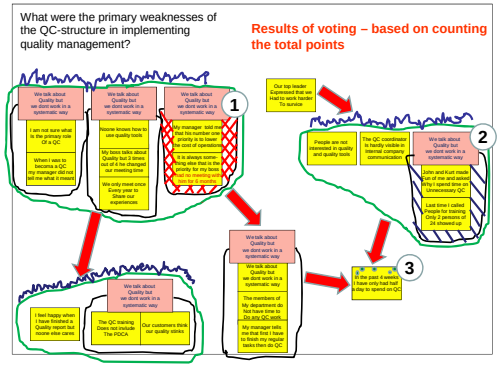
The aim of this step is to prioritize the most important issues influencing the question analyzed. This is done through a voting procedure where each participant independently votes on either 1st level groups (red headings) or on lonely wolves.

- Each group member gets three "*color spots*" on his/her fingers
  - *Red* = 3 points
  - *Blue* = 2 points
  - *Green* = 1 point
- All group members stand in front of the AIM-map and re-read the question for themselves and then look at the content in the map. Voting is done on 1st level grouping or on remaining individual post-its ("lone wolves"). You have to distribute your 3 color spots on different 1st level groups (red headings) or lonely wolves.
- Each group member must have decided **before** anyone moves to put his/her color spots at the map
  - Group leader checks that each and everyone is ready – 'eye contact'
  - Each person needs to nod back – 'I am ready'
  - When all are ready, then the group leader tells everyone to go forward simultaneously and place their spots



The points from the spots are summarized and the 1st level group (or lonely wolf) that gets the highest points is considered the strongest influencing issue. This is visualized by drawing a checkered-pattern with a *large red marker* (see picture below).

The 1st level group with the second largest number of points is visualized by drawing lines with a *large blue marker*. The third largest number of points is indicated by green dots using a *large green marker*. In the example below a lonely wolf received the 3rd largest number of points, and this was indicated by green dots.

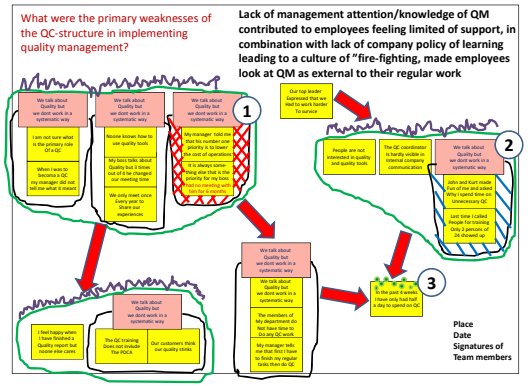


Step 10: Concluding sentence

Summarize the result of the analysis in one single sentence (use a *large black marker*). This sentence should include:

- The priorities found through the voting procedure
  - red, blue and green areas
- The relationships found between these areas – shown by the arrows.

Obs! Before writing with the black marker on the AIM-map, write draft suggestions to a sentence on a separate paper – usually you need to modify the initial version a few times in order to cover the full content of your analysis.



Then, all group members sign the finished analysis in the bottom right corner: place, date and signatures.

Finally, all post-its are made permanent either by using Scotch tape or glue (in order to make it possible to fold the AIM-map and bring it along for later use).

The result of steps 9-10 is that the participants have prioritized what factors are most strongly affecting the starting issue/problem and how these factors are interrelated. Most often this brings a focus on root-causes and an understanding of which are 'victims' (or symptoms of problems).

Finish-off stage FOUR by standing up as a group and shout 'YO-ONE' and clap your hands once.

What is next step?

The AIM provides an analysis of a question (an issue or a problem) but it does not necessarily mean that we have solved the identified issue/problem. Normally it is a tool used when there are important and complex issues/problems and where there is a need of a shared understanding (root-cause analysis).

Put into the context of learning cycles, e.g. a PDCA or Cycle of Experience (CoE), the AIM can preferably be used to create an 'awareness' of an issue or an understanding of the root-cause of a problem. This means that it can be used during the early phase of the cycle when we strive to understand an issue/problem, i.e. in the Plan phase or the Awareness phase in the above cycles. However, after Do and Check in PDCA and Mobilizing Energy and Contact in CoE, the AIM tool can also be used for further reflection and evaluation in the Act phase of PDCA and the Evaluation/Reflection phase of CoE (Shiba et al. 1993, Scheinberg & Alänge 1997).

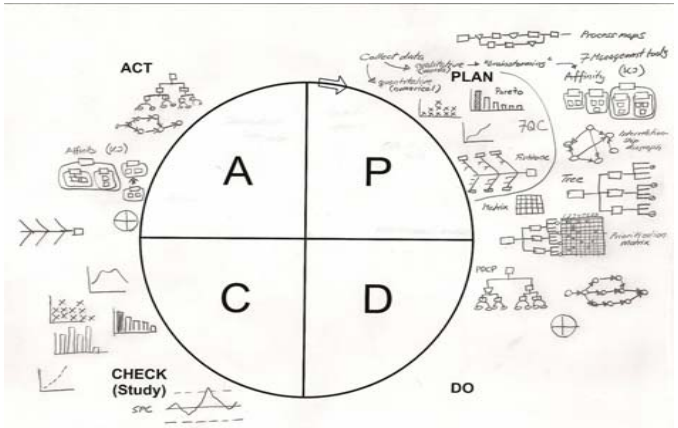


Figure The PDCA cycle with suitable tools for different phases (Alänge 1996)

One final word concerning tools – they are all means for us to structure and analyzing the world around us. By necessity the data we use, regardless of if it is quantitative or as in the AIM qualitative, is always a simplification of reality. If we have been rigorous we have hopefully been able to select the most valid data for our issue, which in AIM depends to a large extent on who participates and contributes to the analysis. However, also the way we conduct the analysis is essential. The step of clarifying meaning is absolutely essential (this step is equally essential in all word-based qualitative methods) – there is a definite need that the participants understand what is written on a post-it – otherwise there is a risk of mediocre analyses). However, even if we have worked in a rigorous way, a method simplifying reality does not provide 'the full truth and nothing but the truth' – we always need to look upon the result in a critical way – do we consider it trustworthy or not. And if not, maybe we need to make another analysis.

However, the big advantage with the AIM is that if we as a group find it trustworthy, we have a good starting point for further action and improvement. And although the major advantage lies in being part of the analyses and reaching a shared understanding, the AIM Map can be used for communication with others because it is a standardized visual tool.

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