

Intersection of Three Measures

As we intersect three of the measures at the school level, e.g., student learning measures disaggregated by ethnicity compared to student questionnaire responses disaggregated by ethnicity, the types of questions that we are able to answer include the following—

- Do students of different ethnicities perceive the learning environment differently, and do they score differently on standardized achievement tests consistent with these perceptions? (Demographics by Perceptions by Student Learning)
- Which program is making the biggest difference, with respect to student achievement for at-risk students, this year, and is there one group of students that is responding “better” to the processes? (School Processes by Student Learning by Demographics)
- Is there a difference in students' reports of what they like most about the school, by whether or not they participate in extracurricular activities? Do these students have higher grade point averages than students who do not participate in extracurricular activities? (Perceptions by Student Learning by School Processes)
- What instructional process did the previously non-English speaking students enjoy most in their all-English classrooms this year? (Perceptions by Demographics by School Processes)

Looking over time allows us to see trends, to really begin to understand the learning environment from the students' perspectives, and to know how to deliver instruction to get the results we want from and for *all* students.

Intersection of Four Measures

Our ultimate analysis is the intersection of all four measures, at the school level, e.g., CTBS disaggregated by program, by gender, within grade level, compared to questionnaire results for students by program, by gender, within grade level. These interactions allow us to

answer questions like—

- Are there differences in achievement scores for 8th grade girls and boys who report that they like school, by the type of program and grade level in which they are enrolled? (Demographics by Perceptions by School Processes by Student Learning)

It is not until we intersect all four circles, at the school level, and over time that we are able to answer questions that will allow us to predict if the actions, processes, and programs that we are establishing for students will meet the needs of *all* students. With this intersection, we can answer the ultimate question—

- Are we achieving the purpose of our school, in all respects, for *all* students? (Student Learning by Demographics by Perceptions by School Processes)

Focusing the data

Data analysis should not be about gathering information just because it is there. It would be very easy to get "analysis paralysis" by spending time gathering data and not spending time using the data. School level data analysis should be about gathering data that will help schools understand if they are achieving their purpose, and if they are meeting the needs of *all* students.

This type of data analysis is easy when schools are clear on their purpose and what they expect students to know and be able to do. These analyses comfortably flow from questions that teachers and administrators naturally ask themselves to learn if these purposes are being met. The good news is, that by looking at trends of the intersected four major measures, schools do not have to conduct complicated program evaluations or needs analyses. These intersections can tell them just about everything they would want to know, and the data are fairly readily available.

Summary

The moral of the story is, if we want to get different results, we have to change the system

that creates the results. Just looking at student achievement measures focuses teachers only on the results; it does not give them information about what they need to do to get different results.

By asking for student achievement measures alone, state and federal program officers can never use these data because the *context* is missing. This request might also mislead schools into thinking they are analyzing student learning in a comprehensive fashion. Just looking at student learning measures could in fact keep teachers from progressing and truly meeting the needs of students.

When we focus only on student learning measures, we see school personnel using their time figuring out how to look better on the student learning measures. We want school personnel to use their time figuring out how to *be* better for *all* students.



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A few insights into Education as a System

Dr. Russell Ackoff

(internationally known leader and giant in the field of modern organizational management)

ON EDUCATION:

"We must give up the search for one best educational system, one that operates optimally regardless of time, place, and students. What is required is a system that can learn in, and adapt to, the conditions under which it must operate."

"The problems of education are not out there in society or the culture -- they're in the heads of the people in this room -- and we have to break out of our own self-imposed constraints."

"Effective management of organized behavior is management of interactions, not actions. The deficiencies in the educational system cannot be removed by changing only the content of education..... The message its structure and processes deliver are more seriously misleading and counter productive than any messages delivered in courses."

"When you get rid of what you don't want you seldom get what you do want. Improvement must be directed at what you want rather than at what you don't want."

ON SYSTEMS:

"A system consists of a set of parts - each part effects all parts; no part has an independent effect on the whole; if you put parts together into subsets - each subset effects all subsets and no one subset has an independent effect on the whole."

"The system is a whole which can not be divided into independent parts."

"When a system is taken apart it loses its essential properties."

"If you focus on optimalization of parts you will not improve the system."

"Performance of the system depends on how the parts fit - not on how good the parts are."

"Systems are not the sum of their parts - they are the product of their interactions."

What Is System Thinking?

Systems thinking is an approach to organizational improvement based on awareness of the whole, the part, and the interactions between the two.

It focuses on root causes for problems (not symptoms)
the behaviors flowing from assumptions and beliefs
and the structures shaped by them.

Organizational outcomes are the end result of a complex equation.
Therefore change in that outcome can only come through changing the whole equation.

Deming believed that 85% of the problems in an organization come from the system, not with the people. For growth and change to happen, we must fix the system, not just the people who operate within it.

The output of a system is primarily influenced by the processes rather than by individuals.

Systems thinking is understanding the connections between people and processes in organizations so that we can continuously improve our work.

Systems thinking is about seeing the whole.

Systems thinking is the only way to achieve long-term improvement.

Systems thinkers believe structure influences behavior.

Systems thinking requires:

Extensive staff development.
Understanding and belief in the knowledge and tools of systems thinking.

Collaboration among individuals representing a cross section of a school system.

Changing the way you think and discarding traditional assumptions.

Long-term thinking.

Pain

What can educators do?

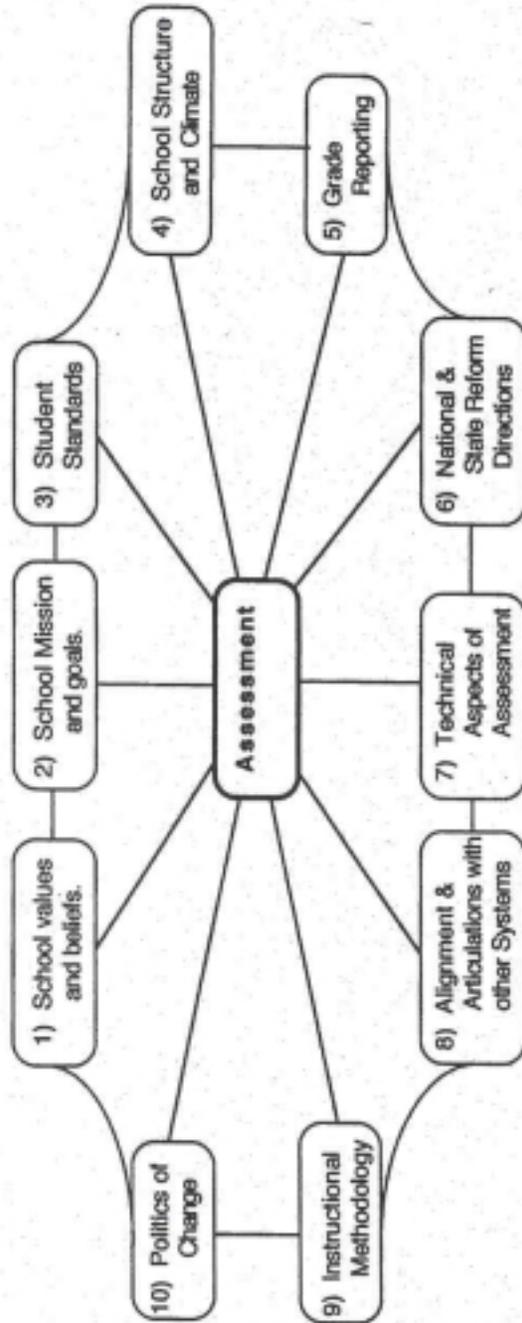
Become a systems thinker.
Learn the concepts and adopt the beliefs
Integrate systems thinking and the tools into your work.

Teach students system thinking. Use the district, school, class, club, or activity as your system.

Don't work on committees that do not use systems thinking - it is a waste of time and dishonest.

The "Systems" Nature of Assessment Reform

"Systems are not the sum of their parts, they are the product of their interactions". Russell Ackoff



"A system consists of a set of parts, each part effects all other parts, no part has an independent effect on the whole. If you focus on optimization of parts, you will not improve the system. Performance of a system depends on how well the parts fit, not on how good each part is. When a system is taken apart it loses its essential properties." Russell Ackoff, Chairman of the Board of INTERACT

Key to Quality: Understanding and Optimizing Your System

Systems resist change.

Improving one part without improving the other is tampering and makes things worse.

Systems nest within systems.

Leaf - Tree - Forest

School districts have many systems.

School districts are parts of other systems.

Define your system.

Throw out your organizational chart - it does not describe your system. Use a flow chart which shows production as a system.

The system - not the workers - is responsible for most problems (90%). Management is responsible for the system.

Jimmy Chancey in November issue of "QQ: Quest for Quality in Virginia Public Schools"

"To successfully serve a large number and variety of students, schools must work as systems whose parts are focused on coherent, consistent, publicly articulated goals."

"A centrally articulated set of goals, even if vaguely stated, plays important roles (in student achievement)."

"Unless coherent schooling elements set high academic standards, we can't expect student achievement to rise."

Laurn Resnick - Dir. of New Standards Project & Kate Nolan - Coordinator for International Benchmarking:
Educational Leadership, March 1995

A Tale of Two Systems

In my father's lifetime of 86 years he experienced the advent of the telephone and all of its major transformations. At his death he was still not very comfortable with the phone and preferred to write letters or speak to people face to face. In my own lifetime I have experienced the phone's transition from the dial system of calling to the now nearly universal touch-tone system. In many ways the changes in our telephones are symbolic of the changes we must make in schooling.

First of all - the many systems that the telephone company has developed over the years worked - and still work. In places where the old "Central" is still in place, calls get through. My old four party dial phone in the Green Mountains of Vermont still works. I dial out, obtain an operator for calls outside of town and am in voice contact nearly the same as if I had had a touch tone-phone. The old dial phones will continue to work - perhaps forever. It is obvious that the changes made by telephone systems were not caused by their older systems ceasing to work.

Second - the reason for a shift from "Central" to the dial phone to the touch-tone phone was improved efficiency and expanded opportunity. It was at the 1964 World's Fair in Flushing Meadows, New York where I first came in contact with the new concept of touch-tone calling. At the AT & T pavilion one could wait in line to test the new technology. A dial phone and touch-tone phone were fixed side by side and you were timed on calling a number on each. With just a little bit of experience one could call out on the touch pad in a tenth the time it took with the dial. Within a short period of time older dial phones were replaced with the touch-tones to the point that thirty years later the dial phone is a bit of a relic. Still functional - still working - but outmoded in its efficiency and abilities.

Third - what appears to be a relatively simple transition from dial phoning to the touch tone was in reality a major shift requiring a complete overhaul of the phone company's whole system. One could not simply attach a touch-tone pad to the rotary dial phone. Nor could the rotary dial be replaced with a touch-tone pad. Many components within the telephone system had to be upgraded, redesigned and replaced. With the different technology came the need for different worker skills. The technology changed job descriptions and titles. Workers were displaced, retrained or eliminated. Changing just one part of the telephone system changed the whole of the system. And changes in the telephone system changed us and the way we use it - forever.

Fourth - the change to touch-tone phones has enabled a whole new generation of telephonic peripherals and services to be added - making the phone system more than just a point to point carrier of verbiage. The additional change from analog to digital transmission has further expanded its capacity. Yes the old dial system still works but it can not come close to competing with its modern hi-tech progeny.

Fifth - remnants of the old dial system are still found not only in the rural regions of our country but in our words and perhaps in our thought. We still wait for a "dial tone". We still are asked to "dial" for operator assistance even though we may get a recording. We still think of the telephone "ringing" when in most instances it beeps or chirps at us. Like my father never becoming comfortable with the phone itself, how many of today's adults do not like to speak to a message recorder, do not think to FAX important items or to use their phones via modem to connect their computers to the world's interlocking network of E-mail and to the Internet?

How does this reflect upon our attempts at restructuring schools?

First - the many systems of schooling we have developed over the years all worked and will continue to work. No doubt all of them will remain in place - continuing to perform - much as the older four party dial phone I have at my summer retreat still functions. Because of the need for increased efficiency and effectiveness, however, restructured schools must gradually replace older forms of schooling much as the digitalized touch-tone system has replaced the rotary dial.

Second - not only will restructured schools improve efficiency - they will provide greatly expanded abilities to meet the needs of a rapidly changing and diverse world. The Amish schools of Pennsylvania still work and still meet the needs of the 18th century Amish culture. They can not, however, meet the demands of 21st century American life. While the Amish schools may very well remain, the majority of our schools must move forward to newer systems.

Third - restructuring schools is not an "add-on" process or an exercise in subtraction. We can not add or take away programs piecemeal. Restructuring must be a total system transformation in much the same way that the phone system changed from the operator to the rotary dial to the digitalized touch tone pad. Interestingly they were able to do this while maintaining service. They changed the tire while the vehicle was in motion - much like schools are being expected to do. Changing one part of our school system will result in the need to change all parts. Nothing will be unaffected.

Fourth - the change to a new system of schooling will result in greatly expanded opportunities for students, teachers, and for networking within the real world. Perhaps school will no longer be centrally thought of as a place. The capacity of schools to elicit learning will increase

Fifth - remnants of the old system will remain on our tongues and within our minds. Perhaps we will continue to speak and think of "grades" when there are none. Of "tests" when there are only assessments. Of "teachers" and "administrators" when there are only guides and facilitators. Of "facts" when there is only knowledge and understanding. There will be many who will never be comfortable with the new system - but that is not cause for halting its progression. My father simply did not use the telephone very much. Others learned to and for me it is a natural act.

The current effort at restructuring New York State's public schools through the processes of the New Compact for Learning can only be accomplished if it is viewed as a systems transformation. Our current system of school structure can not carry the new system of learning anymore than the old rotary dial phone could be adapted to touch-tone technology. We need to transform the old system into the new, while maintaining services to students, communities and state. It can not be done piecemeal, without a plan, or without a vision of the whole.

Next time you "dial" the phone, think of the touch-tone pad you are using and all that is connected to it that has had to change in order for you to punch in the numbers. Then get to work envisioning the systemic changes we must make in our schools in order to transform them for the efficiencies and empowerments so necessary for our future.

A brief paper prepared for the Mohawk Region Association of School District Administrators
Paul G. Preuss, Ed.D. May 19, 1994

Root Cause

a Little Primer

In the Comprehensive Planning Process a crucial step is the identification of "Root Cause(s)" for identified gaps in student achievement. Too often planning or SBM groups jump directly from a symptom (low regents scores) to an immediate solution (remediation or some such other "fix").

In many cases - simply treating the symptom will make the overall problem worse. The gap (low regents scores) is not a cause and should not be addressed directly - rather it is most often only a symptom of a variety of root causes which are often hidden within a school system. The purpose of this step is to reveal the "original reason" or "root cause" behind the symptom so that it may be either removed or corrected. Only then will the symptom disappear or improve.

In working with districts we have found that teams have initial difficulty in differentiating symptoms from root causes or differentiating root causes from treatment. This little primer has been put together with the hope that it can help make more clear the concept of root cause and its importance in resolving problems.

A Non-Educational example

In the old days - before circuit breakers - the family home typically had a fuse box. Most circuits were set up for 15 amp fuses and wired accordingly. As people made use of ever greater numbers of electrical appliances the old 15 amp circuits became overloaded and fuses would blow frequently. The immediate symptom was a black-out created by the blown fuse. An often used initial remedy was to replace the fuse - only to have it blow out a short time later. A longer term remedy was to place a coin behind the fuse - effectively negating the fuse as a safeguard. Another long term remedy was to replace the blown 15 amp fuse with a 20 amp fuse. None of these remedies, however, came close to resolving the root cause which was - too much demand for electricity over a circuit that was not designed to carry it. Some of the remedies, in fact, were dangerous. By negating the fuse safeguard - the last two remedies could very easily result in a meltdown of the wires - causing the house to catch fire.

By exploring the root cause (too much demand for electricity over a system not designed to carry it) we come to a variety of remedies which attempt to address the root cause.

- Remedy 1 Expand the electric circuitry of the house to meet the demands of the increased electrical load.

- Remedy 2 Reduce the use of appliances to keep within the limits of the present system to deliver.

- Remedy 3 Use alternative sources of power for some applications - a gas stove, for example, instead of an electrical one.

Implementing remedies for symptoms is wasteful, ineffective and sometimes dangerously counterproductive. Therefore the search for root cause is essential for the successful removal or improvement of a problem.

Paul G. Preuss
November, 1997

Tool 10: The Five Whys

Uncovering the real reasons behind a problem often requires a process that goes deeper than simply answering the question "Why?". A Japanese tradition suggests that only after answering that question five times will the true causes (root causes) of a problem begin to emerge. Here is an example:

1. Why didn't you do your homework last night?

I didn't have time to do my homework.

2. Why didn't you have time to do your homework?

I had other things I had to do.

3. Why did you have other things to do?

I had to be with my little brother.

4. Why did you have to be with your little brother?

Because there was no one else at home.

5. Why was there no one else at home?

Because my parents were at a party and my little brother started throwing up right after they left. I had to take care of him until my parents got home after midnight, and then I was too tired to do my homework. If it's OK with you, I'll hand it in tomorrow.

From: John Jay Bonstingl's book "Schools of Quality: An Introduction to Total Quality Management in Education", ASCD, 1992.

A Five-Step Process for Identifying Root Cause

When you want to examine the relationship between a given outcome and the factors influencing that outcome, use a cause-and-effect diagram. Sometimes called an Ishikawa diagram or even a "fishbone diagram," the cause-and-effect diagram focuses on specific issues, identifies areas short on data and gives you a structured approach to finding root causes. Here's what you do:

Specify the problem to analyze. The effect can be positive (objective) or negative (problems). Place the problem's title in a box on the right side of the diagram.

Problem: Low enrollment in Distance Learning classes.

List the major categories of factors influencing the effect you're studying. You can use the "4Ms" (methods/manpower/materials/machinery) or "4Ps" (policies/procedures/people/plant) as your starting point.

Major Categories selected: Policies
Procedures
People
Plant

Identify factors and subfactors. Ask yourself "Why?" or use brainstorming or mental imaging to generate ideas. Start with the major categories and work from there. (Use data where available.)

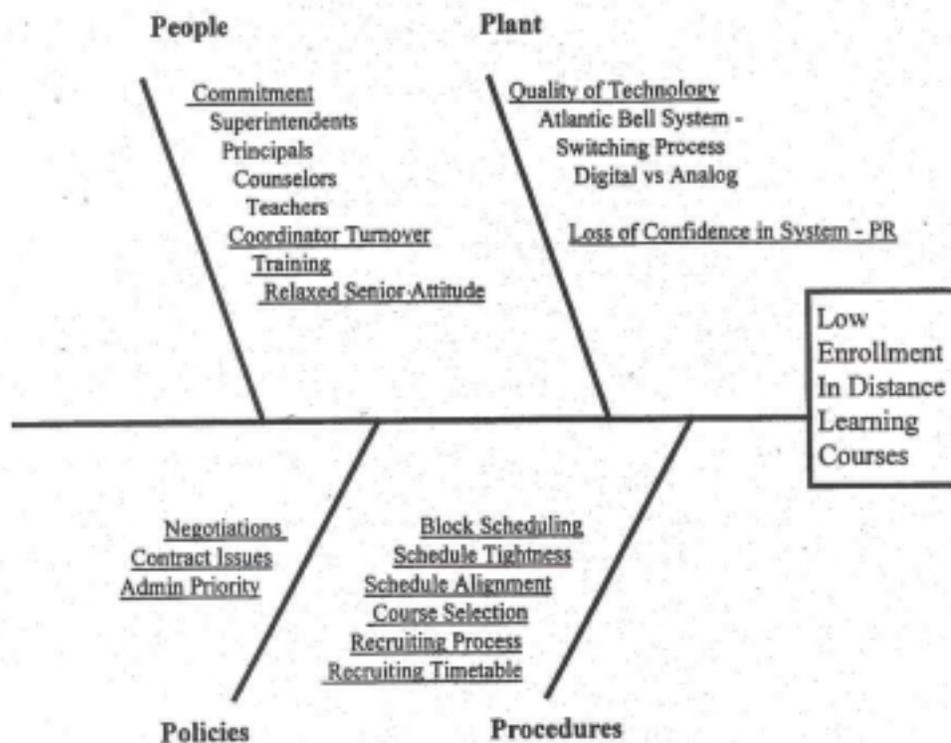
Identify significant factors. What factors appear repeatedly? List them. Then list those factors having a significant effect (your data can help you identify these).

Prioritize your list of causes. Don't confuse location with importance - a subfactor may be the root cause to all your problems. When you prioritize, you may also discover new factors; then you'll need to collect more data. Prioritization can be done using pareto processes, multivoting, nominal group technique

Example of Cause-and-Effect Diagram created by this process is on the next page.

Adapted by Paul Preuss from the US Air Force's Quality Institute "Process Improvement Guide", 2nd Edition, September, 1994, Published at Air University, Maxwell AFB, Alabama.

Sample Cause-and-Effect Diagram



This diagram of the causal issues and sub-issues can be used as a basis for developing needed data and/or prioritizing issues through pareto and other processes. Once prioritizing, and verification of prioritizing, has taken place - the group's action plan should be based upon illuminating or improving those issues which were indicated as major contributors to low enrollment in DL classes.

Improvement process

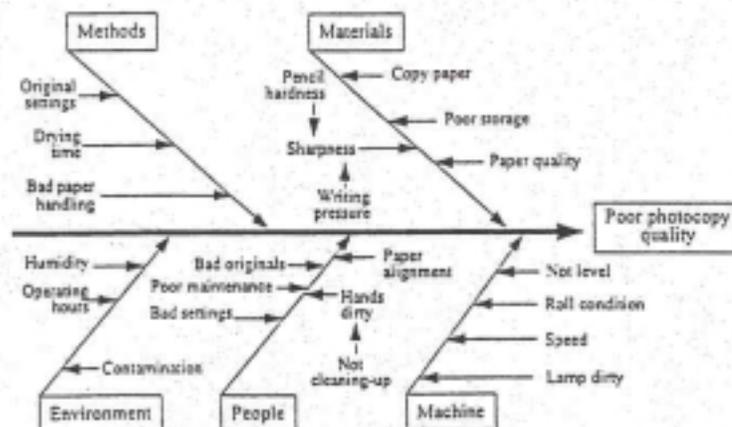
Cause-and-effect diagram

When you're searching for root causes, cause-and-effect diagrams can help. Sometimes called an Ishikawa diagram or "fishbone," this tool gives you a structured approach to finding the root cause (or causes). You'll also identify areas that might need more data. A cause-and-effect diagram illustrates the relationships affecting your problem or objective.

After you decide what to analyze, list the major categories (manpower, machines, materials, etc.). Then list the factors and subfactors; you'll see factors that appear repeatedly. Which have a significant effect? Your data can help you decide. From there, prioritize your list. And don't overlook subfactors—they might be the root cause! Here's what a cause-and-effect diagram can do for you:

CIP step 3

- Organize your approach to analyzing problems
- Determine root causes of a given effect
- Identify areas that need more data



The Five Whys - Rick Ross

It's mid-afternoon, an hour before the shift changes at a manufacturing plant, and I'm the foreman. I'm walking through the plant, giving a tour to a friend who happens to be a systems thinker. Suddenly, I see a pool of oil on the floor. So I grab the nearest member of the assembly line crew: "Hey! There's oil on the floor! For Pete's sake, somebody could slip in that! Clean it up!"

When I'm finished, my systems thinking friend breaks in with a quiet question: "Why is there oil on the floor?"

"Yeah," I repeat to the crew member. "How'd the oil get on the floor?" The crew member replies, "Well, the garbungie's* leaking." All of us looked automatically to the ceiling. Sure enough, there's a visible leak up there in the garbungie.

"Oh, okay," I sigh. "Well, clean up the oil and get the garbungie fixed right away."

My friend pulls me aside and murmurs, "But why is the garbungie broken?"

I say, "Yeah, well, the ga....." and turn to the crew member. "Why is the garbungie broken?" "The gaskets are defective", is the reply.

"Oh, well, then, look," I say. "Here. Clean the oil up, fix the garbungie, and, uh, do something about the gaskets."

My friend adds: "And why are the gaskets defective?"

"Yeah," I say. "Just out of curiosity, how come we got defective gaskets in the garbungie?" The shop floor crew member says, "Well, we were told that purchasing got a great deal on those gaskets."

I can see my friend start to open his mouth, but this time I get there first. "Why did purchasing get such a great deal?" "How should I know?" says the crew member, wandering off to find a mop and bucket.

My friend and I go back to my office and make some phone calls. It turns out that we have a two-year-old policy in the company that encourages purchasing at the lowest price. Hence the defective gaskets - of which there is a five year supply - along with the leaking garbungie and the pool of oil. In addition, this policy is probably causing other problems throughout the organization, not closely related in time or space to the "root cause".

*The garbungie is a big machine mounted in the ceiling, which carries the whosis into the frammistat so it can be fribbulated.

Taken from: The Fifth Discipline Fieldbook pp 108-109 (ISBN 0-385-47256-0)

