**1 CLEAR WRITING : Fundamentals**

adapted from <http://mywebpages.comcast.net/tgeorges/write/index.html>

**MYTH : COMPLEX SUBJECT MATTER DEMANDS COMPLEX LANGUAGE**

Many of us can talk and write coherently as long as we think we are in a conversational mode. But what happens to us when we have to write professionally? There are many examples that show how highly respected scientists and technologists use simple, down-to-earth language to express technical concepts that might otherwise seem incomprehensible. By imitating their style, you can make your reports and papers more informative, no matter how complex their subject matter.

Here's a passage written **more than a hundred years ago** by the scientist Thomas Henry Huxley:

|  |
| --- |
| All sorts of limestones are composed of more or less pure carbonate of lime. The crust which is often deposited by waters which have drained through limestone rocks, in the form of what are called stalactites and stalacmites, is carbonate of lime. Or, to take the more familiar example, the fur on the inside of a tea-kettle is carbonate of lime; and for anything that chemistry might tell us to the contrary, the chalk might be a kind of gigantic fur upon the bottom of the earth-kettle, which is kept pretty hot below. |

**No matter how complex your message, you can always benefit by making it understandable to the widest possible audience.** This example shows how to use familiar imagery to make the reader comfortable with complex ideas that would otherwise be hard to visualize. If you can't explain your work at a cocktail party, you don't know what you're doing.

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**Lesson 1 : How to organise your paper**

|  |
| --- |
| **THE TRADITIONAL OUTLINE**  **1. Introduction (Historical background)**  **2. Statement of the problem (Why are you doing this?)**  **3. Technical background (How far have others gotten on this problem?) Usually a historical account**  **4. Description of your analysis, development, or measurements (What have you done? How did you do it?)**  **.....................**  **..................... Supporting details**  **..................... (the bulk of your paper)**  **5. Results (What did you find out?)**  **6. Discussion and interpretation (What do your results mean and how do they relate to the stated problem?)**  **7. Conclusions and recommendations (What should be done next?)** |

If you follow this outline, that is, if you write in answer to this sequence of questions, then your paper may come out OK. At least it will conform to the classical conventions for organizing a report on a technical project or a scientific investigation.

**PITFALLS OF THE TRADITIONAL APPROACH**

The first is that you are forcing your reader to wade through the same process you did to get to your results and conclusions. It's almost as though you were saying, "I had to go through this painful process to reach my conclusions... why shouldn't you?"

**When you let the facts or the data themselves determine the structure of your writing, your paper, in effect, says no more than "Look at my wonderful data!" How many papers have you seen that seem to say nothing more than this? Aren't they really just *catalogs* of undigested facts?**

So many writers simply catalog facts that readers, in defense, have learned a trick to subvert the problem: To find the main conclusions, results and recommendations, **they skip to the end**! If they can't find them there, they often give up, because they don't feel like digging through the whole text to find the few important facts they're looking for.

**THE ANALYTICAL OUTLINE**

Here's a different kind of structure for your reports and papers.

It's called THE ANALYTICAL OUTLINE. It looks like this:

|  |
| --- |
| **THE ANALYTICAL OUTLINE**  1. The problem (What have you done and why?)  2. Your results and conclusions (What did you find out, and why is it important? What's your solution to the problem?)  3. Your recommendations (What should the reader do about your results?)  4. The two or three major details of your analysis, investigation or development (Here are the details of what I did and how I did it.)  5. Your conclusions (Restatement, in which you answer these questions: SO WHAT? and WHO CARES?)  6. Appendices (The rest of the details) |

1. Your readers can find what they're looking for quickly and easily ....namely **what's** paragraphs and be rewarded in proportion to the time they have spent. In fact, the first three sections are so self-sufficient, they can stand alone and even be distributed separately to readers who don't care so much about the details.

2. When you begin with the concrete results, you **immediately get your readers' attention**, instead of boring them with a general introduction.

3. You can immediately expose your readers to **your point of view**, so that they can judge all that follows in the light of your conclusions.

4. Your article tends to be **shorter and easier to write**. After you write the first three sections (which should be short), the rest is just supporting detail. You're much less tempted to pad those details after you've given the punch line away.

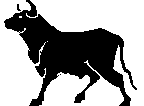
5. By putting most of the minor details in appendices, you **avoid cluttering your writing** and obscuring your main points. The readers who are interested in those details can find them more easily, too.

6. You distinguish between the **order of doing** and the **order of reporting**.

**IT'S WHAT'S UP FRONT THAT COUNTS!**

**Lesson 2 : How to handle all those details**

**WHERE'S THE BEEF?**

In sharp contrast with the other kinds of writing you learned about in school, the essence or "beef" of scientific and technical writing lies in its **details**. But no one wants *all* the details, and besides, you can't include all the relevant facts anyway. So **how effective and informative your technical writing is depends critically on how you select, reject and arrange details.** Too many, and you put your readers to sleep. Too few, and you leave them uninformed. Put them in the wrong order, and you leave them confused.

You have to **answer three questions** about details when you write:

**How much detail? Which details? How to rank details?**

To answer these questions, you obviously have to know something about your **readers**. Specifically: **Who am I writing for?** And **What are they looking for?**

**HOW MUCH DETAIL?**

When you start thinking about the different possible audiences for your writing, you should notice that there is an **inverse relation** between the **size of your audience** and the **amount of detail** that is appropriate. In other words, the largest audience gets the least amount of detail, and vice-versa.

Here's an **exercise** that should clarify the principle.

How much detail about an automobile would you expect to see in each of these publications? Put number **1** next to the one that would have the **least** amount of detail and so on, up to number **5** for the one with the **most** detail.

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a *MotorTrend* magazine ad Bas du formulaire

Haut du formulaire

the manufacturer's engineering specificationsBas du formulaire

Haut du formulaire

a showroom brochure Bas du formulaire

Haut du formulaire

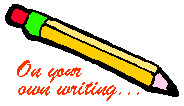
the owner's manual Bas du formulaire

Haut du formulaire

a *TIME* magazine ad Bas du formulaire

Haut du formulaire

Bas du formulaire

Take a paper or report you wrote. Make a list of key words or phrases that describe all the details you have reported. Now rank those details according to how interested you think **your audience** is in those details. Throw out the bottom half. Now compare that list with the details that actually appeared in your paper or report.

**CLEAR WRITING : Your tool kit**

adapted from <http://mywebpages.comcast.net/tgeorges/write/index.html>

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Analytical Writing means **telling your readers what's important and why -- by differentiating, interpreting, contrasting and specifying.**

This means that your **words** are **concrete, specific, objective and unambiguous.** In Lesson 1, you will learn that plain, down-to-earth words are more informative than pretentious, impressive ones. Your **sentences** state **relations among ideas**, not just disconnected facts.

**Your tools for writing more informative sentences will be:**

**THE CONCRETE NOUN (Lesson 2)   
THE ACTIVE VERB (Lesson 3)   
THE DEPENDENT CLAUSE (Lesson 4)**

Your **paragraphs** tell your readers all they need to know about an idea, in a logical way, without wasting their time with irrelevant details.

**Your tools for writing more effective paragraphs will be:**

**ORIENTING YOUR READER (Lesson 5)   
TYING IDEAS TOGETHER (Lesson 6)**

**Lesson 1 : Use the simplest word that will do the job**

**DUMP AWKWARD PHRASES**

Just as you have learned to streamline your words, you can also short-circuit roundabout phrases. Look at this list of phrases that are just long-winded ways of saying something very simple. Write in the space following each one the **single-word equivalent**:

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a large/small number of Bas du formulaireHaut du formulaire

a sufficient quantity of 

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Haut du formulaire

Bas du formulaire

Haut du formulaire

at this point in time 

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Haut du formulaire

Bas du formulaire

Haut du formulaire

due to the fact that 

Bas du formulaire

Haut du formulaire

for the purpose of 

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

in the event that 

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Haut du formulaire

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

**WHAT ABOUT BUILDING MY VOCABULARY?**

|  |
| --- |
| **Please don't...** |
| Actualize, verbalize, finalize, prioritize, schedulize, contemporize, utilize, formalize, qualitize, containerize, operationalize, parameterize, concretize, conceptualize, definitize, militarize, annualize, accessorize, computerize, or standardize.  **IZE** is a drug consumed in large quantities by business and technical speakers and writers. It turns ordinary people into official-sounding authorities and lets them talk for hours without saying anything. |

How can you use the simplest word that will do the job and still maintain and demonstrate a reasonable vocabulary?

The trick is to use words that are designed to **express** rather than to **impress**. If you know a big word that exactly expresses your idea, and no little word will do, **use it**. Your readers will appreciate your precision. But if you have a simple idea that can be expressed in a few one-syllable words, putting it in flowery, convoluted language just reveals your insecurity with the language.

**Lesson 2 : Use concrete nouns for clarity**

**WHAT'S AN ABSTRACT NOUN?**

First, let's make sure you understand how to recognize abstract nouns when you see them. Abstract nouns are the names of things you can't visualize. They are usually the names of a condition or quality, like:

A noun is usually **abstract** if it ends in one of these **suffixes**:

|  |  |
| --- | --- |
| -tion | -ism |
| -ity | -ment |
| -ness | -age |
| -ance/-ence | -ship |
| -ability | -acy |

These suffixes "kill" verbs and adjectives by turning them into nouns.

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Whenever you see a word with one of these suffixes, see if you can rewrite the sentence to **use the verb root instead.**

**USE TERMS YOUR READER CAN PICTURE**

Look at this list of words and number them, with **1** indicating the **most abstract** and **5** indicating the **most specific and concrete**:

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machine

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Haut du formulaire

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

vehicle

Bas du formulaire

Haut du formulaire

conveyance

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

car

Bas du formulaire

Haut du formulaire

rusty green Volkswagen

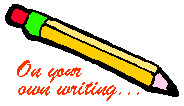
Bas du formulaire

Look at this abstract for a technical paper and try to identify specifically why it fails to inform as well as it could:

|  |
| --- |
| The recent identification of high concentrations of aged urban pollutant haze in the Arctic Basin suggests the possibility of climate modification through the interaction of the haze with solar radiation. The presence of the absorbing aerosol layer over a high-albedo surface will lead to an enhancement in the absorption of solar radiation by the atmosphere and surface surface system. This additional heating will manifest itself as an increase in the temperature of the atmosphere and an increase in the rate of ice melt in the spring. |

Virtually all of the information in this abstract is buried in its abstract nouns. What if the abstract were rewritten this way?

|  |
| --- |
| Recent increases of urban pollutant haze in the Arctic Basin could modify the Arctic climate by absorbing more sunlight. The additional heating could make the ice melt faster in the spring. |

Bas du formulaire

Find a couple of paragraphs from your own writing, and mark all the **abstract nouns** with your **green highlighter**, and underline the weak verbs and awkward constructions that accompany them. Rewrite the passage, removing as many of the abstractions as you can, and amplify any general statements with concrete examples.

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**Lesson 3 : Use active verbs for natural-sounding prose**

In this lesson, you'll learn how to eliminate most of the passive verbs in your writing. It's not that passive verbs are bad in themselves, but when they are overused, they hide the identity of the doer, they invite awkward sentence construction, and they lead to awkward, unnatural-sounding prose. At least half of the passive verbs in scientific and technical writing should be changed to active forms.

**PASSIVE VERBS ATTRACT ABSTRACT NOUNS**

In the last lesson, we learned how to substitute concrete nouns for abstract ones. Passive verbs seem to attract abstract nouns, so that when you eliminate one you often have to change the other.

Here is a sentence with abstract noun and passive verb. Rewrite the sentence to remove both.

“The practice of filling out work orders in triplicate is disliked by the machinists.”

Haut du formulaire



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Bas du formulaire

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**PASSIVE VERBS ATTRACT AWKWARD CONSTRUCTIONS**

When you decide to write a sentence with a passive verb, you often get trapped into using awkward constructions like:

* through the use of
* on the part of
* as to whether
* for the purpose of

In the following sentences mark and remove each passive verb, noticing how, at the same time, you no longer need such awkward constructions:

In the laboratory, a high safety record is achieved through the use of double-shielded walls.

Haut du formulaire



Bas du formulaire

A new power supply was required in order to fix the robot.

Haut du formulaire



Bas du formulaire

Bas du formulaire

**LIBERATE DISGUISED VERBS**

Weak verbs like **do, make, perform, have** and forms of the verb **to be** convey practically no sense of **action**, and so waste the function of the verb as the sentence's **power source**. Whenever you can, substitute verbs that create a clear sense of action. This is easy when you see nouns that are really verbs in disguise.

Look at these examples of weak verbs coupled with nouns that are really strong verbs in disguise. Write in the blank after each one the strong verb that you can substitute.

Haut du formulaire

make a recommendation 

Bas du formulaire

Haut du formulaire

formulate an argument 

Bas du formulaire

Haut du formulaire

raise an objection 

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

Bas du formulaire

Haut du formulaire

arrive at a conclusion 

Bas du formulaire

Haut du formulaire

perform an analysis 

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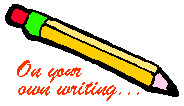
find a solution 

Bas du formulaire

Haut du formulaire

make a decision 

Bas du formulaire

Find a few paragraphs you have written recently and use your **pink highlighter** to mark all the passive verbs. Notice how the passive verbs have attracted awkward constructions and abstract nouns. Rewrite those paragraphs using the techniques you have learned in this lesson.

**Lesson 4 : Use dependent clauses to write analytically**

In this lesson, you'll learn how to use a powerful tool for analyzing the details you have to write about. It's called the **dependent clause**.

**WHAT'S A DEPENDENT CLAUSE**

The dependent clauses are in boldface.

**If at first you don't succeed**, try something else.

A helium nucleus has two protons, **whereas hydrogen has only one.**

**Although Klingon battle cruisers are not very maneuverable**, they can make themselves invisible.

Notice how each dependent clause can't stand by itself, even though it has a subject and a verb of its own. Instead, in some way it **amplifies or qualifies** the statement in the main part of each sentence. The first boldface word in each case is the key. It goes by the name of *subordinating conjunction*.

**DEFINING RELATIONS AMONG IDEAS**

There are many ways to combine related ideas. The best ways are the ones that **precisely define relations among ideas**, by explaining, contrasting, limiting and expanding.

**Practice** forming dependent clauses by combining each of the following sets of isolated ideas into one sentence.

*The airplane landed. We got off. We discovered we were not in Pittsburgh. We were in Havana.*

*Haut du formulaire*

*Bas du formulaire*

*Bas du formulaire*

*Computer maintenance costs kept increasing. Georgette complained about peanut butter on the diskettes. Mr. Figby banned food from the computer room.*

*Haut du formulaire*

*Bas du formulaire*

*Doppler radars measure radial velocities. A conventional radar cannot. Doppler radars are useful for remote sensing.*

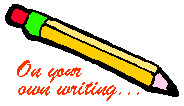
*Haut du formulaire*

*Bas du formulaire*

*Bas du formulaire*

Haut du formulaire

Bas du formulaire

Find a paragraph or two that you have written recently and underline all the dependent clauses. If you don't find very many, you can be sure that your sentences aren't informing as well as they could. Try rewriting your paragraphs so that at least half the sentences contain dependent clauses.

**AVOID STRINGS OF ADJECTIVES**

Scientific and technical writing are notorious for cataloging details by stringing bunches of adjectives in front of nouns. These are sometimes called **noun strings**. Here are some examples I extracted from actual technical writing:

agency management planning system enhancements

inferior product labeling requirements

multichannel complex maximum-entropy (autoregressive) spectral analysis

surface water quality protection procedures development

canister/missile launch support stand (TSE4508) interface design

Here are a few sentences that cause most readers to do a double-take. Underline the piled-up adjectives:

*The QX-7 is the first extra-long range (800-1000 miles), low-silhouette pilotless target aircraft to be built entirely of fiberglass.*

*It was necessary to run the transient counterflow program to obtain the average temperature history of a mass averaged nozzle and the deuterium coolant exit temperature history.*

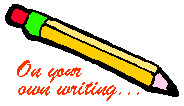
*The closed-cavity power data base was used to establish the gain generator run conditions at the various power points specified.*

In these examples, technical adjectives are so crammed together ahead of nouns that it's not even clear what they mean.

What can you do about strings of technical adjectives? If you're tempted to translate them into strings of prepositional phrases, **don't**! That's sometimes an improvement, but as you just learned, prepositional phrases are catalogers of ideas, too.

The first example above can be rewritten using a dependent clause:

The QX-7, which is the first pilotless aircraft to be built entirely of fiberglass, combines a range between 800 and 1000 miles with a low radar silhouette.

Haut du formulaire

Bas du formulaire

Now, take a paragraph or two of your own writing and underline any strings of technical adjectives. Rewrite those sentences using more analytical constructions.

**Lesson 5 : Orient your reader**

**SHOULD RULES DETERMINE PARAGRAPH LENGTH?**

The most commonly cited rule about paragraphs is **keep them short**. says to make your typewritten paragraphs no longer than your little finger. Most rigid rules like that are, of course, **nonsense.**

If your paragraphs seem too long, it's probably because you've wandered from the logical thread you started at its beginning. Check the final sentences and see if they are still directly related to your topic sentence at the beginning of the paragraph. If not, break it up.

If your paragraphs seem too short and choppy, you're probably jumping around between unrelated ideas. Try to combine logically related ideas from different paragraphs into larger units.

Length *in itself* has nothing to do with informing efficiently. A long paragraph can well be a sound and informative logical unit. **Cut off your paragraphs where there is a logical break in your reasoning.**

The only good reason I know of to keep your paragraphs short is that long stretches of words present a formidable visual image and make your writing *appear* hard to read. So, when in doubt, start a new paragraph.

**Lesson 6: Tying up your ideas**

**CONNECTIVES**

Here is a list of some connectives. Like the subordinating conjunctions, **these are the good guys**; use them liberally (but correctly and appropriately), and your writing will become more effective. They are hard to overuse.

**Connective words that describe relationships:**

|  |  |  |
| --- | --- | --- |
| ALSO | HOWEVER | ALTHOUGH |
| INCIDENTALLY | THEREFORE | BESIDES |
| LIKEWISE | THUS | MEANWHILE |
| MOREOVER | USUALLY | FURTHERMORE |
| NEXT | WHATEVER | GENERALLY |
| YET | ACCORDINGLY | NEVERTHELESS |
| INSTEAD | IN CONTRAST | FOR EXAMPLE |

**Connectives that give a sense of time:**

|  |  |
| --- | --- |
| FIRST | SECONDLY |
| FINALLY | NOW |
| ONCE | WHEN |
| ULTIMATELY | EVENTUALLY |
| LASTLY | LATER |
| MEANWHILE | PREVIOUSLY |
| THEN | SOON |
| FORMERLY | SOMETIMES |

**Other Connective phrases:**

|  |  |
| --- | --- |
| TO BEGIN WITH | ON THE OTHER HAND |
| IN BRIEF | IN GENERAL |
| IN SUMMARY | MORE SPECIFICALLY |
| INSTEAD OF | IN ADDITION TO |
| IN OTHER WORDS | ANOTHER WAY TO |
| FOR THE SAME REASON | NO MATTER WHAT |
| SUCH A | THAT'S WHAT (WHY) |
| IN FACT | WHAT'S MORE |
| IN THE SAME WAY | ON THE CONTRARY |
| CONVERSELY | AS A RESULT |
| SUMMING UP | IF SO / NOT |

**All of these words and phrases link ideas and assure continuity in your writing**.

Another useful principle to assure continuity in your writing and tie your sentences together is:

|  |
| --- |
| TRY TO HAVE A WORD OR PHRASE SOMEWHERE IN EACH SENTENCE THAT REFERS TO SOMETHING IN A PREVIOUS SENTENCE. |

An obvious way to ensure continuity in your writing is simple **repetition**; that is, carry the same nouns from one sentence to the next. For example:

Scientists map the winds and precipitation inside hurricanes by flying specially instrumented aircraft through them. **These aircraft** must withstand stresses of up to six times the force of gravity.

**INTENSIVES**

Another way to tie ideas together is with **intensives**. Intensives help you emphasize what's important and to set the important apart from the incidental -- a major goal of all scientific and technical writing. Compare the following two sentences, the first without intensives and the second with intensives added:

The whale is the largest living mammal. The largest whales weigh over 150 tons, are 100 feet long, and consume 5 tons of food each day.

The whale is **by far** the largest living mammal. **In fact**, the largest whales weigh **as much as** 150 tons and grow **as long as** 100 feet. These **enormous animals** consume 5 tons of food each day.

Notice how the bold words that have been added emphasize certain points the author deemed important.

Here is a list of some **useful intensives**:

|  |  |  |
| --- | --- | --- |
| ESPECIALLY | AS MUCH AS | EVEN IF/THOUGH |
| INCREASINGLY | BY FAR | SO...THAT |
| MORE IMPORTANTLY | HIGHLY | ONLY |
| PARTICULARLY | IN FACT | VERY |
| SIGNIFICANTLY | QUITE | SUCH |
| MOST | UNIQUE | AT ALL |
| ABOVE ALL | INDEED | IN ANY CASE |

**CAUTION:** Misusing or overusing intensives (most notoriously, the word **very**) can weaken your writing. **Use them like garlic -- sparingly**. Eliminate intensives that are thrown in gratuitously or that don't make a definite contribution by emphasizing an important fact or idea.

Here is an **exercise** to give you practice linking your ideas together. Add connectives, intensives (from the lists above, or make up your own) and repeated words to the following sentences to make a coherent paragraph:

* Global Airlines carried three-million passengers last year.
* They expanded their routes into the Pacific Northwest and Canada.
* The new DC-12 aircraft proved more fuel-efficient than the older 737's.
* Older, unprofitable routes were dropped.
* Passengers seem to like on-time flights and automatic ticketing.
* Only one-million passengers flew Global two years ago.
* Their record has been accident-free since 1950.
* Global planes have averaged 80-percent full last year.
* Profits were up 60 percent, in spite of increased fuel costs.

**...AND REMEMBER...**

|  |  |
| --- | --- |
| **CATALOG EFFECT:** | **ANALYTICAL WRITING :** |
| Prepositional phrases | Dependent clauses |
| Simple sentences | Complex sentences |
| Abstract nouns | Concrete nouns |
| Passive verbs | Active verbs |
| Impersonal style | Personal style |

The following article written by Susan E. Ross (©The Washington Post) provides an excellent and humorous writing sample for you to practice translating pretentious governmentese into everyday English:

|  |
| --- |
| **A BUREAUCRAT'S GUIDE TO CHOCOLATE CHIP COOKIES**  Total Lead Time: 35 minutes.  Input Modules:  1 cup packed brown sugar  1/2 cup granulated sugar  1/2 cup softened butter  1/2 cup shortening  2 eggs  1-1/2 teaspoons vanilla  2-1/2 cups all-purpose flour  1 teaspoon baking soda  1/2 teaspoon salt  12-oz package semi-sweet chocolate pieces  1 cup chopped walnuts or pecans  Guidance:  After procurement actions, decontainerize inputs. Perform measurement tasks on a case-by-case basis. In a mixing-type bowl, impact heavily on brown sugar, granulated sugar, softened butter and shortening. Coordinate the interface of eggs and vanilla, avoiding an overrun scenario to the best of your skills and abilities.  At this point in time, leverage flour, baking soda and salt into a bowl and aggregate. Equalize with prior mixture and develop intense and continuous liaison among inputs until well coordinated. Associate key chocolate and nut subsystems and execute stirring operations.  Within this time frame, take action to prepare the heating environment for throughput by manually setting the oven baking unit by hand to a temperature of 375 degrees Fahrenheit (190 degrees Celsius). Drop mixture in an ongoing fashion from a teaspoon implement onto an ungreased cookie sheet at intervals sufficient enough apart to permit total and permanent separation of throughputs to the maximum extent practicable under operating conditions.  Position cookie sheet in a bake situation and surveil for 8 to 10 minutes or until cooking action terminates. Initiate coordination of output within the cooking rack function. Containerize, wrap in red tape and disseminate to authorized staff personnel on a timely and expeditious basis.  Output:  Six dozen official government chocolate-chip cookie units. |