

## **Communication Hierarchy Analysis and Decision Making in Science and Technology Communication: How Much of What is Adequate for Desired Impact of Communication**

Leeladhar Kala  
Centre for Energy Studies  
Indian Institute of Technology  
Hauz Khas, New Delhi 110016 (India)  
ldkala@yahoo.com

**Abstract.** Science and the method of science and the subsequent analytical techniques have been the hallmark of modern development, be it in sciences or even in humanities. These analytical techniques have increasingly been put to use across the entire spectrum of knowledge generation and its application. Why science communication should be away from developing these tools for democratising the subject in the sense that more and more human resource can be turned friendly to science communication and hence to the advanced world of sciences. It is high time that science communication should be demystified from the guarded codes of inclinations and experience to simpler training of quantification of ingredients of science communication and be allowed to flourish in an increasingly science consuming society.

Communication Hierarchy Analysis has potential to be able to fill this gap. For this it has been found appropriate to expand the horizon of science communication and the concept of total transfer of knowledge has been introduced and this has been named Total Communication. For this to be able to make the concept vividly understanding, communication of technology has also been considered within the greater realms of science communication as we generally tend to apply the term to general use. This paper recognises the very fact that different levels of communication produces distinctly different results. Emergence of such an analytical tool required higher level of understanding of the subject of science communication in terms of various skill groups such as linguistics, story weaving, communication and entertainment mix, illustrations including graphical, etc. Sooner it can be done, faster the objectivity of sciences can

be imparted to science communication in particular and communication in general.

**Keywords:** Science communication, Science and technology communication, Communication hierarchy analysis, Total communication, Decision making tool

### **Introduction**

Communication is a complex phenomenon that apparently looks simple. Various inherent process involved in communication are—the ‘source’ identifies the subject (topic) to be communicated, identification of the ‘target’ (to whom it is to be communicated), the form of communication, the level of communication, the amount of knowledge intended to be transferred, the dimensions (degree) of communication tools (voice, text, image, etc. and their mix), the objective, etc. The act of communication also involves simultaneous evaluation of the ‘receptivity of the ‘target’ and gap between ‘achieved’ and ‘intended’ level of the understanding it has made on the target.

In face to face communication this simultaneous correction are made impromptu and hence is most preferred for communication with higher prerequisites such as curriculum communication (teaching). The capacities to achieve these corrections make one a good or a poor communicator (teacher). It is for this very reason that interactive form of communication provides best results and curriculum teaching essentially employs this in conventional terms. This means that a communication other than face to face has to integrate these ingredients to be the most effective and how to achieve this is the key to its success. This paper attempts at quantifying the various parameters and helping arrive at the right mix for a communication. The clarity and quantification practised in science can help communication decode the abstract terms of likes of skill, understanding, etc. and put in place a well defined measure for assessing the content and its likely impact on the target of communication.

### **Principle of ‘Communication Hierarchy Analysis’**

Different forms of communication achieve different results. Sometimes it just provides information. This again can be amongst the peers or homogeneous groups or between two groups where one sits higher on the knowledge

ladder and the other at lower levels. It is, at times derives different perspectives of the same information, sometimes diagonally opposite. Adoption of a new device in the automobiles to control pollution has different meanings an environmental scientists and to an ordinary taxi driver. This difference in perspectives generated by communication (by difference in the knowledge level hence different perception generated by a communication) makes way for various information grades in communication tools, which is necessary for amalgamating communication with complicated knowledge having societal implications and this is quite possible in science and technology (S&T) communication. It is therefore thought prudent here to analyse communication tools on the basis of this hierarchy in objectives and impact; delivery and acquisition; and literacy and knowledge prerequisites.

While first order hierarchy should infer hierarchy in basic communication delivery menus, such as speech alone, or together with text, visuals, caricature, audiovisuals, graphics, etc., the next order of hierarchy can definitely be objective linked. Here elements deriving importance should be retention, impact, knowledge level, level of enlightenment, etc., objective linked hierarchy is associated with the objective aimed to be fulfilled while carrying out communication activity. The author first proposed in the year 2009, the Principles and Basis for 'Communication Hierarchy Analysis' to understand the selection of the type of media, objectives achievable against the subject being taken up for communication activity and its nature. Ensuing classification satisfies this hierarchical understanding and the analysis subsequently completes the process involved.

### **Assumptions and Elaboration**

In order to develop the principle of Communication Hierarchy Analysis, a new concept named 'Total communication' was proposed. It has made possible where the human race stand today. At the very basis of this hypothesis, lies the need for the communication. But then, the question arises, what level and form of communication. This paper has already recognised and discussed above the very fact that different levels of communication produces distinctly different results.

Emergence of science required higher level of communication skills and all higher or derived forms of knowledge emerging out of

scientific advancements necessitated more effective forms of science communication. The concept of Total Communication is ever developing as itself the very tenets of science and technology. The concept of Total Communication necessitates highest extent of communication such that the source of that communication on knowledge front is matched by the receiver or the target to a great extent after the communication process is over.

### **'Communication Hierarchy Analysis'**

#### ***Dimensional hierarchy***

Verbal communication  
Written communication  
Visual communication (exhibits and displays)  
Audio-visual communication  
Hands on communication

#### ***Objective linked hierarchy***

Information  
Appreciation  
Understanding  
Learning  
Total knowledge acquisition

#### ***Subjective linked hierarchy***

Mass communication  
Specialised mass communication such as for children  
Education (training and teaching)  
Science and technology (mass) communication and  
Expert peer group communication

The Dimensional hierarchy is the first order analysis and deals with the very obvious analysis in communication. Whereas verbal mode is the basic but it is most essential. It can reach to every kind of target mass and it can also be utilised to reach common and specialised target audience. At the top of the hierarchy, here we have Hands on communication, which leaves minimal knowledge difference level between the source and the target. The methodology adopted here ensures that almost every aspect associated with the subject of communication is transferred to the target. The application of this method needs to be chosen keeping in mind the above effect (objective) namely Total Communication in mind, which the communication exercise is required to fulfil.

The Objective linked hierarchy is analysis based on objectives achievable through

a communication activity. Information may not require as deep involvement of all the acquisitive learning faculties of the target involved. Total knowledge acquisition on the other hand, requires greater involvement of acquisitive learning faculties of the target. The results here are of highest order.

Subjective linked hierarchy analysis seeks its basis in the subject of the communication activity. For mass communication the generalist strategy is put to use which takes note of some basic commonly

understandable concept to be communicated. Vocabulary usage depends upon this minimum understanding of the target associated with. Expert and peer group communication involves highly technical concepts and vocabulary in communication as 'expert' here becomes the 'generalist' (target). This group puts a lot of emphasis on the necessary skills and expertise of the communicator as well as of the receiver (target). Table-1 discusses the prerequisites demanded for the source and the target for Subjective Linked Hierarchy.

Table-1: Prerequisites for Subjective Linked Hierarchy

<b>Subjective linked hierarchy (increasing order)</b>	<b>Source prerequisite</b>	<b>Target prerequisite</b>
Mass communication	High knowledge level	Threshold understanding
Specialised mass communication such as for children	High knowledge level; Good communicative skills	Threshold understanding; Comprehensive skills
Education (training and teaching)	Higher knowledge level; Good communicative skill; Good assessing skills	High comprehensive skills; Expressive skills; Lower knowledge level
Science and technology (mass) communication	High know level; High communicative skills; Good simplification skills	Threshold knowledge level; Comprehension skills;
Expert peer group communication	Highly knowledgeable; Reasonable communicative skills; High comprehension	Highly knowledgeable; High comprehension; Reasonable communicative skills

### **Decision Making and Communication Hierarchy Analysis**

Most of the time two parameters at the most are provided to the communication designer – the target audience and the objective. Entire strategy for effective communication now involves a series of processes involving identification, quantisation and analysis before deciding exactly upon the format and content of communication to be used. Following series of steps are undertaken to complete the process.

1. Target audience–Provides information and enables decision on Dimension Hierarchy

Objective–Provides information and enables decision on Objective Linked Hierarchy

2. Both, the Target audience and Objective together enable decision on Subjective linked Hierarchy
3. These decisions enable quantification of level of Source prerequisites and Target prerequisites for each hierarchy
4. The combined output so collected from all the groups enable the communication designer to work out the nuts and bolts of the communication solution for a particular situation

This entire process has been explained graphically through a flow chart in Figure-1. The critical steps and issues involved during designing a communication solution is indeed a complex tasks requiring characteristic evaluation and deciding upon the structure and ingredients of a communication solution which will bear the greatest impact upon the target prescribed. Target audience and Objective when passed through the Dimensional Hierarchy Analysis and Objective Linked Hierarchy Analysis are able to decide upon the prerequisites based on these. That means now we know the requirements on the part of the source and the target as regard to the dimensions of communication must be involved.

From consideration on the objective too the exercise is able to quantify prerequisites for both. It is now for the designer to employ Subjective Linked Hierarchy Analysis and complete the process for obtaining the solution for a communication need.

**Science and Technology Communication**

Science and technology (S&T) communication belongs to the Subjective Linked Hierarchy in the Communication Hierarchy Analysis. The need for S&T communication arises from the input provided by the previous two hierarchies, namely, Dimensional Hierarchy and Objective Linked Hierarchy.

**The process of Communication Hierarchy Analysis**

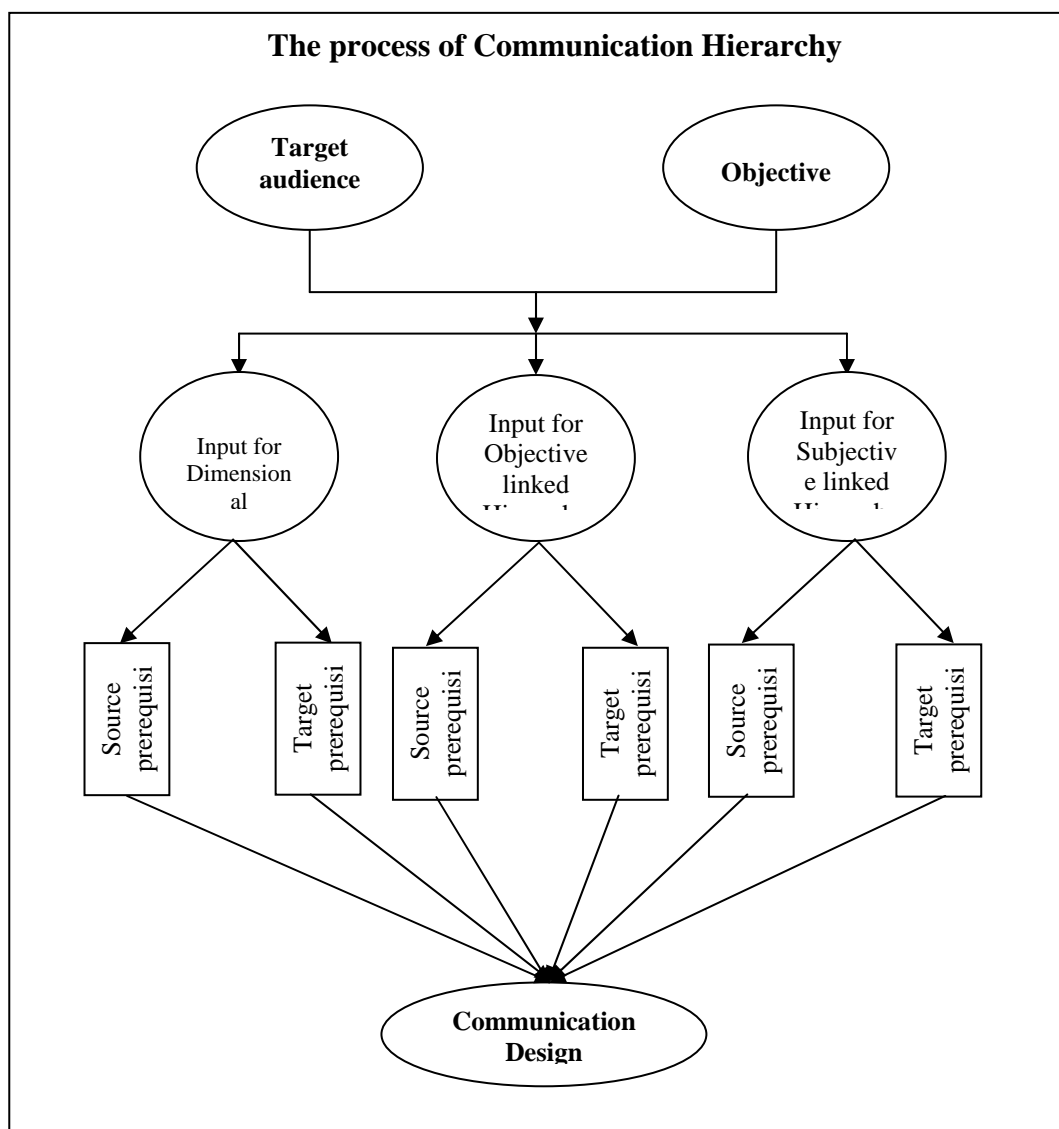


Figure. 1 Illustration depicting decision making requirements during designing of a communication solution

A communication designer now needs to take several set of decisions pertaining to source & target prerequisites and content prerequisites except one or more set which has been provided as the preliminary information. There emerges clear cut picture now for the source and target prerequisites after the entire analysis. It is now extremely easy task to draw lines for the content and hence its presentation.

While working for science and technology communication, it can be easily understood that the hierarchies belong to higher level. Complex subject relates to possessing higher degree of hierarchy and difficult becomes selection of the objective. Also, if you are required to select higher degree of hierarchy in any of the two groups, then there are some threshold prerequisites for the target to have already acquired in terms of the knowledge level associated with. This can very well be defined by the communicator involved. More importantly this can not be universal, every communicator has to evolve for his way of handling of the communication tasks and his expertise with the tools of communication to be put to use. But one thing can be very well understood that this is due to the different level of experience, skills and knowledge level of the communicator (source) and hence all the more necessary for a communication designer to specify the source prerequisites very carefully.

Technology communication in particular has another dimension. It is of transfer of technology. This is much more complex a task but relatively easy to carry out if all the requirements are met, as the 'source' and the 'receiver' both are in the highest state of effective 'transmission' and 'reception' of knowledge.

### **Conclusion**

In designing a communication, there are several components (ingredients), which are required to be decided on the basis of the impact likely to be achieved. Conventionally it has been purely on the basis of experience and knowledge of the communicator. In the era of specialisation, communication is best designed by specialists, namely, communication designer. This is difficult in fulfilling as is difficult in concept level itself. Not anymore with a decision making tool for communication design, called – Communication Hierarchy Analysis. This involves analyzing the communication requirements on the basis of Dimensional hierarchy analysis, Objective linked analysis and Subjective linked analysis. Based on these, source and target prerequisites can be ascertained and the contents of the communication, its format and presentation can be worked out. This tool can be an asset especially while working in the area of science and technology communication.

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