



Paths of Communications

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1 Introduction

It is a paradigm of economy that an organization has to grow (increase output) in order to prosper. Growth can be achieved with increased productivity. In most cases it also means adding staff.

This paper looks at the effect that adding staff has on the internal communication within an organization, on a purely mathematical basis.

2 Paths of Communications

2.1 Definition

A path of communication exists between any two people in a group. In a group of two, you have one path of communication. If you add a third person, the number of paths increases to three, add a fourth person, and the number of paths is already at 6, etc.

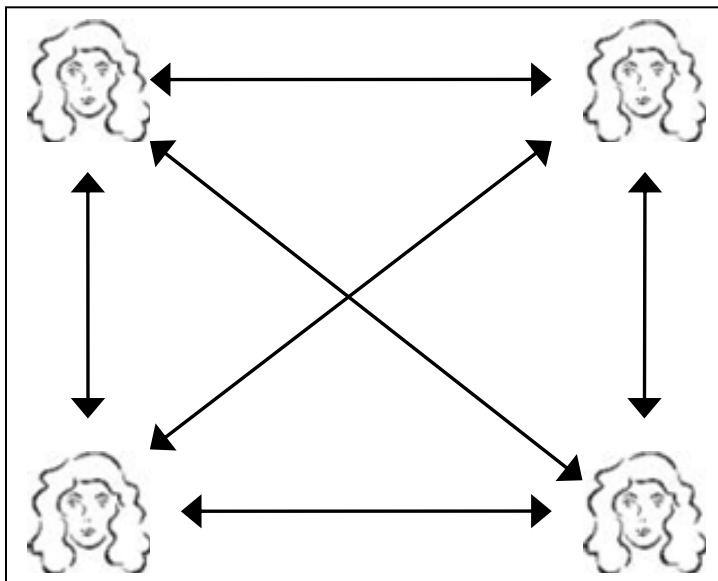


Fig. 1: the 6 Paths of Communications between 4 people

2.2 Bigger Groups

Looking at bigger groups, the number of possible Paths of Communications (PoC) grows roughly with the formula

$$\text{PoC} = n^2 / 2 \quad (\text{With } n \text{ being the number of people in the group})$$

(the bigger n the more accurate the formula, for smaller n it is slightly less)

Organizations follow the same basic laws. Even if one might rightfully object, that not everyone has to communicate with everyone in an organization, it is probably a safe assumption that the number of 'active' Paths of Communications grows accordingly (if the headcount doubles, there are roughly 4 times the number of active Paths of Communications to cover).

Fig. 2 shows the relationship between the number of possible Paths of Communication and number of Participants.

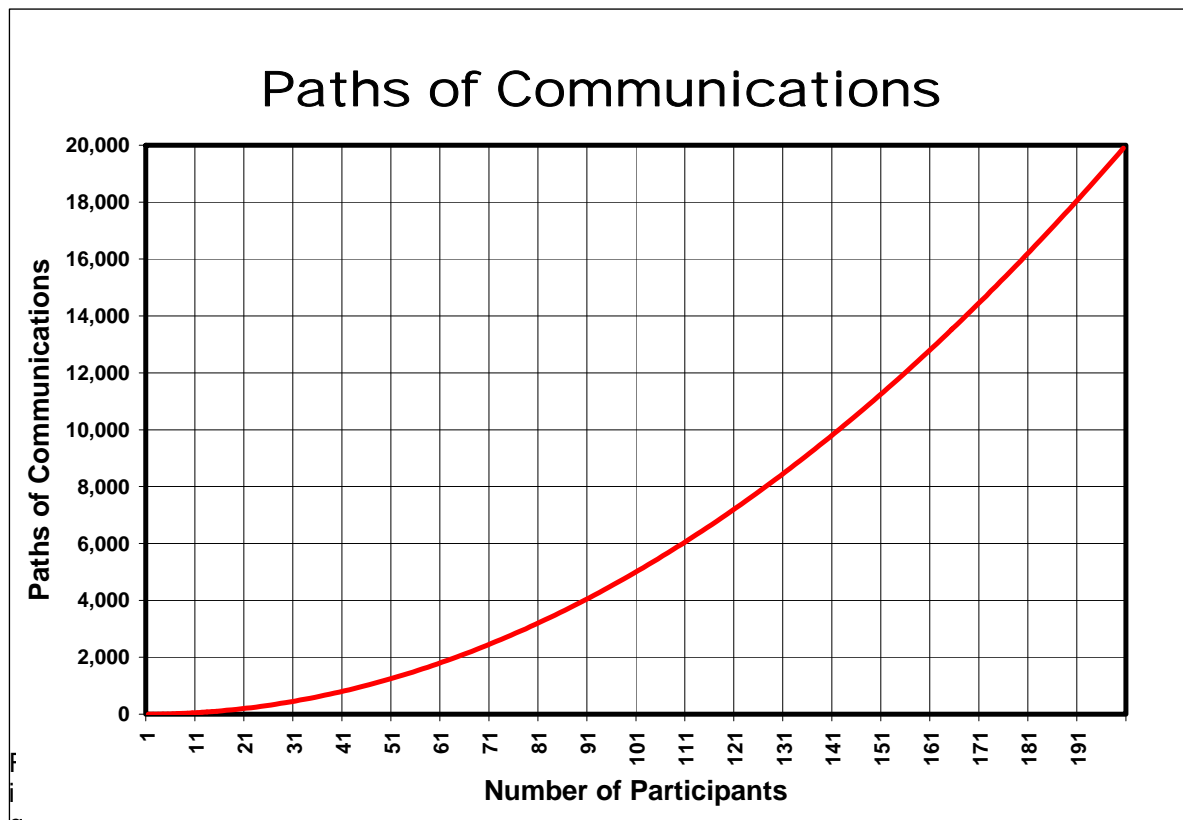


Fig. 2: Paths of Communications = f (Number of Participants)

2.3 Additional Factors

In very small organizations all people involved are often concentrated in one single office. A lot of information is 'distributed' by involuntarily overhearing what is going on.

As an organization grows, functions become more specialized. With increasing workload the duties of one single individual are 'reorganized' into the tasks of one or even several departments. It is also no longer possible to have all the people work in the same office, and even if they do, they are not able to 'overhear' what is going on. In other words, passing on or gathering the information needed is not only complicated by the increased number of Paths of Communications, but also by the geographical separation between the individuals.

3 Conclusion

The increasing size of an organization increases the complexity of disseminating information and data over-proportionally. E.g. if you increase your headcount by 10% per year for two years, your organization has to handle roughly 50% more 'Paths of Communications'.