



### Introduction

**"Scientific teams" are a new basis with which Muslims changed the way of thinking of former scientists. For the first time in history, Muslims formed an integrated scientific team that included more than a scientist specialized in more than a field. Eventually, they provided us with a useful integrated work, which would not see light unless it relied on more than a scientific specialization.**

### First Scientific team in History

**Sons of Musa ibn Shakir (Muhammad, Al-Hasan and Ahmad) were the first and the most famous scientific team in history. Muhammad was an engineering scientist; Ahmad was an astronomer; and Al-Hasan was a mechanist. Working together, they composed Kitab Al-Hiyal, which reflected the spirit of scientific team directly. The book embodied the principle of teamwork that is based on cooperation. The whole book was written in a plural form. For instance, Muhammad, Al-Hasan and Ahmad said in their book: "We wish to explain how a beaker is made in which a quantity of drink is poured, and if the quantity of an amount of drink or water is added to it all its contents are discharged." [1] "We wish to make a jar with an open outlet: if water is poured into it nothing issues from the outlet, and if pouring is stopped the water issues from the outlet, and if pouring is resumed [discharge] ceases again, and if pouring is stopped the water discharges, and so on continuously."**

**[2]**

**"We wish to explain how we make two fountains from one of which something like a lance discharges and from the other something like a zipper discharges."**

**[3]**

**There are many other examples, which reflect the mature mentality of the sons of Musa ibn Shakir as an integrated scientific team. Such examples also reflect the importance**

and the value of teamwork in the scientific field.

There is no doubt that such integration and mix of various specializations between those brothers led them to reach scientific facts that were difficult to reach without teamwork. These facts include the accurate calculation of the diameter of the earth, and the manufacture of the huge astrolabe that enabled astronomers to calculate the position of the sun and other major nearby stars with respect to both the horizon and the meridian.

This was not confined to that distinguished scientific team, but it recurred in many other branches of science. There was noticeable cooperation between physicians, pharmacists, botanists and zoologists, and also between geologists, geographers and astronomers, and so on.

This happened between the famous physician Al-Razi and his students. Ibn Al-Nadim relates in his book *Al-Fihrist* (index) that "Al-Razi was a unique physician at his time. He had the knowledge of ancient scientists, especially physicians. He used to travel. He used to be surrounded by several circles of students. When some patient arrived, he asked about his illness, this question was passed on to students of the first circle. If they did not know the answer, it was passed on to those of the second circle and so on and on, until at last, when all others had failed to supply an answer, it came to al-Razi himself. Al-Razi was a very generous man, with a humane behavior towards his patients, and acting charitable to the poor. He used to give them full treatment without charging any fee, nor demanding any other payment." [4]

Al-Razi's students were scientific teams, each of them used to propose their opinion about a certain issue until they reach a conclusion. Meanwhile, Al-Razi used to listen, follow up and correct their opinions after he discusses the issue with them!

This was not confined to life science only, but it also included the religious domain. Religious groups used to meet to discuss a certain issue, seeking the help of scholars of Qur'an, hadith, jurisprudence, faith, and others, thus enriching the scientific movement and developing it quickly.

**[1] Sons of Musa ibn Shakir: Kitab Al-Hiyal, explained by Ahmad Yusuf Al-Hasan and others, Arab Scientific Heritage Institute, 1981, p 57.**

**[2] Op cit, p 9.**

**[3] Kitab Al-Hiyal, p 356.**

**[4] Ibn Al-Nadim: Al-Fihrist, p 356**