As teachers, we all want to make the mathematics we teach more ‘alive’, more ‘realistic’ and more ‘accessible’.
By making it more ‘alive’ we want to attract our pupils to learn mathematics, simply to make it more interesting, even though it is not an easy subject. By making it more ‘realistic’ we want to show that we need mathematics in everyday life, although we very often do not realise this. By making it more ‘accessible’ we want to make mathematical skills available to as many pupils as possible, although every one has different potentials and possibilities in this area.

To put our principles into practice very often we try to use ‘real world’ problems in our teaching. It is important to be aware that these problems are usually very complex, and to solve them we need a wide range of knowledge and experience.
A good example of this is the description of movements. To do this we have to build an appropriate mathematical model. We have to simplify the situation by excluding a lot of unimportant elements (according to our aim) from the description, such as the kind of light or our state of health, and by extracting important things (according to our aim) such as emerging forces or the time/speed correlation.

One can ask the important question:
“*Is it possible and worthwhile*
to use mathematical models of ‘real world’ problems
in mathematics teaching?”
My answer is yes, and by using the situation of welcoming I would like to show some of advantages of this approach.

When we meet someone for the first time we usually welcome each other. I use this fact to start one of my workshops. After this greeting, I usually ask the question: *How many acts of welcoming took place?* This is not an easy question to answer. Firstly, because no one paid much attention to it during the actual welcoming, and secondly because I (on purpose) disturb the order (if any emerged). So, to arrive at an answer we have to make clear our purpose before the action, so that is possible to quantify the amount of welcoming that takes place. Then we repeat the experiment.
We can avoid repeating the experiment by using mathematics to give the answer, but only under certain conditions. So, during the discussion we first of all find out the necessity of making order. While we are establishing the order, we have to start from defining the object of our considerations – what we will consider as a welcome. We also have to define the rules which we think it is reasonable to follow to receive the proper answer – e.g. everybody has to welcome each person and does it only once. Only now, after fulfilling all these basic criteria, can we start to solve our problem. Usually when we use ‘real world’ situations as problems, we do not have clearly defined statements which we should prove . So, we have an opportunity to set hypothesis and by using our knowledge and skills to prove or refute them.

The main advantage of using ‘real world’ problems in teaching mathematics is the natural way in which the processes mentioned above in bold appear. And also by going through this process with our students, we teachers make our teaching more ‘alive’ and ‘accessible’.

But once we have built a mathematical model of something we have to be very careful when using it. For example from the film entitled "Sight" we learn that *colour-blindness (not distinguishing red and green colours) affects 1 in 20 men, and the proportion is much lower among females.*

So, if we were asked the following questions:

How many people do we have to examine in order to find 20 colour-blind people?

How many colour-blind people might we find (according to the statistics) if we examine 100 women?

a lot of us make a mistake, by giving the answer 100 to the first question. But when we take a closer look, we notice that we do not know exactly if we examine men, women or a mixed group of people. But even when we assume that we examine only men we cannot be sure that 100 will be enough. Why? Because we could be very unlucky and not find a single colour-blind person even if we examine one million people.

In the second question there is the clue, that answering it we could rely on the given statistics. And although we have no exact information from the film as far as the proportion among females is concerned, we can give an answer to this question.

As teachers, we should be very careful when preparing our teaching materials involving 'real world' problems. As an example of this we could use other information from the film "Sight". We learn that *we blink about 17 000 times a day, and so during one day through blinking we close our eyes for over ½ an hour*. It is a very nice proportion, so to practise understanding of this concept we can ask the following questions:

How many times (according to the statistics) will one person blink during one week? And so through blinking how much time will she or he have their eyes closed?

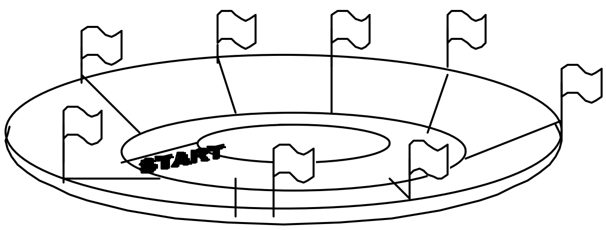
How many times (according to the statistics) will one person blink during one hour? And so through blinking how much time will she or he have their eyes closed?

We are quite safe with the first question, but the second one could cause a lot of problems. Because when we ask about a period of time shorter than a day we have to state precisely which hour we consider – during the day or night. Moreover we have to establish how many hours "a day" contains. Now it is not a simple proportion, and the reason for this is the 'real world' origin of the situation used.

We should also consider the things which surround our tasks (e.g. pictures) as well as our pupils' experience. If for example we have a task:

There are 6 flags surrounding in equal distances the school running truck. Yesterday our team practised racing. We started from the first flag. Eve needs 30s to run to the third flag. Using this information find out how much time she needs to run to the sixth flag?

And if this text is accompanied by a picture like this:



we have to establish if when solving the problem, we should rely more on the text or on the picture. From my experience I have learnt that pupils treat the picture more seriously than the text!

The next problem which can appear is that of pupils' experiences, which influence their understanding of the problem. For example, pupils analysed the above mentioned problem, mainly based on their experience, so felt uncertain – the running which they knew from 'real life' was straight not round. So we, as teachers, should try to predict problems connected with pupils' previous experiences, and so prepare our students in a better way to cope with problems they could meet in their lives.

Of course, we could use given opportunities in the field of teaching mathematics (all of the presented cases) to make our pupils more aware of what they are doing, but when we fail to predict potential traps, using 'real life' problems could cause problems.

In my presentation I have pointed out some situations which give us opportunities to teach our pupils in a better way – the advantages of using 'real life'. But also I have mentioned some of the difficulties, which could appear during this kind of work – their disadvantages about which teachers should be aware, while preparing their materials for pupils. So now, we appreciate the need for *Connecting Mathematics Problem Solving to the Real World* during our teaching practice, while at the same time being conscious of the need to make pupils aware of mathematical modelling and applications of mathematics. How to do this in a reasonable and effective way, is one of the main problems connected with current mathematics teaching.