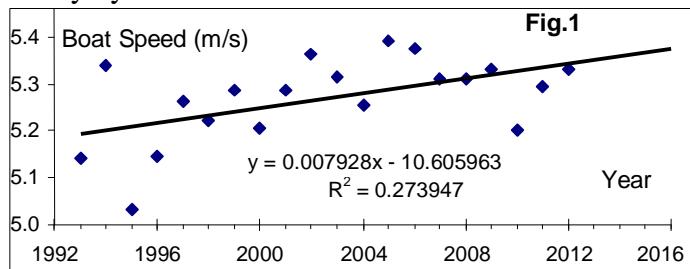


Race analysis after Olympics-2012

As usual, after four years of the Olympic cycle we analysed performances in World rowing regattas.

- To define general boat speed trends, we used a different method compared to previous publications, where speed was analysed based on winners and finalists of the world championships and Olympics. In fact the World Best Times (WBT) were not always shown in the finals, which we saw this year: six WBT were set during the heats of the World cup in Lucerne and one in London 2012. Therefore, we used a different approach: the Best Times of the Year (BTY) were derived from the past 20 years 1993-2012 (Before 2000 the data was only available for World regatta finals).

It was found that the trend of average boat speed in 14 Olympic events grew by 0.79% per year (Fig.1). The time factor explains 27% of the performance variability and the rest is explained by other factors, mainly by weather conditions.



Using the trends in each event, we derived "Gold Times" for the year 2016 (GT2016) using the following method: if the statistical value was better than WBT, the first one was used; otherwise the value in the middle between it and WBT was used. The last column "New WBT" in the following table shows the year, when the new WBT is expected based on the current trend of BTY:

| Event | WBT | WBT year | Growth | GT2016 | New WBT |
|-------|---------|----------|--------|--------|---------|
| M8+ | 5:19.35 | 2012 | 1.89% | 5:19.5 | 2017 |
| LM4- | 5:45.60 | 1999 | 1.87% | 5:45.7 | 2016 |
| M4x | 5:33.15 | 2012 | 1.84% | 5:34.0 | 2019 |
| LW2x | 6:49.43 | 2012 | 1.55% | 6:48.2 | 2015 |
| W8+ | 5:54.17 | 2012 | 1.51% | 5:54.2 | 2016 |
| W4x | 6:09.38 | 2012 | 1.16% | 6:11.1 | 2024 |
| LM2x | 6:10.02 | 2007 | 1.13% | 6:09.6 | 2015 |
| M2- | 6:08.50 | 2012 | 0.78% | 6:10.8 | 2024 |
| M4- | 5:37.86 | 2012 | 0.54% | 5:41.0 | 2029 |
| W2x | 6:38.78 | 2002 | 0.30% | 6:41.1 | 2027 |
| W1x | 7:07.71 | 2002 | 0.26% | 7:11.6 | 2038 |
| W2- | 6:53.80 | 2002 | 0.24% | 6:55.1 | 2021 |
| M2x | 6:03.25 | 2006 | 0.22% | 6:05.4 | 2029 |
| M1x | 6:33.35 | 2009 | 0.19% | 6:34.4 | 2020 |

The lowest growth of 0.2-0.3% per year was found in M1x, M2x, W2-, W1x and W2x, i.e. in small boats (SB), in the open category; except M2-. The longest "waiting period" of 10-26 years till new WBT is expected here. The future will show us, if this

is evidence of achieving the limit of performance, or whether it's just a temporary stagnation related to the current generation of athletes, coaches and training technologies?

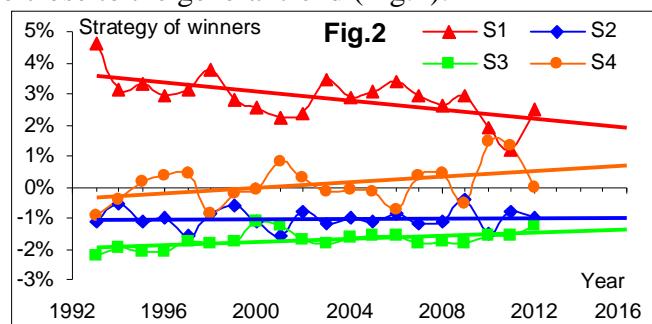
Conversely, **trends in lightweights (LW) and big boats (BB) show quite a high growth 1.1-1.9% per year**, so we can expect significant progress in these events. Here we observed a much tougher competition for medals in London-2012, where average margins within medallists were 2.3s in LW and 3.1s in BB, compare to 5.4s in small boats. We can only speculate that the progress in LW is related to a wider selection of athletes of average size. In BB, the likely reason is the rise in centralized professional systems of athlete's development in many leading rowing nations, which facilitates the matching of better rowers for longer periods of time and achieving better training and synchronisation in the crew. We would be very grateful for your ideas in this area.

- Unfortunately, GPS data was not available for the London-2012 Olympic regatta due to IOC ownership of the results. We hope, it'll be published soon and suitable for analysis of stroke rates.

- In RBN 2008/09 we predicted the average race strategy of the winners in 2012: +2.5%, -1.1%, -1.4%, +0.2%. The winners of London-2012 expectedly showed the strategy of +2.5%, -1.0%, -1.3%, 0.0% on average, which is very close to our forecast.

| OG2016 | Gold | Silver | Bronze | 4th | 5th | 6th |
|---------|-------|--------|--------|-------|-------|-------|
| Start | 2.5% | 2.2% | 2.5% | 1.9% | 2.5% | 2.9% |
| 2nd 500 | -1.0% | -1.3% | -0.8% | -1.1% | -0.8% | -0.9% |
| 3rd 500 | -1.3% | -1.4% | -1.5% | -0.8% | -1.6% | -1.6% |
| Finish | 0.0% | 0.6% | 0.0% | 0.2% | 0.0% | -0.1% |

The table shows that there is no significant difference between the finalists: the winners, bronze medalists and 5th place takers used very similar race strategies. This suggests that **now the races were won because of proportionally faster boat speeds in all sections of the race** and most of competitors' strategies are close to the general trend (Fig.2).



From the current trends we can forecast the following typical strategy of the winners for 2016: +1.9%, -1.0%, -1.4%, +0.7%. Which means **the boat speed during the race is becoming more and more even**.