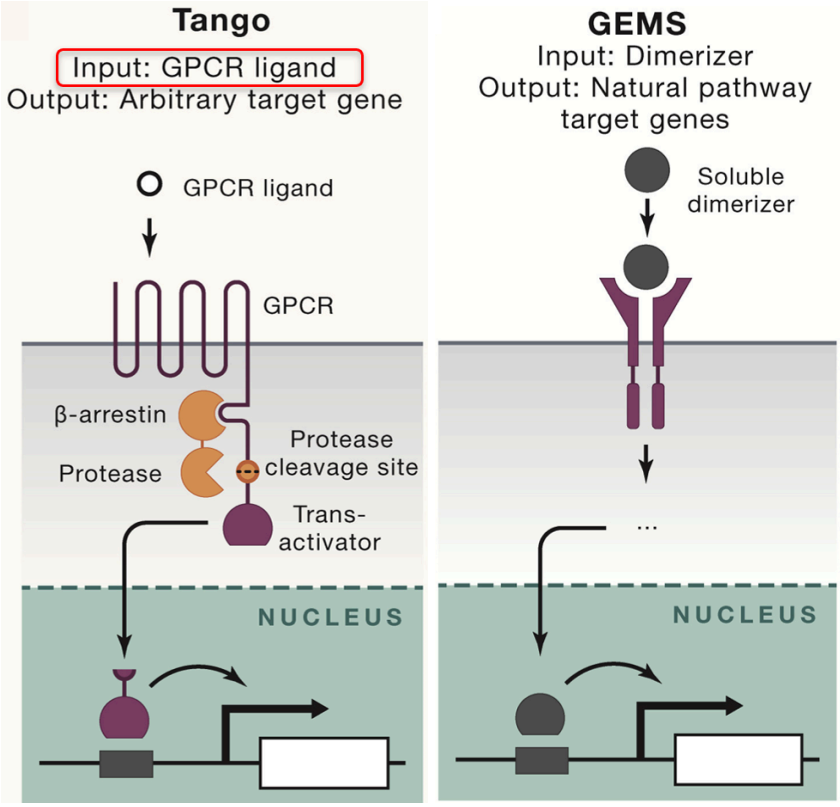
# Cell Engineering - Exercise Session 1

Please note that this exercise session is graded, and that each student will have to submit an individual report.

## The Tango-GEMS system

We described in class the TANGO and the GEMS systems (see image below), each with its unique advantages and drawbacks. While TANGO is limited to natural input ligands but can have an arbitrary output, GEMS can sense "non-native" ligands but its output is limited to intracellular signaling domains that activate through dimerization.




**Question 1a)** Could you think of a more advanced sensor system that combines the strength of both TANGO and GEMS? Discuss the advantages of your advanced sensor system compared to the drawbacks of the regulatory mechanisms governing TANGO, GEMS. Please provide a clearly labeled schematic drawing of your advanced sensor system and explain your design.

**Question 1b)** Discuss one potential application where the combined capabilities of your advanced sensor system could be particularly advantageous.

**Question 1c)** You notice that your "advanced sensor system" shows high basal activity even in absence of your input molecule. Name one potential reason for this.