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A NEW PROCESS FOR THE PRAGMATIC CHOICE OF WIND MODELS IN COMPLEX TERRAIN

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PROJECT FACILITATED BY WINDFORS:

Overall coordination	Hochschule für Technik Rapperswil (HSR)			
Management	HSR		Hochschule für Technik Esslingen (HSE)	
Implementation	HSR	Meteotest	HSE	Stadtwerke Tübingen
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Site data provision		ewz	Enercon	ADEV
	Others tbd			

ACADEMIC AND INDUSTRY RESEARCH PARTNERS:



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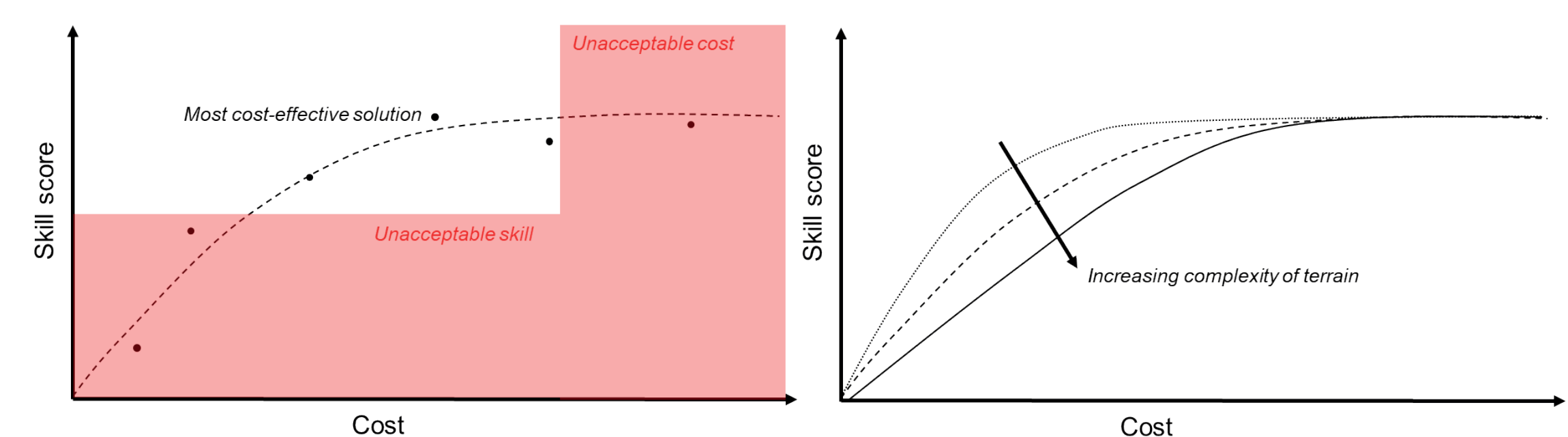
OUR GOAL IS TO HELP FIND THE RIGHT MODEL FOR THE JOB:

Challenge: there are currently no guidelines or tools available to the wind resource modeller to help choose the most appropriate wind model in terms of accuracy and costs, and the incorrect choice of tool can be catastrophic for investors or acquirers of wind parks.

Solution: development of a new industry-relevant decision process for selecting the wind model that gives the best results with the least computational effort and costs for any given wind energy project, with a focus on complex terrain.

Benefits: quicker and more reliable choice of wind resource assessment tool, optimal usage of resources and optimal accuracy of results.

THE MODELLER NEEDS TO FIND THE OPTIMUM SKILL-COST RELATIONSHIP:



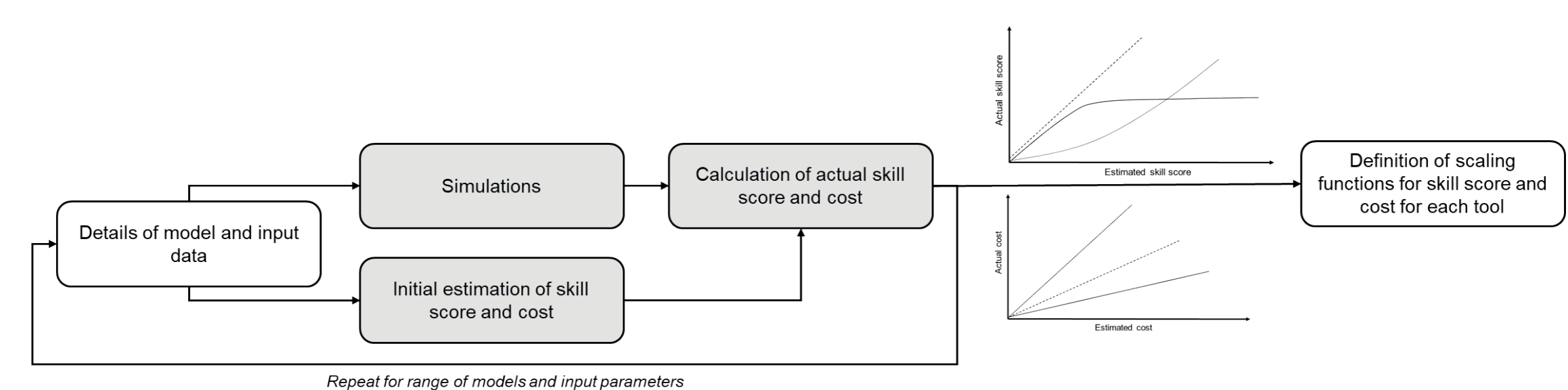
SOME SKILL AND COST PARAMETERS CAN BE DEFINED BEFORE CARRYING OUT SIMULATIONS:

Skill score (estimated)		Costs (estimated)
Model	Input data	Software costs
Aerodynamic assumptions	Site characteristics (terrain, atmosphere)	Time to learn model and training costs
Thermodynamic assumptions	Quality of comparison data	Changes to standard processes
Algorithm accuracy	Quality of site characteristics data	

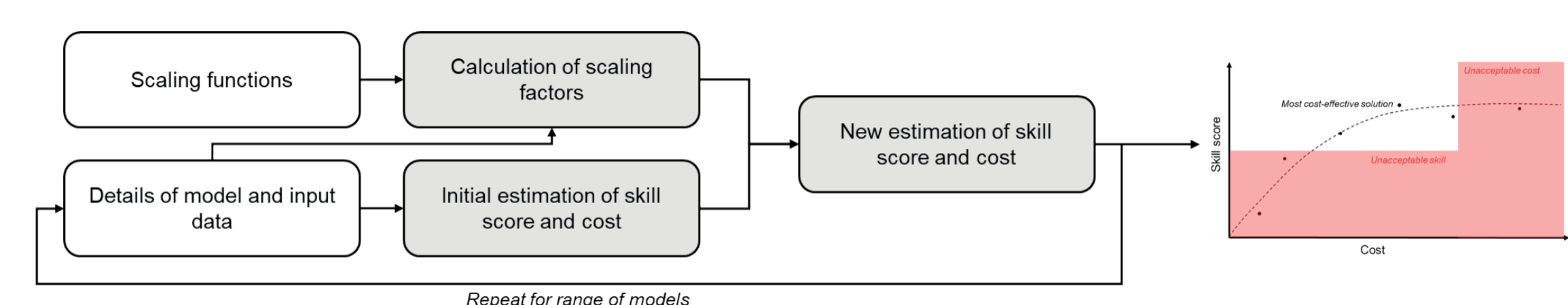
SOME SKILL AND COST PARAMETERS CAN ONLY BE DEFINED AFTER CARRYING OUT SIMULATIONS:

Skill score (actual)			Costs (actual)
Comparison simulation - measurement			Model run-time
Value	Resolution		Model set-up time
Wind speed	10-minute average	1 Hz time series	
Shear factor	Absolute difference	Correlation coefficient	
Turbulence intensity	Relative difference	Fraction of predictions within a factor of two of the observations	
		Fractional Bias	
		Normalized Mean Square Error	
		Geometric Mean	
		Geometric Variance	
		Figure of Merit	
		Measure of Effectiveness	
		Hit Rate	

SCALING FUNCTIONS THEREFORE NEED TO BE DEVELOPED VIA A RANGE OF SIMULATIONS BY VARYING THE INPUT PARAMETERS:



THE NEW SCALING FUNCTIONS CAN THEN BE APPLIED TO ESTIMATE SKILL SCORE AND COST WITHOUT CARRYING OUT SIMULATIONS:



Find out more: <https://www.windfors.de/en/projects/pragmatic-wind-modeling/>

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