



Co-designing a climate service for winter tourism business in Northern Finland for reducing uncertainty in decision-making



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Photo credits: Ilona Mettiäinen, AC UoL

Downhill skiing as a “canary in the coalmine”

- Winter tourism industry strongly dependent on climatic conditions for economically successful operation
 - Downhill skiing as an indicator of the impacts of climate change
 - Fewer snow-cover days and delay of winter in Northern Finland in the future
- Snowmaking and snow storage are increasingly important for ensuring early beginning of the skiing season

Snowmaking as an adaptation strategy

- Snow-making and storing of snow are common adaptation strategies in skiing centers
 - Important for snow security; used for ensuring early season start
- Snowmaking important expenditure
- Adaptive strategies can be reactive or proactive, and contribute to climate change mitigation (adaptigation) or be maladaptive
- Snowmaking potentially maladaptive like airconditioning, if done based on fossil fuels (unlike in Ruka that uses renewables)? Economically devastating reactive adaptation strategy due to the increasing costs?

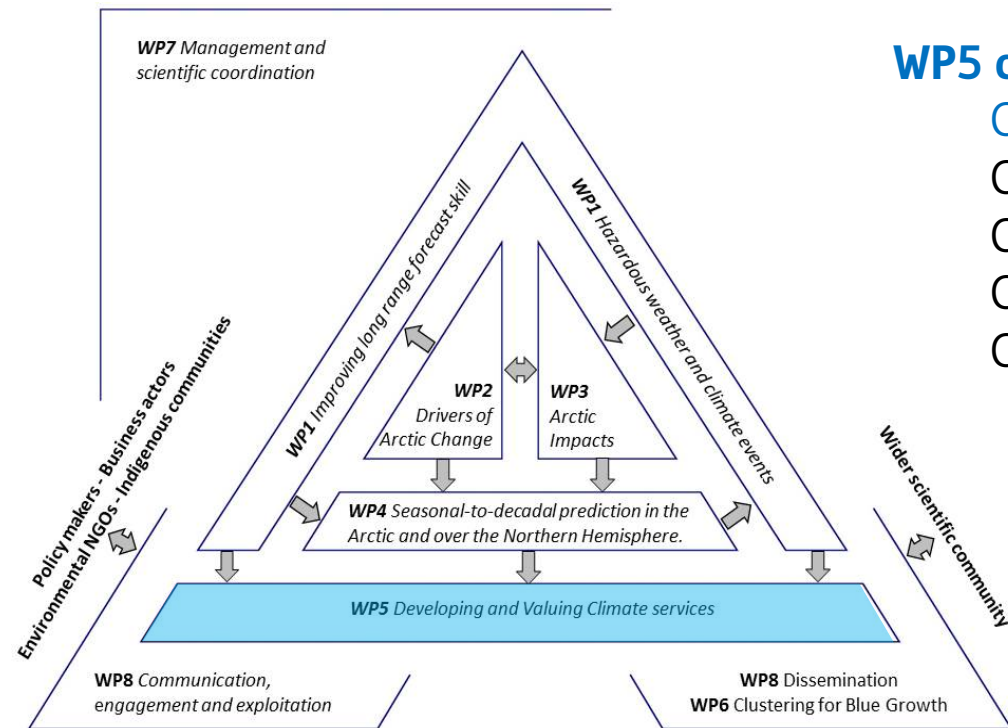
Climate services

The European Commission's Roadmap to Climate Services 2015:

*"[T]he transformation of **climate-related data** — together with **other relevant information** — into **customised products** such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices, development and evaluation of solutions and any other service in relation to climate that **may be of use for the society at large**. As such, these services include data, information and knowledge that **support adaptation, mitigation and disaster risk management (DRM)**."*
(EC 2015)

- In short: **the provision of relevant climate related information in a way that is meaningful for the end-user and assists its decision-making**

Five case studies on climate services in the Blue-Action project (EU Horizon2020)



WP5 case studies co-design climate services for different fields:

- CS1 Winter tourism centers in Northern Finland
- CS2 Temperature-related human mortality in European regions
- CS3 Extreme weather risks to maritime activities
- CS4 Climate services for marine fisheries
- CS5 Yamal 2040: Scenarios for the Russian Arctic

More information: www.blue-action.eu

RUKA skiing center as the end-user and business partner in CS1



RUKA skiing center in Northern Finland



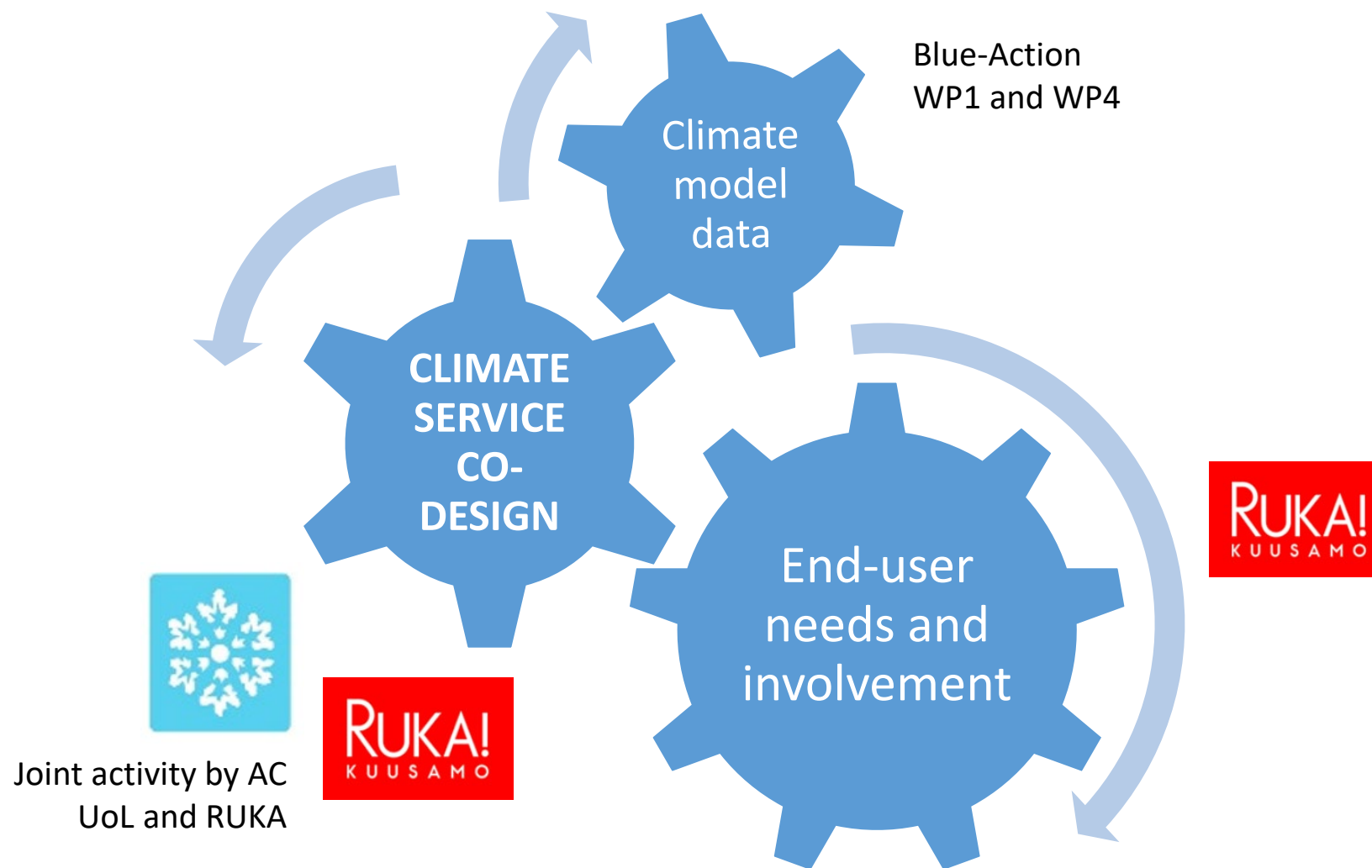
- Awarded Finland's Best Ski Resort in the World Ski Awards 2014
- Market leader in ski resort industry - nearly 20% share of ski pass sales, turnover of approx. EUR 26 million annually, 380,000 visitors and employs about 170 people
- 34 slopes, 21 ski lifts and chairlifts, lift capacity of 25,400 skiers per hour
- Summit height = 492 m, longest slope = 1300 m
- 200 ski days per year
- Forerunner in environmental programs:
 - Green energy (hydropower and biomass)
 - Carbon neutral
- Strategy to be the most snow-secure resort in Europe



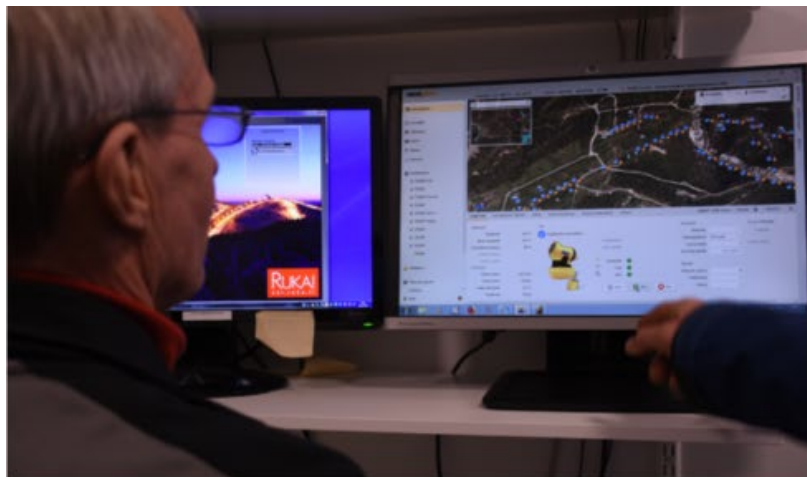
Better climate and weather information for Ruka

- When to make snow by snowmachines?
 - 30 x difference in snowmaking costs depending on the conditions
 - Need for better forecast on snowmaking and snow storage conditions
- Weather conditions influence also seasonal decisions
 - opening of the skiing season: e.g. recruitment, marketing, spreading of snow, possible additional snowmaking
- Reducing uncertainty on future climatic conditions help with longer-term investment decisions

Climate service co-design in our case study



Fieldwork and co-design including visual working methods, learning cycles



Fieldwork, workshop and case study meeting in February 2018 in Ruka
Credits: Ilona Mettiäinen, AC UoL (photos 1, 3-4), Jusu Toivonen, RUKA (photo 2)

Snowmaking:

- For slopes: **Oct-Nov**
- For storage **(Dec)-Jan-(Feb)**

All slopes open by the 2nd week of **November** (natural snow, man made snow)



Skiing season start: **Early October** (2 slopes)



Snow storage **Jan-Sept**
- Up to 30-50 % loss of volume

Decision to start the downhill skiing season on **5 Oct 2018** was made in **January 2018** based on stored snow

Knowing in Jan about poor snowmaking conditions in Oct -> making more snow in Jan

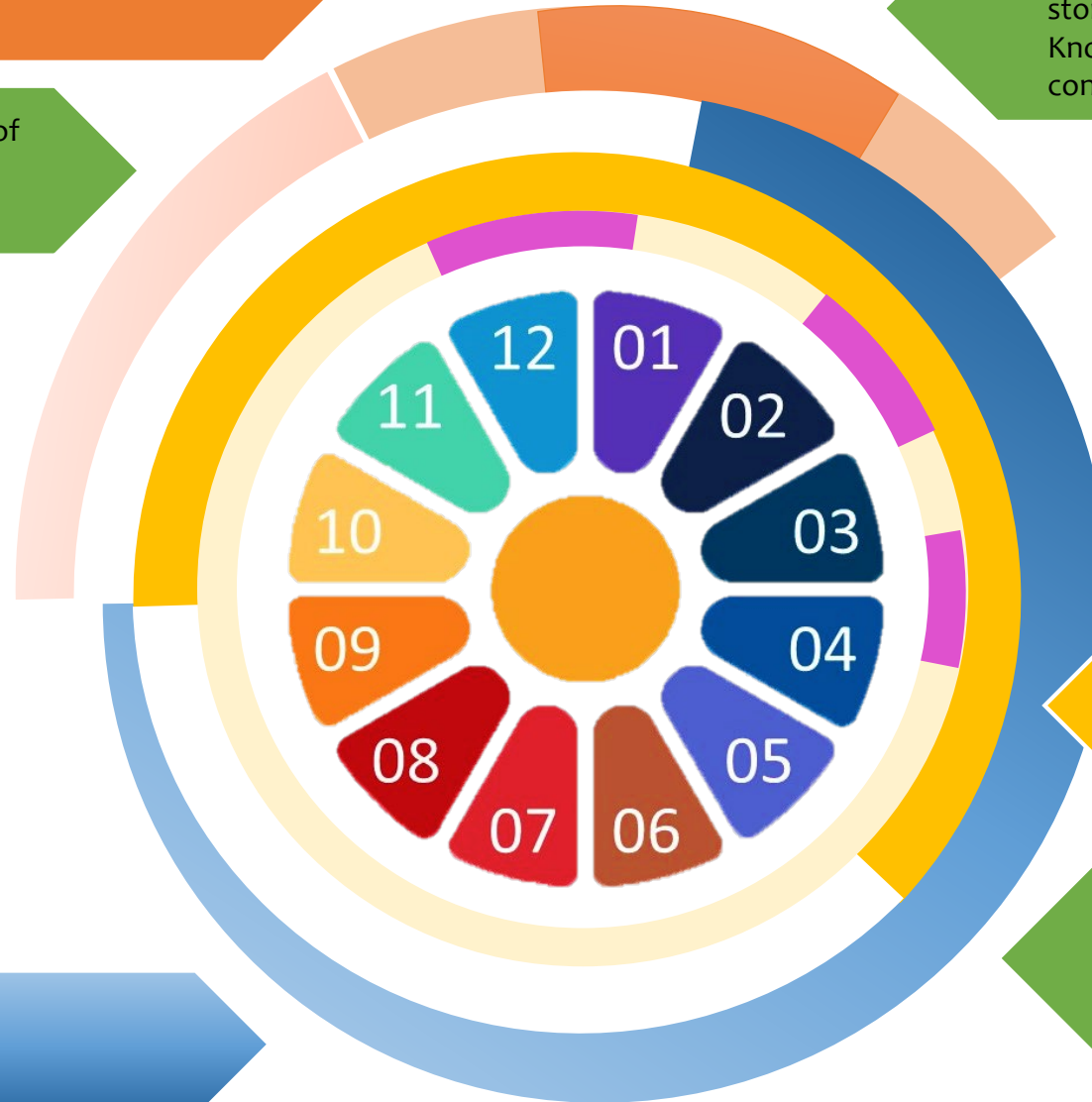


Skiing season **Oct-May**

Peaks: Christmas, Skiing holidays, Easter

May-July:

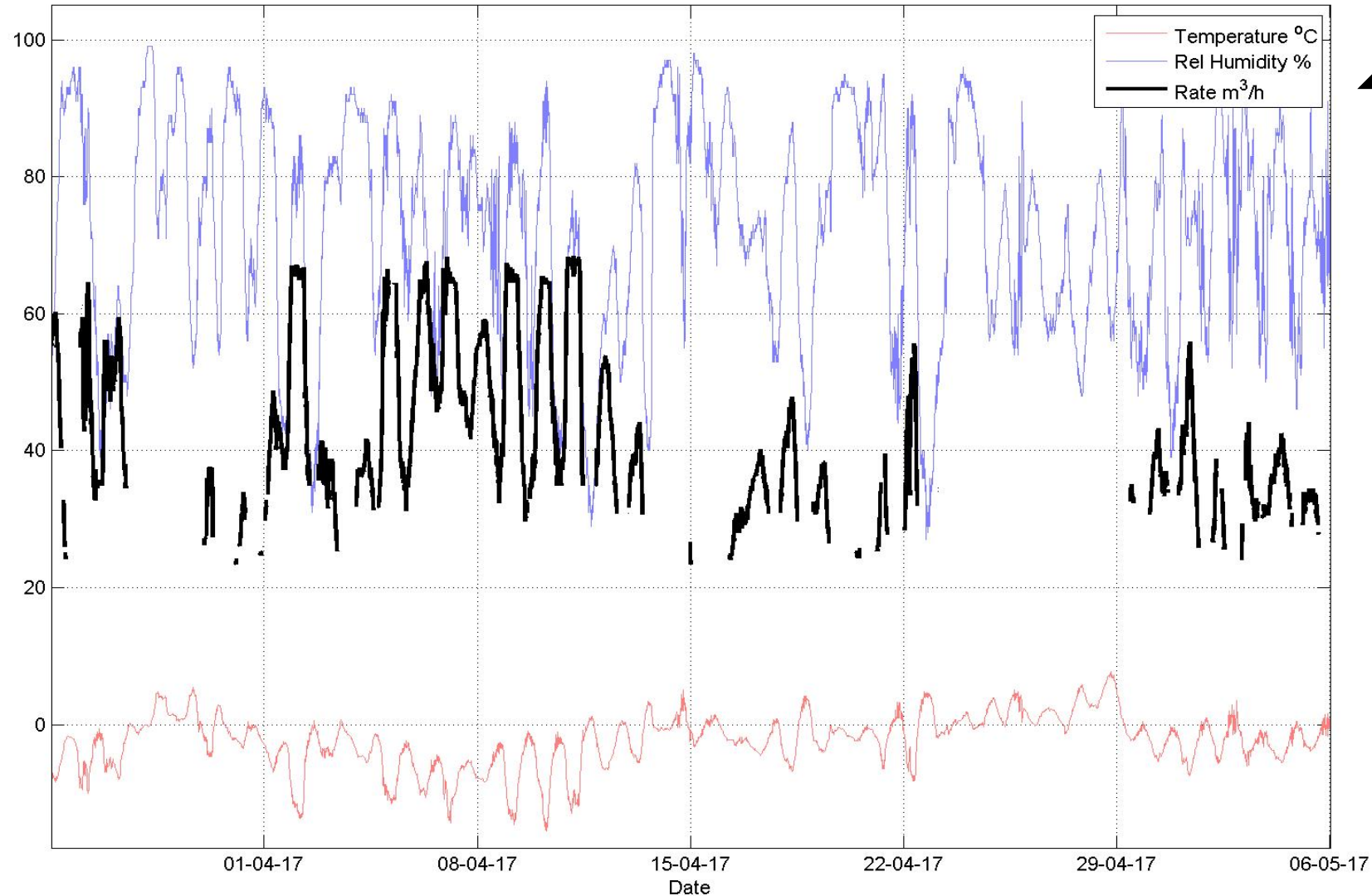
- Decisions on hiring personnel for October
- Summer activities



Linking weather conditions and costs and emissions caused by snow-making

- The main link between weather conditions and costs of snow-making is energy consumption
- Minimizing energy consumption with better information provided by our climate service helps to
 - Minimize costs from snowmaking
 - Minimize greenhouse gas emissions (when replicating the service for other ski resorts; Ruka uses only renewable energy in snowmaking)

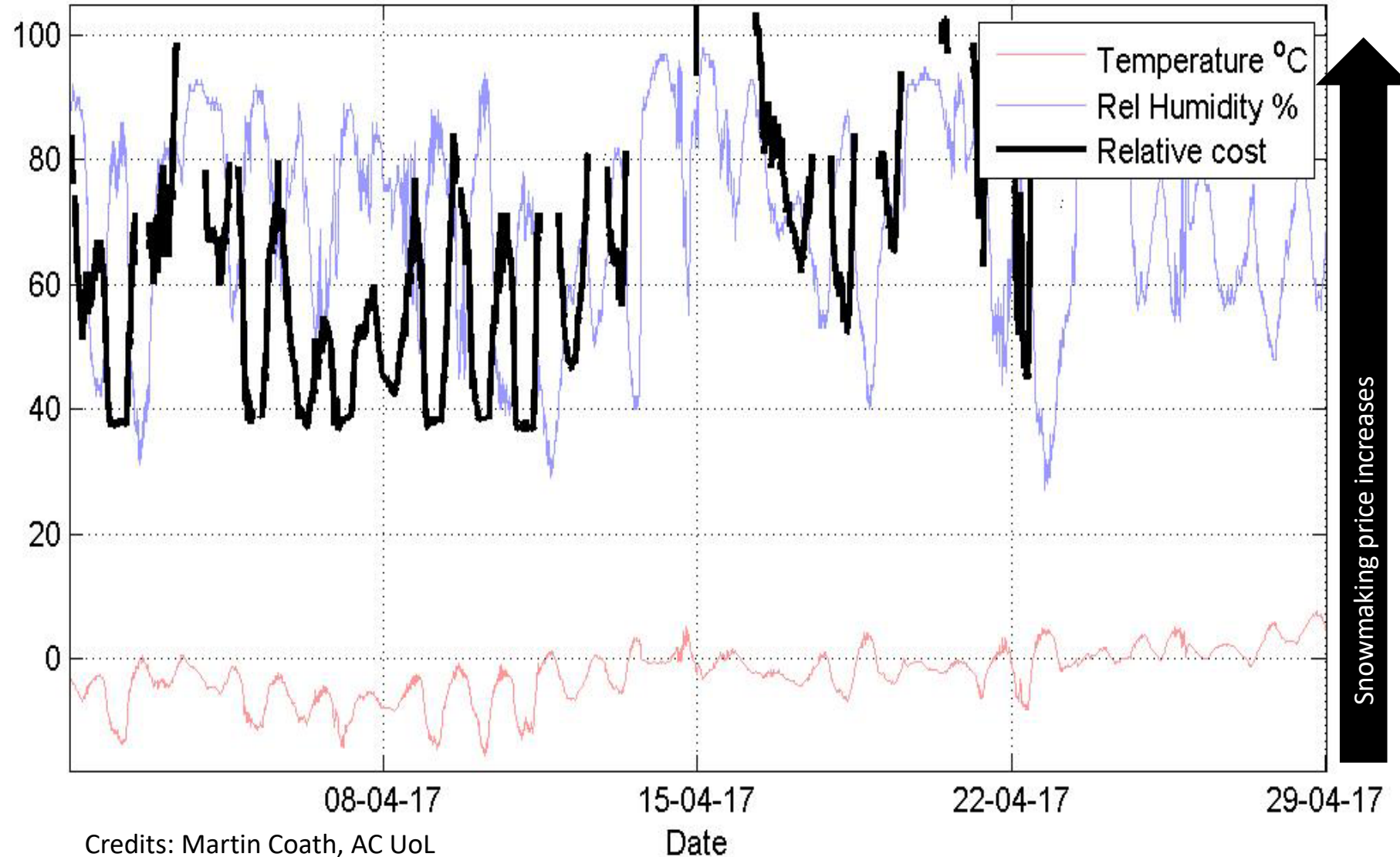
Snow Rate: Connection between weather and the cost of snow-making



Snowmaking conditions improve

Credits: Martin Coath, AC UoL

Snow Cost: Connection between weather and the cost of snow-making



Credits: Martin Coath, AC UoL

The climate service we are co-designing is a **flexible and interactive interface** between climate modellers and winter tourism industry. This interface consists of **software, working practices and methods of communication**

- Rather new research topic; venturing largely into the unknown
- Service co-design, climate services and transdisciplinary work are emerging and developing research settings and tasks
- Business-to-science and science-to-business
- Replicability of the climate service to winter tourism business potentially in all snowy countries; potentially global commercial importance
- Ensuring sustainability of snowmaking as an adaptation strategy: our climate service to help minimize extra costs and GHG emissions by optimization

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