By temporal resources we mean resources manipulated by programs whose usage is time-sensitive or time-critical, and which, while perhaps already physically available to a program, can be used or acted upon only after a certain amount of time has passed or some prescribed events have taken place (perhaps in some order).

In this talk, I will discuss some ongoing work on using and combining graded effect systems, temporally aware algebraic effects and effect handlers, and graded modal types for specifying, controlling, and verifying how and when programs use their resources. In particular, I will discuss how our past work, which only tracked (the lower bounds on) the duration of program execution, naturally generalises to a setting where effect grades and resource grades can come from general, and not necessarily the same, ordered monoids. For instance, in this way the effect system part of the calculus can track fully detailed information using sets of traces of events or algebraic operation calls, while the modal resource-typing part can specify properties of resources in terms of durations of computations or in terms of (sequences of) only certain events.

(This talk is based on past and ongoing joint work with Andres Alumets, Mariana Milicich, Gašper Žajdela, and Joosep Tavits.)