

Rolling Wave Planning

Project teams are complex systems and non-linearity is the norm when determining the time needed to undertake complicated activities¹. This means, as with other complex systems such as the weather, you can expect to model the short term reasonably accurately in most circumstances but have no real chance to accurately predict long term outcomes in detail. The long term schedule needs to be focused on setting a realistic time budget. Whereas in the short term (the next 3 months) you should have much better knowledge of whose available, where they are working and how good they are. From this information, you can develop realistic schedules with the people actually responsible for doing the work (team leaders / sub-foremen and key trades people). This detailed component of the overall schedule needs to be focused on achieving the overall time budget so acceleration is frequently needed between the first draft and an acceptable plan².

Rolling wave is a form of progressive elaboration – progressive elaboration is the progressive increasing of detail in any aspect of the project documentation from a broad overview (typical in the early phases of any project) to the degree needed for the efficient directing and undertaking of the work. This includes: design, specifications, cost estimates, schedule, etc..... Rolling wave is the process of increasing the detail in a schedule as more information becomes available the distinguishing feature is timing – rolling wave increases the detail of the work you are going to do in the next few months and is repeated at regular intervals, the progressive elaboration ‘rolls’ through the project schedule rather than the whole schedule being increased in detail at one time³. Rolling Wave planning evolved to allow future work to be outlined using ‘planning packages’. The planning packages are then expanded into fully detailed work packages before the actual work commenced (see ‘Origins of Rolling Wave’ below). The technique is closely aligned to Work Breakdown Structures (WBS)⁴ and Earned Value Management.

The core concept behind ‘rolling wave’ is: *you cannot plan in detail what you do not know*. If a project or program involves a design phase, until the design is reasonably complete it is impossible to meaningfully plan in detail the work that is not yet designed. However, it is reasonable and necessary to frame realistic time (and cost) budgets for the whole project, then once the design is finished, the detail planning focuses on achieving the objectives.

Rolling Wave is very useful because even if the design is fully available at the start of a project, we still cannot reliably predict the long term future. Any long term schedule will be wrong to a greater or lesser extent and there is absolutely no point doing detailed scheduling for work months or years in the future when you don’t know who will be doing the work, don’t know how capable they are (or will be) and don’t know the circumstances that will prevail⁵. There is a significant difference between setting a realistic and achievable target at an appropriate level of detail and scheduling a specific task to start at 11:15 am on the 3rd September in 2 years time, *even if your software will do the calculations, the data is meaningless!* It is impossible to accurately plan something in detail if you don’t know exactly what has to be done and who is going to do it. However, scheduling a job to start at 11:15am tomorrow morning is reasonable and the probability of the work starting around 11:15am is quite high.

¹ For more on complexity see: http://www.mosaicprojects.com.au/WhitePapers/WP1058_Complexity_Theory.pdf

² For more on schedule acceleration see: http://www.mosaicprojects.com.au/WhitePapers/WP1059_Schedule_Compression.pdf

³ The increase in detail from a Schedule Level 2, to Level 3, to Level 4 may be managed on a holistic basis if the project is relatively small and all of the information is available or by using rolling wave if the project is large or information becomes available progressively over time. For more on Schedule Levels see: http://www.mosaicprojects.com.au/PDF/Schedule_Levels.pdf

⁴ For more on WBS see: http://www.mosaicprojects.com.au/WhitePapers/WP1011_WBS.pdf

⁵ See *Scheduling in the Age of Complexity*: http://www.mosaicprojects.com.au/Resources_Papers_089.html

The major weakness in Rolling Wave planning is that the technique tends to focus on work packages and the expansion of the detail within the work package and the overall pre-existing logic. Most texts on ‘rolling wave’ omit reconsideration of the logic that may be needed to achieve the overall objectives of the project.

A newer concept, *Schedule Density*, is code driven as the schedule density is increased, a more detailed schedule is developed to achieve the objectives of the overall time budget⁶. Density upgrades are set at routine time intervals and focus on engaging the different levels of supervision to generate a realistic, achievable and agreed schedule at each of the three densities: ‘long term/low density’, ‘medium term/medium density’ and ‘short term/high high density’. The process is part of an overall approach to effective time management laid out in *The Guide*⁷.

Origins of Rolling Wave

The concept of planning (or summary) packages and more detailed work packages extends back to the early 1960s. Whilst the first version of MIL-STD-881 for Work Breakdown Structures was not published until the 1st November 1968, the concept of a WBS was firmly embedded in the PERT/COST system used by the USA Military and their contractors from June 1962⁸ (with prototype systems being used by the Navy and Air force before the promulgation of PERT/COST in June’62). Under PERT/COST, programs needed to be fully developed at the summary level and then detail was added by the various contractors as they were engaged. This was ‘rolling wave’ in everything but name.

Similarly, in the UK during the early 1960s, the ICT1300 Series PERT, 1500 PERT and then 1900 PERT systems had a processing capacity of around 4000 activities. On major projects, ICT created an overall network at the third level of the WBS and every six weeks or so populated the next three months worth of work down to the fifth or sixth level of the WBS. The past progressed tasks were replaced with one omnibus task to hold the time and resources. Overall around four or five hundred tasks were moved each time, in a three month band, as the project rolled along. This process is the epitome of ‘rolling wave’ although as with PERT/COST, the ICT staff did not use the term ‘rolling wave’⁹.

At the time of writing – the precise origin of the term ‘Rolling Wave’ remains obscure. However, the concept certainly has its origins in the early 1960s or possibly before.

Progressive Elaboration

Both Rolling Wave and Schedule Density adjustments to the schedule are a form of ‘progressive elaboration’. The overall scope of information contained in the schedule remains the same, but the amount of detail is increased at each iteration¹⁰.

⁶ For more on schedule density see: http://www.mosaicprojects.com.au/WhitePapers/WP1016_Schedule_Density.pdf

⁷ The **Guide to Good Practice in the Management of Time in Complex Projects**:
http://www.mosaicprojects.com.au/Book_Sales.html#CIOB

⁸ The original CPM and PERT systems were developed in 1957 so the concepts would appear to be focused on managing the rapidly increasing complexity of programs. For more on the origins of CPM see - **A Brief History of Scheduling**: http://www.mosaicprojects.com.au/Resources_Papers_042.html

⁹ Information provided by Raf Dua, a former ICT employee who worked on the development of the ICT PERT systems. ICT became ICL. ICL was then purchased by Fujitsu.

¹⁰ Progressive Elaboration is defined in the *PMBOK® Guide* 4th Edition at page 7