Scheduling 101
The Basics of Best Practices

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The Build

- Develop the WBS
- Define work packages
- Define activities
- Define logic
- Define resources and work
- Define timeframe
- Analyze the schedule
Work Breakdown Structure (WBS)

- Functional
- Deliverable
- Hybrid
WBS - Deliverable

- Project A
  - Requirements
    - System
  - Design
    - High Level
  - Programmatic
    - Plans
  - Monitoring/Control

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Work Package

Right

• Use Verb-Noun descriptors
  – Develop Outline
  – Perform Unit Test
  – Pour footing

• Keep manageable (tasking as well as resources)

Wrong

• Use of non-descriptive verbiage
  – System Engineering
  – Program Management
  – Plumbing
  – Framing

• Large unruly
**Activities (aka; Task, Step)**

- Breakdown of the work packages into actionable parts.
- Keep relatively small
  - Within two reporting periods
  - Normally no more than three weeks in planned duration (but this is really done under the timeframe process)
- Ensure they are measurable
  - Wrong – Develop code 25%
  - Right – Develop code outline
Logic

- **False Logic**
  logic used to *arbitrarily modify* the sequence of events in a schedule to bring about *preconceived* results in activity start and/or finish dates. (e.g. Doc 1 must finish before Doc 2 can start when the same resources are working both documents but the documents do not relate in any other way to each other.)

- **Soft Logic**
  logic used to shift references of schedule start and/or stop dates based on *perceived requirements* within the activities. (e.g. Rough Plumbing must finish before Rough Electrical can start (though this is normal practice in construction, this is not hard logic).)

- **Hard Logic**
  logic used which provides *valid* links between activities. (e.g. the foundation must be cured before the walls can be erected.)
Logic - Types

- **Start-to-Finish (SF)** – Available, but use with **EXTREME** care
- **Finish-to-Finish (FF)**
- **Start-to-Start (SS)**
- **Finish-to-Start (FS)** – Most commonly used

**Note:** Always tie the finish of an activity.
Logic – Leads/Lags

• Basic Guidelines
  – FS should not have lags
  – Use percentages vice durations

• Lags are used but be careful you are not hiding an activity by using them (e.g. concrete curing time)

• Leads are used to fast-track, crash, or overlap activities (e.g. development may be planned to begin once an 80% solution in design is accomplished.)
Resources and Work

• Types
  – Consumable
  – Non-Consumable

• Work
  – How much actual work by what type of resource is required?
  – Use lowest common increments (days, hours)
  – Not how long will it take (2 weeks, 1 month)
Timeframe

• Resource efficiency factor
  – General rule of thumb is that you will get 6 hours of productive work from an 8 hour day
  – Senior or excited “I love my job” personnel usually perform more efficiently than new or “bored” personnel.

• Three-point estimates
  – Empirical information is always best
  – Do not allow +/- generic values
  – 80/20 Rule – 80% best/worst case values
  – Basic PERT formula for duration estimate
    • \( \frac{(t_o + 4t_m + t_p)}{6} \)
    • MS Project: \( du = \frac{(du1 + 4du2 + du3)}{6} \)
Analysis

• Constraint Dates
  – Hard
  – Soft

• Critical Path
  – Longest path through the network
    • Critical Path
    • Not necessarily zero (0) float
  – Near Critical Path
  – Risk Path
Analyze – Constraint Dates

Hard
- Must Start On
- Must Finish On
- Start No Later Than
- Finish No Later Than

Soft
- As Soon As Possible
  - Default
  - Early Start
- As Late As Possible
  - Just In Time
- Start No Earlier Than
- Finish No Earlier Than
Analyze – Building the Schedule

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Analyze – Critical Path
Analyze – Near Critical Path
Analyze – Risk Path
Assessments

• A few tools exist for automated compliance, though easy calculations can be made depending on the scheduling tool of choice.
  – They do not check for technical accuracy
  – They only check on basic building blocks

• Some tools are:
  – Schedule Detective Pro (www.PMMetrics.com)
  – OnTrack™ Schedule Assessment (www.cognitive-technologies.com)
Example Assessment Criteria

• Defense Contract Management Agency (DCMA) 14 Point Assessment
  – Some basic measure of a schedule’s health
  – The vast majority of the best practice rules apply.
DCMA 14 Point

• Has nothing to do with the feasibility of the schedule nor technical achievability.

• Start with some basic info gathering first
  – TT = Total Task Count (Exclude Summary, LOE, Zero Duration or Milestone)
  – CT = Complete Task Count (subset of TT with AF =< Status Date)
  – IT = Incomplete Task Count (subset of TT w/o AF)
  – BT = Baseline Task Count (subset of TT with BF =< Status Date)
DCMA 14 Point (Cont)

1. Logic test
   - IT missing predecessor and/or successor
   - <= 5%

2. Leads
   - IT with negative Lag (Lead)
   - Zero (0) goal

3. Lags
   - IT with positive Lag
   - <=5%
4. Relationship Types
   - IT with predecessor
   - FS =>90%

5. Hard Constraints
   - IT with other than ASAP constraint type
   - MFO + MSO + SNLT + FNLT <=5%

6. High Float
   - IT with Total Float > 44 days
   - <=%5
DCMA 14 Point (Cont)

7. Negative Float
   – IT with total float < 0
   – Zero (0) goal

8. High Duration
   – IT with Du > 44d with BL Start within rolling (planning) period
   – <=5%
DCMA 14 Point (Cont)

9. Invalid dates
   – TT with planned start/finish < status date or
   – TT with actual start/finish > status date
   – Zero (0) goal

10. Resources
    – IT without costs assigned
    – Zero (0) goal

11. Missed Tasks
    – TT with BF <= Status date and AF/PF > BF
    – <=5%
12. Critical Path Test
   - Insert Remaining Duration of 600d into a CP task
   - Project finish should move proportionately

13. Critical Path Length Index (CPLI)
   - \( \frac{(CP\ Length + Total\ Float)}{CP\ Length} \)
   - > 1.0 good; < 1.0 bad

14. Baseline Execution Index (BEI)
   - Using TT; CT/BT
   - > 1.0 good; < 1.0 bad
Conclusion

- Develop the WBS
- Define work packages
- Define activities
- Define logic
- Define resources and work
- Define timeframe
- Analyze the schedule
Questions
Who is Elden Jones?

• Project management arena for over 25 years
• Experiences in DoD, DoJ, State & Local government, private sector
• Experiences in IT/IS, Aeronautical, Construction, and Petrochemical
• Clients include Fortune 500 firms
• Heavily involved with PMI:
  – San Diego Chapter – Various SIGs/COPs
  – Standards development – PMI Global BoD committee volunteer
• Teaches
  – PMP Prep
  – PM Certificate (SDSU, UCSD)
  – Various PM relevant lecture circuits
• Concentrations
  – Project/Program Management – Risk Management
  – Master Scheduling – Configuration Management