

Scheduling 101

The Basics of Best Practices

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The PM Professors

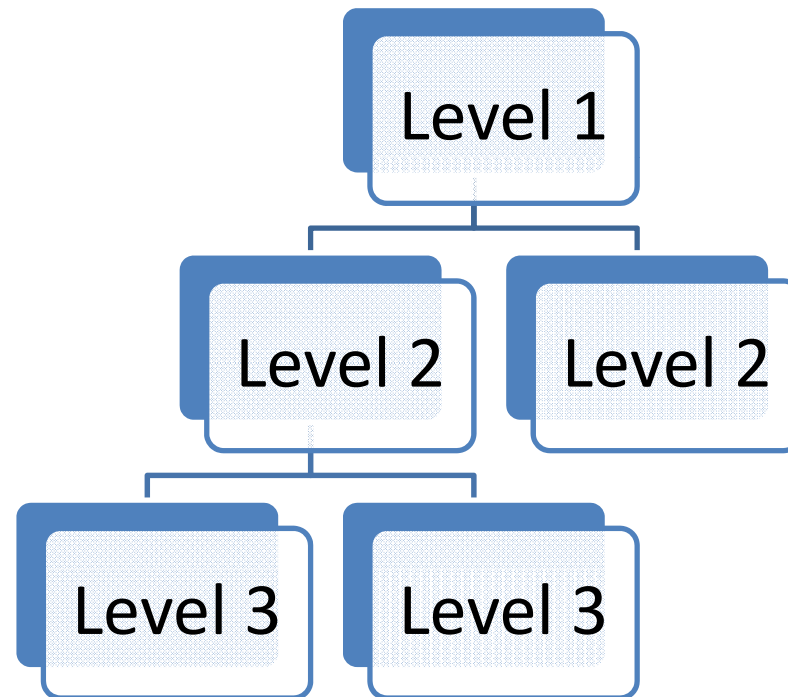
The Build

- Develop the WBS
- Define work packages
- Define activities
- Define logic
- Define resources and work
- Define timeframe
- Analyze the schedule

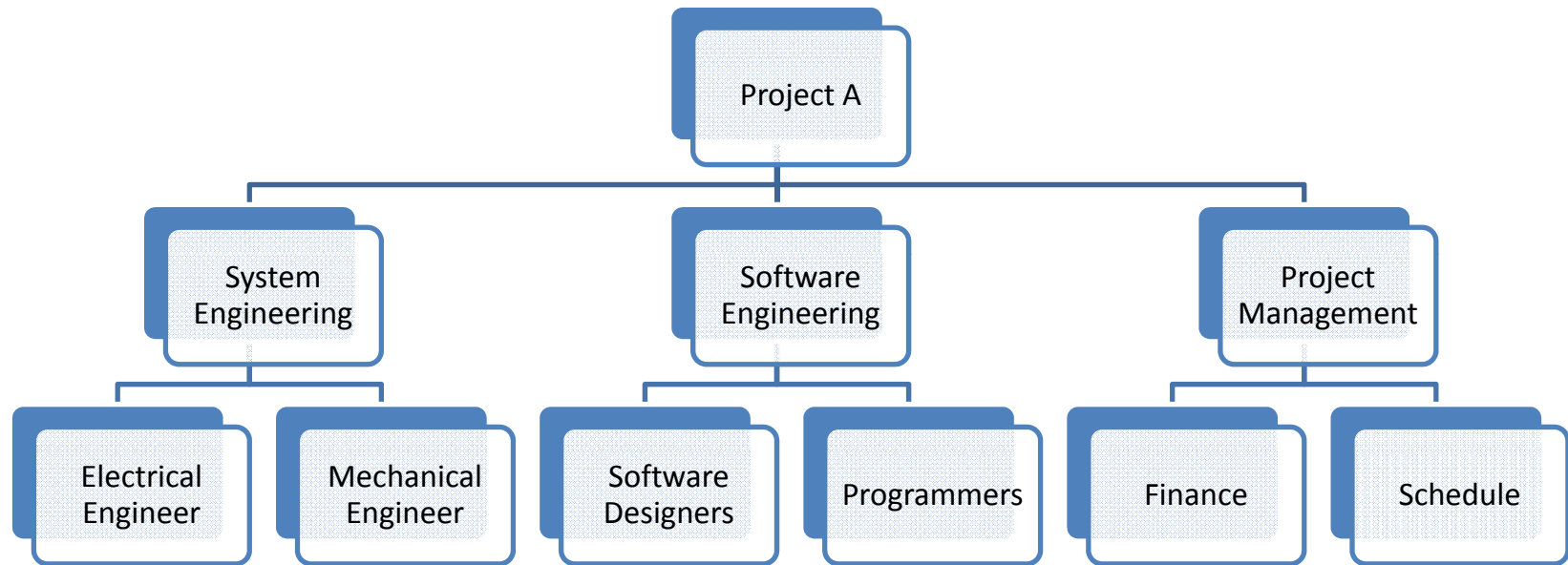


Work Breakdown Structure (WBS)

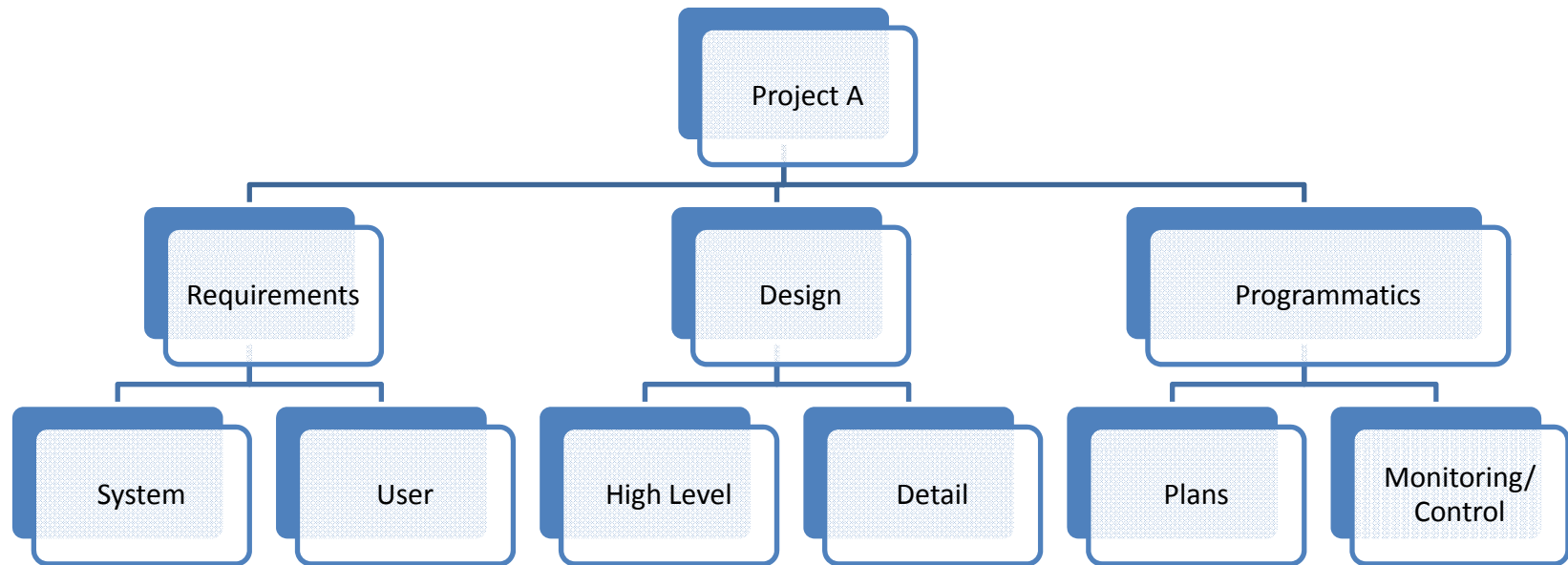
- Functional
- Deliverable
- Hybrid



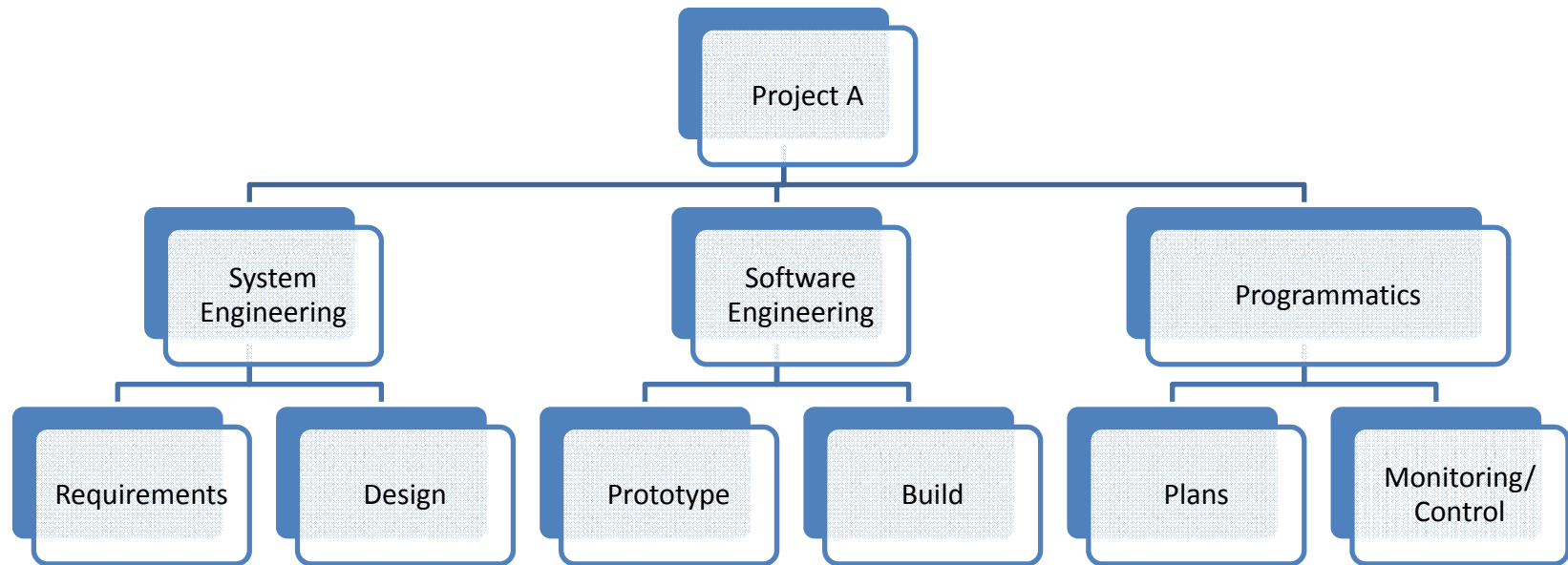
WBS - Functional



WBS - Deliverable



WBS - Hybrid



Work Package

Right

- Use Verb-Noun descriptors
 - Develop Outline
 - Perform Unit Test
 - Pour footing
- Keep manageable (tasking as well as resources)

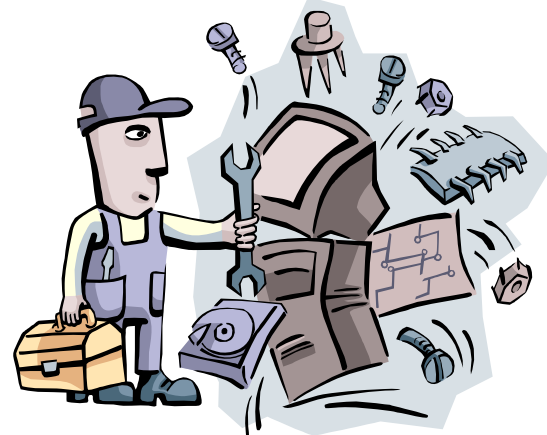
Wrong

- 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

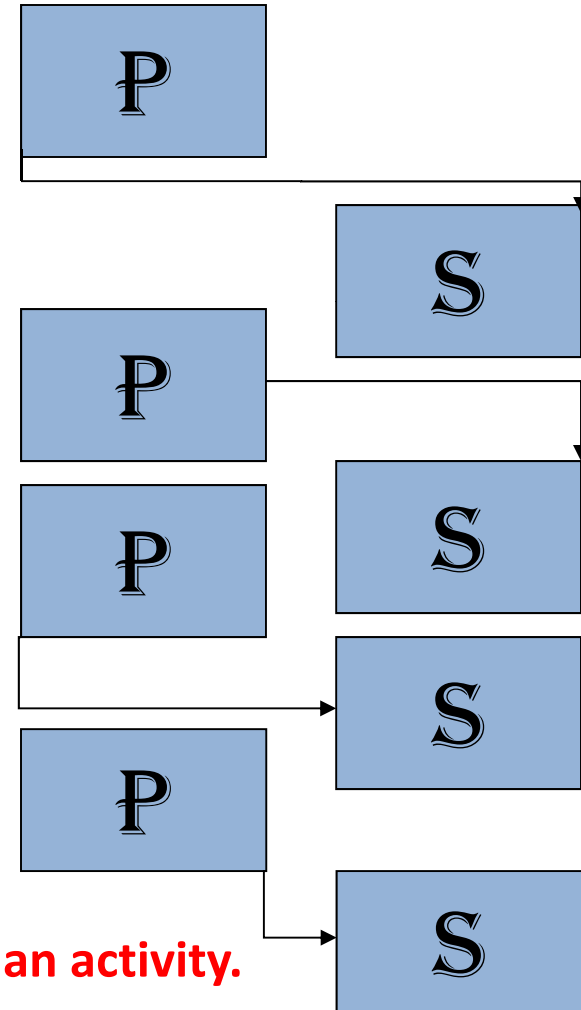
logic used to shift references of schedule start and/or stop dates based on **perceived requirements** within the activities. (e.g. Rough Plumbing must finish before Rough Electrical can start (though this is normal practice in construction, this is not hard logic).)

- 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)



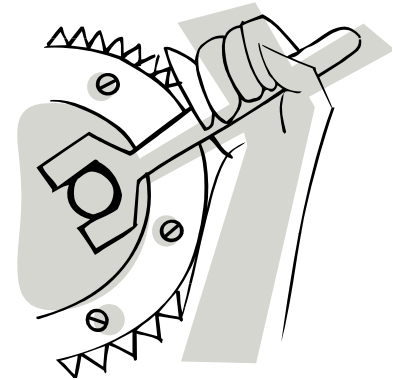
- Leads are used to fast-track, crash, or overlap activities (e.g. development may be planned to begin once an 80% solution in design is accomplished.)



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)

- Labor
- Material



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
 - $(t_o + 4t_m + t_p)/6$
 - MS Project: $du = (du1 + 4du2 + du3)/6$

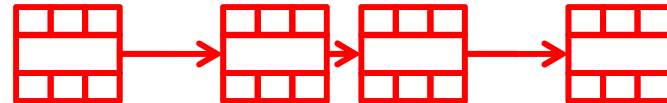
t_o	t_m	t_p	t_{PERT}	Type
9	10	11	10.00	+/- 10%
9	10	15	10.67	Risky
5	10	12	9.50	Opportunity
10	10	10	10.00	No three-point



Analysis

- Constraint Dates
 - Hard
 - Soft
- Critical Path
 - Longest path through the network

- Critical Path

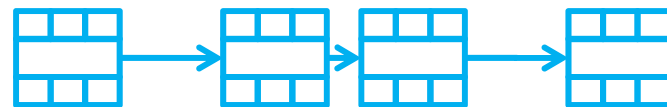


- Not necessarily zero (0) float

- Near Critical Path



- Risk Path



Analyze – Constraint Dates

Hard

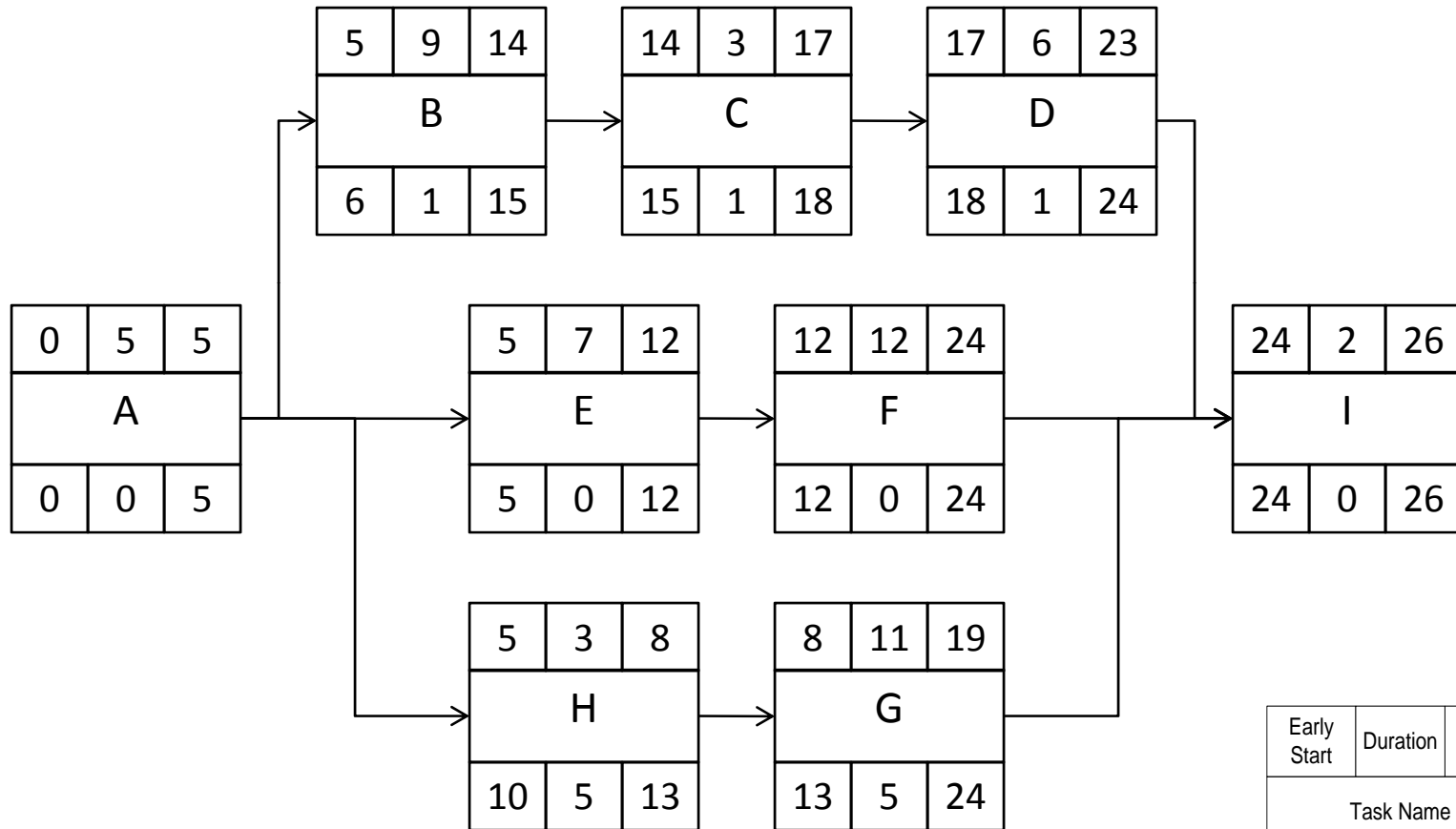
- Must Start On
- Must Finish On
- Start No Later Than
- Finish No Later Than



Soft

- As Soon As Possible
 - Default
 - Early Start
- As Late As Possible
 - Just In Time
- Start No Earlier Than
- Finish No Earlier Than

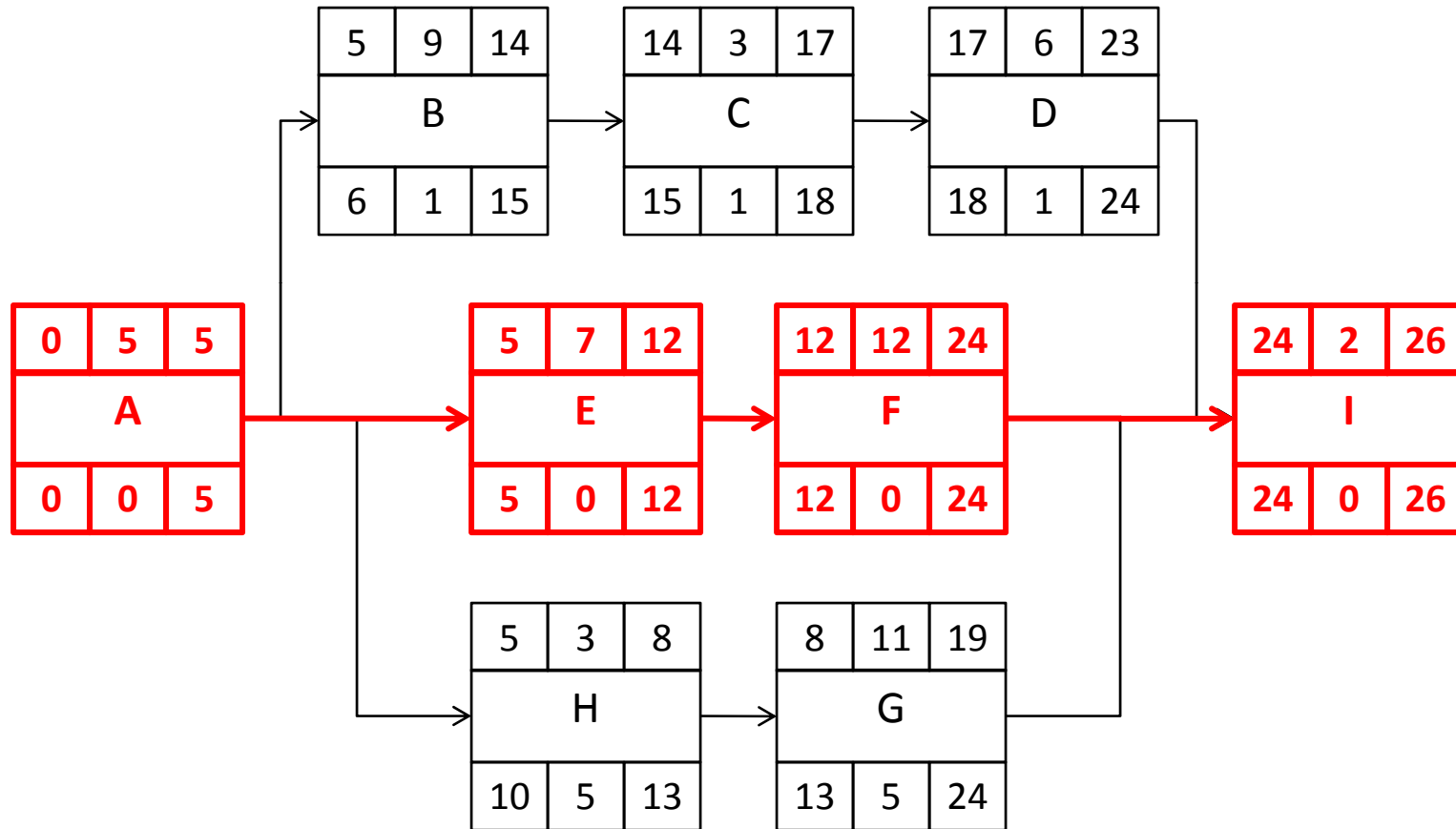
Analyze – Building the Schedule



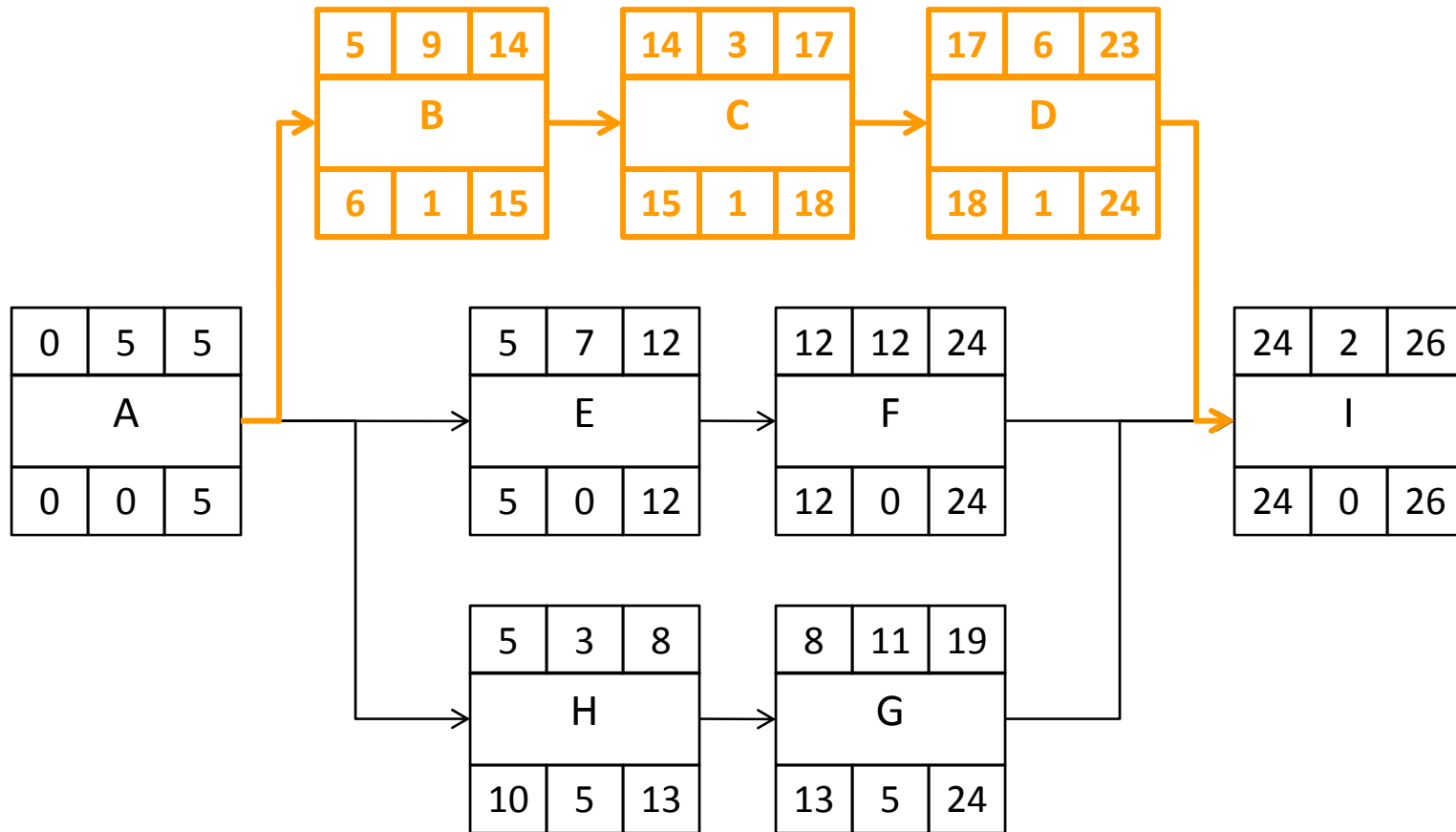
Early Start	Duration	Early Finish
Task Name		
Late Start	Float	Late Finish



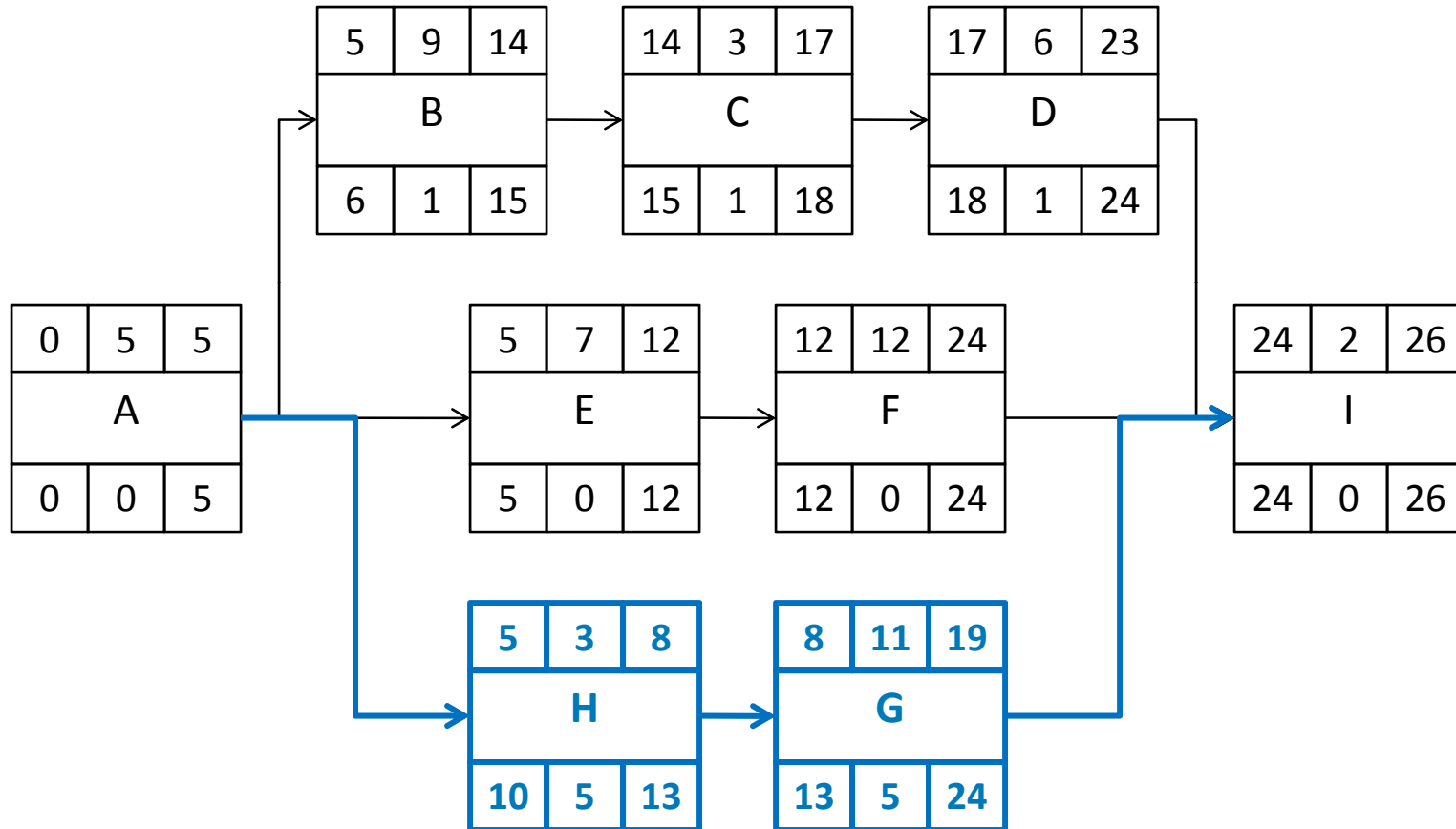
Analyze – Critical Path



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
- $\leq 5\%$

2. Leads

- IT with negative Lag (Lead)
- Zero (0) goal



3. Lags

- IT with positive Lag
- $\leq 5\%$



DCMA 14 Point (Cont)

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
- $\leq 5\%$



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%



DCMA 14 Point (Cont)

12. Critical Path Test

- Insert Remaining Duration of 600d into a CP task
- Project finish should move proportionately

13. Critical Path Length Index (CPLI)

- $(\text{CP Length} + \text{Total Float}) / \text{CP Length}$
- > 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
 - Standards development
 - Various SIGs/COPs
 - PMI Global BoD committee volunteer
- Teaches
 - PMP Prep
 - PM Certificate (SDSU, UCSD)
 - Various PM relevant lecture circuits
- Concentrations
 - Project/Program Management
 - Master Scheduling
 - Risk Management
 - Configuration Management

