ODTÜ METU

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Residua: From Nostalgia Towards Future-Evolution of Construction Management Topics Since 1980s

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ODTÜ – İnşaat Mühendisliği Bölümü – Yapım Mühendisliği ve Yönetimi Dalı

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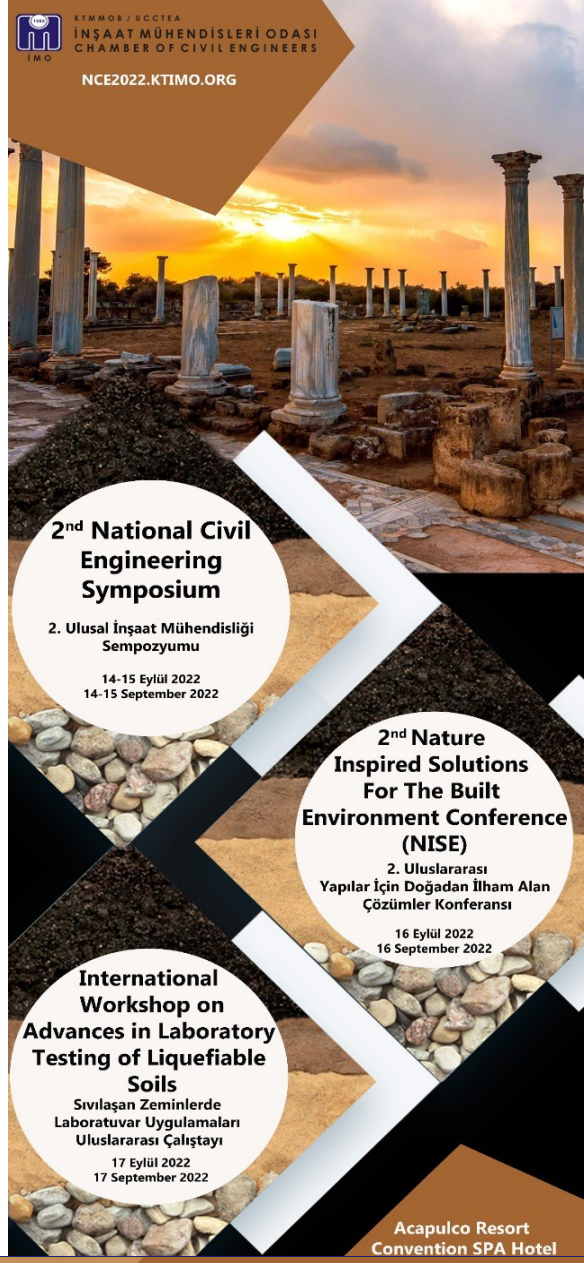


CONSTRUCTION MANAGEMENT

- Management is a combination of **art** and **science.**
- Construction Management is an interdisciplinary science which exists at the intersection point of two applied sciences namely **"Construction"** and **"Management".**

Ostrich

CONSTRUCTION MANAGEMENT

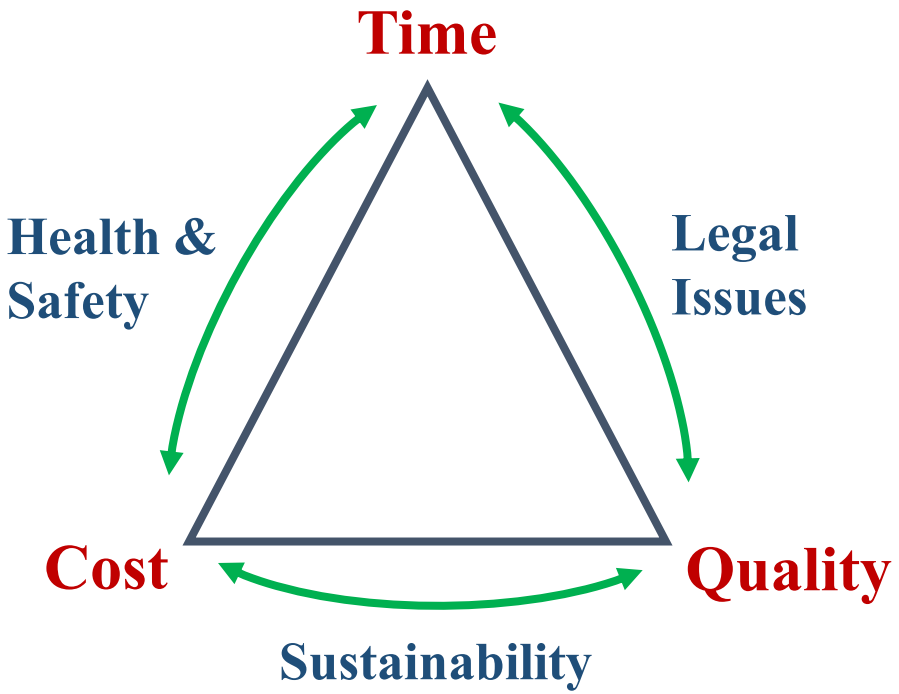
❖ According to Construction Management Association of America (CMAA):

- Construction Management is a professional service that provides project owner(s) with effective management of project's schedule (time), cost, quality, safety, scope and function.

CONSTRUCTION MANAGEMENT

A construction project is a series of activities that have constraints of:

- **Time** – to schedule and finish the project **on time.**
- **Cost** – to complete the project **within budget.**
- **Quality** – to complete the project **at the desired quality level.**

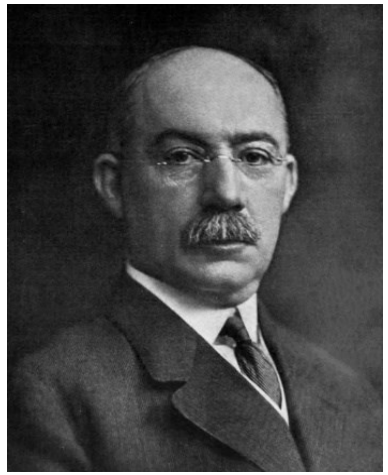


TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

1. Bar (Gantt) Chart

Henry L. Gantt
(1861-1919)



Mechanical Engineer
& Management Consultant

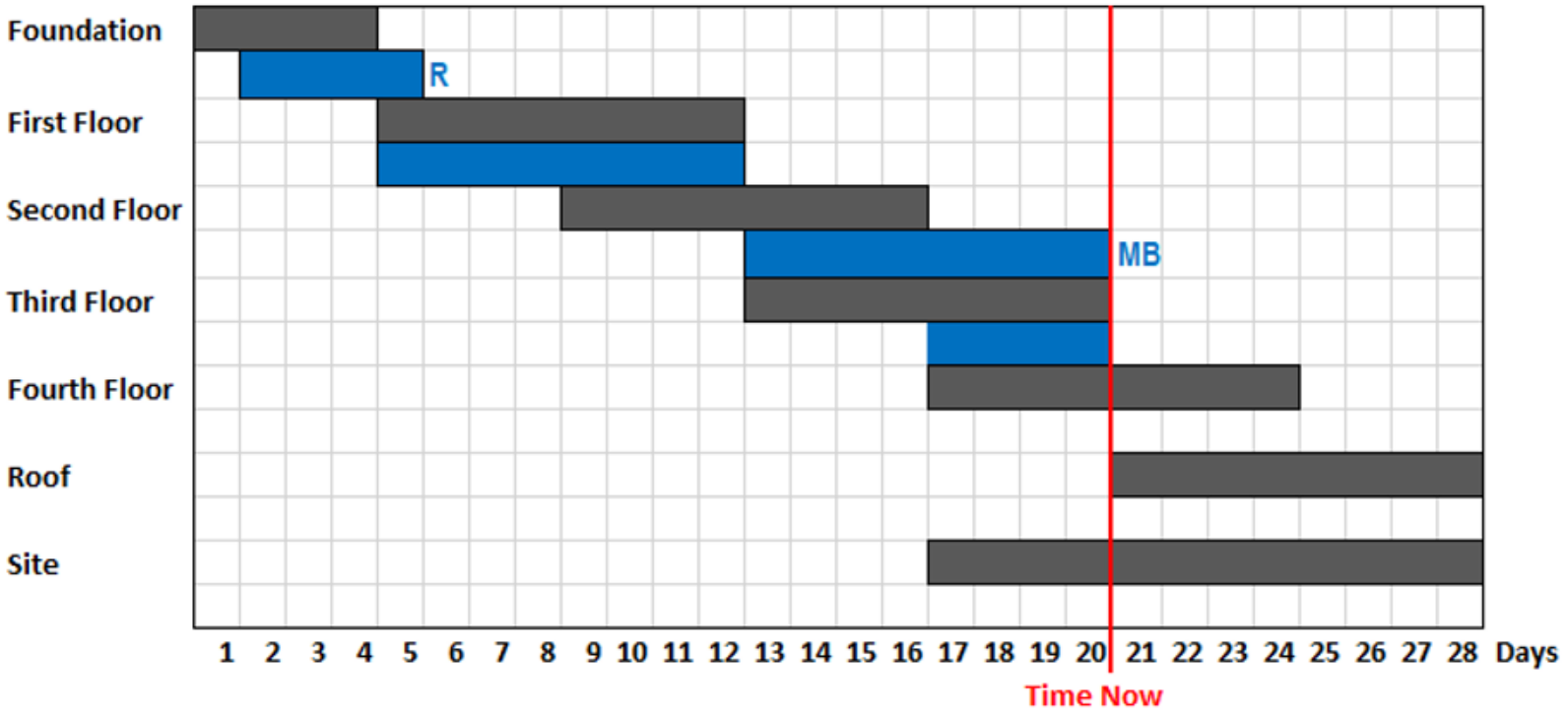
	Wk. 1	Wk. 2	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	Wk. 11	Wk. 12
EXCAVATION												
Utility Clearance	■											
Surface Scraping	■											
Major Excavation		■	■	■								
Periodic Surveying	■	■	■	■	■	■						
Shoring (none expected)												
FOUNDATION												
Place Forms			■	■	■							
Tie Rebar				■	■	■						
Inspection				■	■	■						
Pour Concrete					■	■	■					
Test Concrete							■	■	■			
STEEL WORK												
Check Anchor Locations				■	■	■						
Complete First Level										■		
Complete Second Level											■	
Complete Roof Trusses												■
Inspection										■	■	■

- The chart is named after Henry Gantt (1861-1919), who developed it around the years 1910-1915.

TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

1. Bar (Gantt) Chart



- Easy to draw
- Easy to understand even by ordinary workers
- Shows passing of time
- There is continuity
- Compact

BUT !!!

Planned Realized

R : Rainy Days

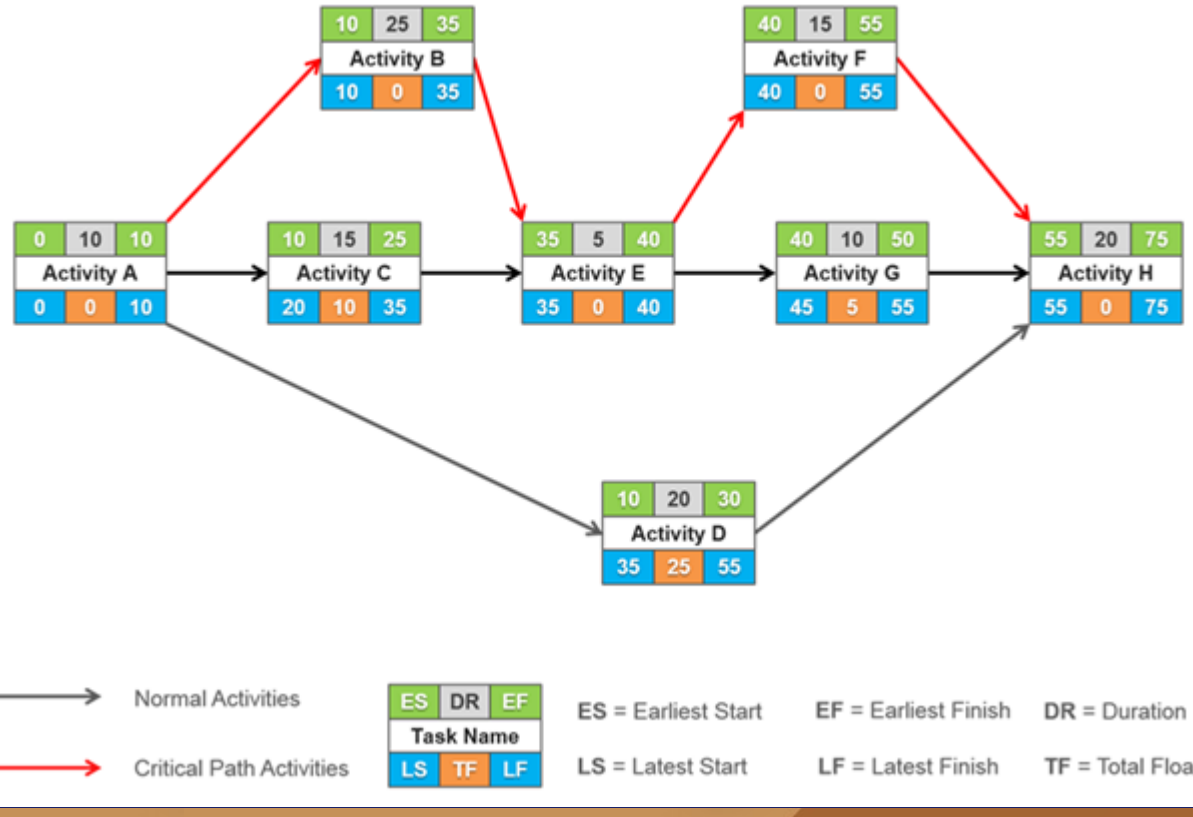
MB : Mechanical Breakdown

TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

2. Critical Path Method (CPM)

- Critical Path Method (CPM) is a project management technique that is used to schedule project activities.

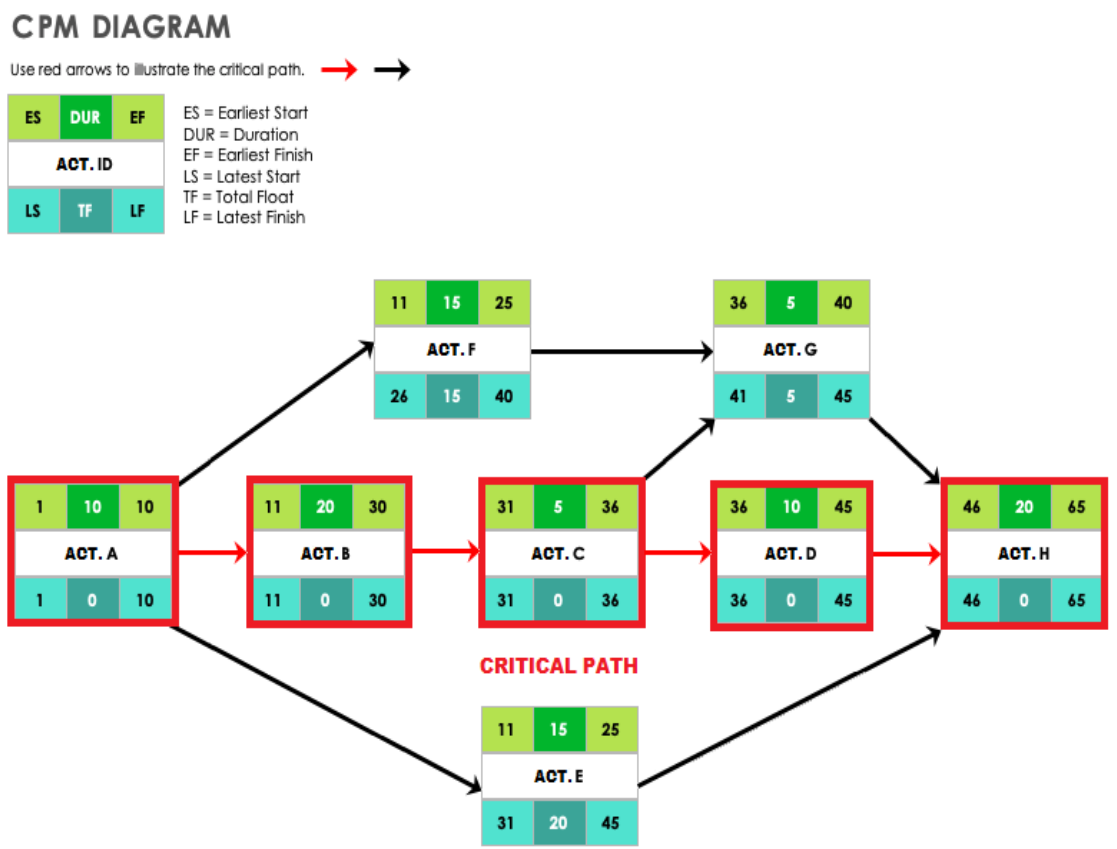


TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

2. Critical Path Method (CPM)

- CPM was developed by Kelley (Remington Rand) and Walker (DuPont) during the years 1956-57, at USA, in an attempt to reduce costs associated with plant shutdowns and restarts due to inefficient scheduling.



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  Loughborough University, UK, 1973

- M.S., Civil Engineering (Construction Engineering);

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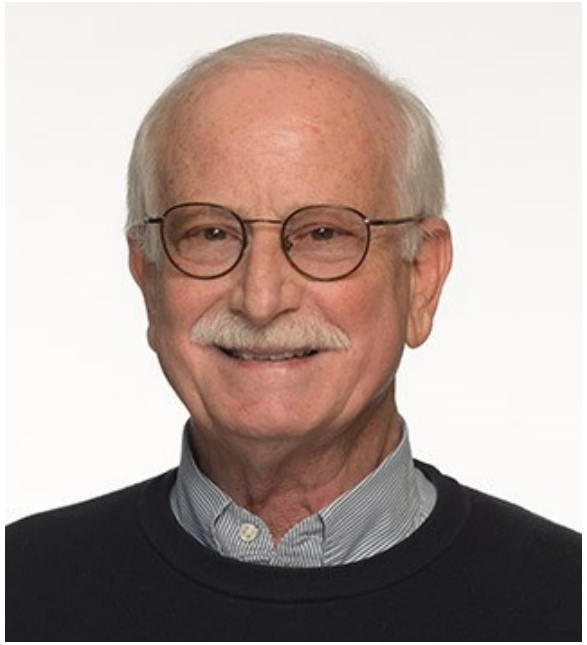
- B.S., Civil Engineering; Middle East Technical University,

  Ankara, Turkey, 1967



TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

3. Program Evaluation and Review Technique (PERT)

- Program Evaluation and Review Technique (PERT) was developed in 1958 by the US Navy Office, for the planning and scheduling of Polaris submarine missile system (3,800 contractors and 60,000 activities).

- ❖ The optimistic time (t_o)
- ❖ The most likely time (t_m)
- ❖ The pessimistic time (t_p)

❖ The expected mean time

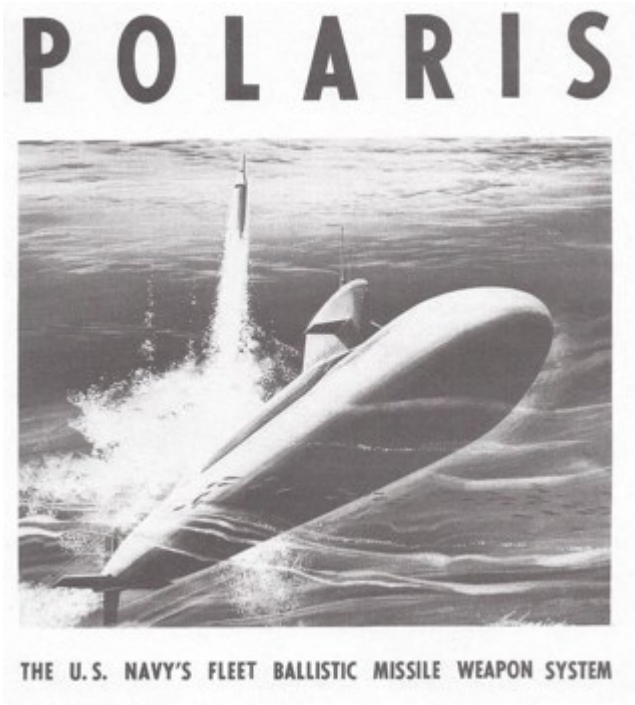
$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

TIME MANAGEMENT

EVOLUTION OF PROJECT PLANNING TECHNIQUES

3. Program Evaluation and Review Technique (PERT)

- Polaris missile program's complexity led to the development of PERT to replace the simpler Gantt chart methodology.



QUALITY MANAGEMENT

- Crosby (1979) defined quality as “conformance to requirements”.
- According to Deming (1986), quality is uniformity with respect to a correct target.
- Juran and Gryna (1993) defined quality as “fitness for purpose”.
- In the construction sector, quality is understood as the ability to meet the requirements contracted with clients.

QUALITY MANAGEMENT

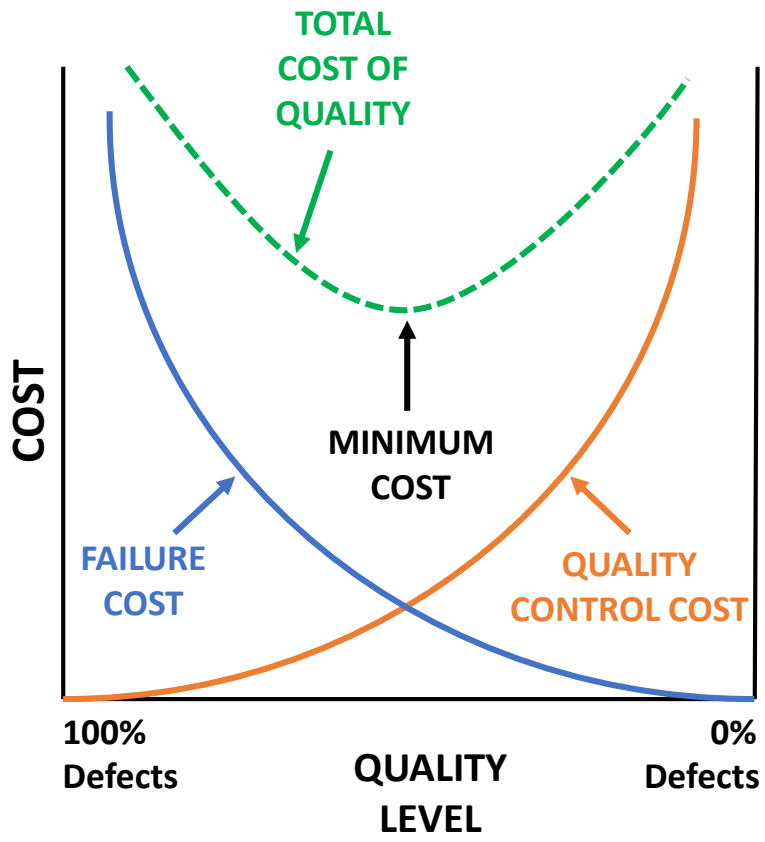
- During the 1980s Total Quality Management (TQM) techniques started to appear in western organizations.
- 1979 – British Standard BS 5750 for quality standards is published.
- 1987 – ISO – The International Organization for Standardization published the ISO 9001 standards, based on the BS 5750 series.
- 1992 – BS 7850 for TQM is published.

QUALITY MANAGEMENT

- Great expenditures of time, money and resources are wasted due to insufficient or nonexistant quality levels in construction industry.

QUALITY COST BREAKDOWN (PAF APPROACH)

- **Quality Control Cost** = Prevention Cost + Appraisal Cost
- **Failure Cost** = Internal Failure Cost + External Failure Cost
- **Total Cost of Quality** = **Quality Control Costs** + **Failure Costs**



CLAIM MANAGEMENT

- Claim Management is a collective term for the advice and services provided in respect of claims for compensation, reparation or any other remendy for financial loss or breach of contractual obligation.

CLAIM MANAGEMENT

❖ As a civil engineer the roles that you can play in claim management process are as follows;

- Expert witness (in courts)
- Expert (in arbitration)
- Dispute Adjucation Board (DAB) member
- Arbitrator (in arbitration)
- Consultant

CLAIM MANAGEMENT

❖ Frequently observed dispute headings in claim management are;

- Delay analysis (delay, disruption and quantum)
- Change orders
- Termination of contract (unjust or rightful)
- Loss of profit
- New unit price formation
- Unit price interpretation
- Final account

CLAIM MANAGEMENT

Delay, Disruption, Quantum

- Delay is concerned with time, meaning that work activities taking longer time than the planned durations. The focus is on delay to the completion of the works – in other words, critical delay. Hence, 'delay' is concerned with an analysis of time.
- Disruption is concerned with disturbance, hindrance or interruption to a contractor's normal working methods, resulting in lower productivity or efficiency in the execution of particular work activities.
- Quantum is the monetary compensation amount awarded by the court, to a successful party in a claim.

CLAIM MANAGEMENT

Float

- The final outcome of CPM analysis is to determine the critical path(s) and total float of each activity.
- Float is the amount of time by which an activity or group of activities may be shifted in time without causing delay to completion.
- If Total Float = 0 ⟶ Critical Activity

CLAIM MANAGEMENT

Float

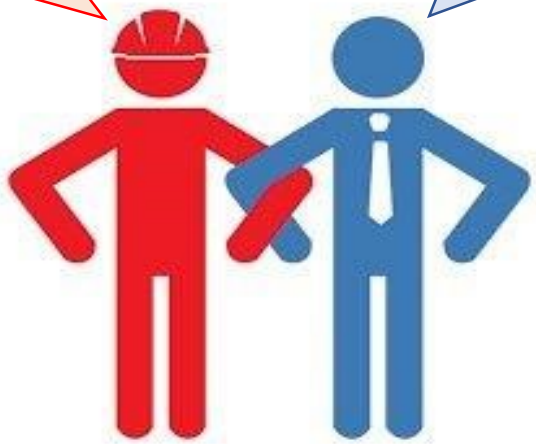
- Float values are an indication of the relative criticality of activities and when float is exhausted, the completion date will be impacted.

CLAIM MANAGEMENT

Float Ownership

- **Work program**
- **Method of construction**
- **Cashflow and budget allocation**

- **Final product belong to us**
- **Owner of the project**



Contractor **Employer**

According to Society of Construction Law;

- Float is not for the exclusive use or benefit of either the employer or the contractor.

∴ Float is a common commodity that belongs to the project.

CLAIM MANAGEMENT

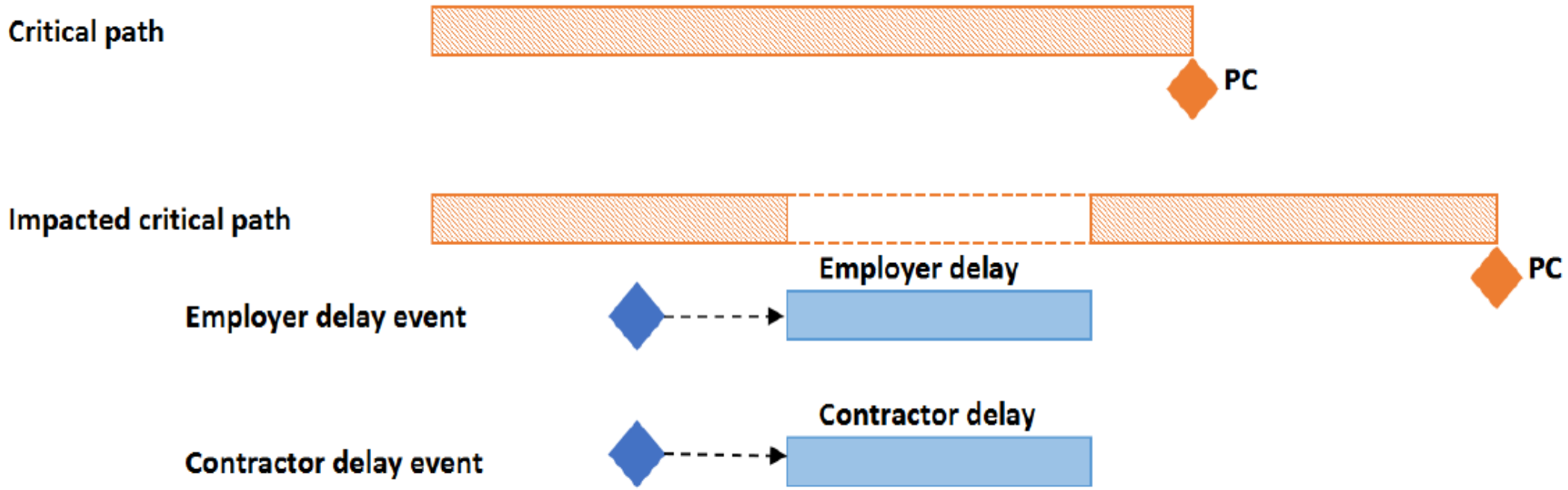
Concurrent Delay – Effect on Entitlement to Extension of Time (EOT)

- True concurrent delay is the occurrence of two or more delay events at the same time, one an Employer Risk Event, the other a Contractor Risk Event, and the effects of which are felt at the same time.
- For concurrent delay to exist, each of the Employer Risk Event and the Contractor Risk Event must be an effective cause of Delay to Completion (i.e. the delays must both affect the critical path).
- Where Contractor Delay to Completion occurs or has an effect concurrently with Employer Delay to Completion, the Contractor's concurrent delay should not reduce any EOT due.

CLAIM MANAGEMENT

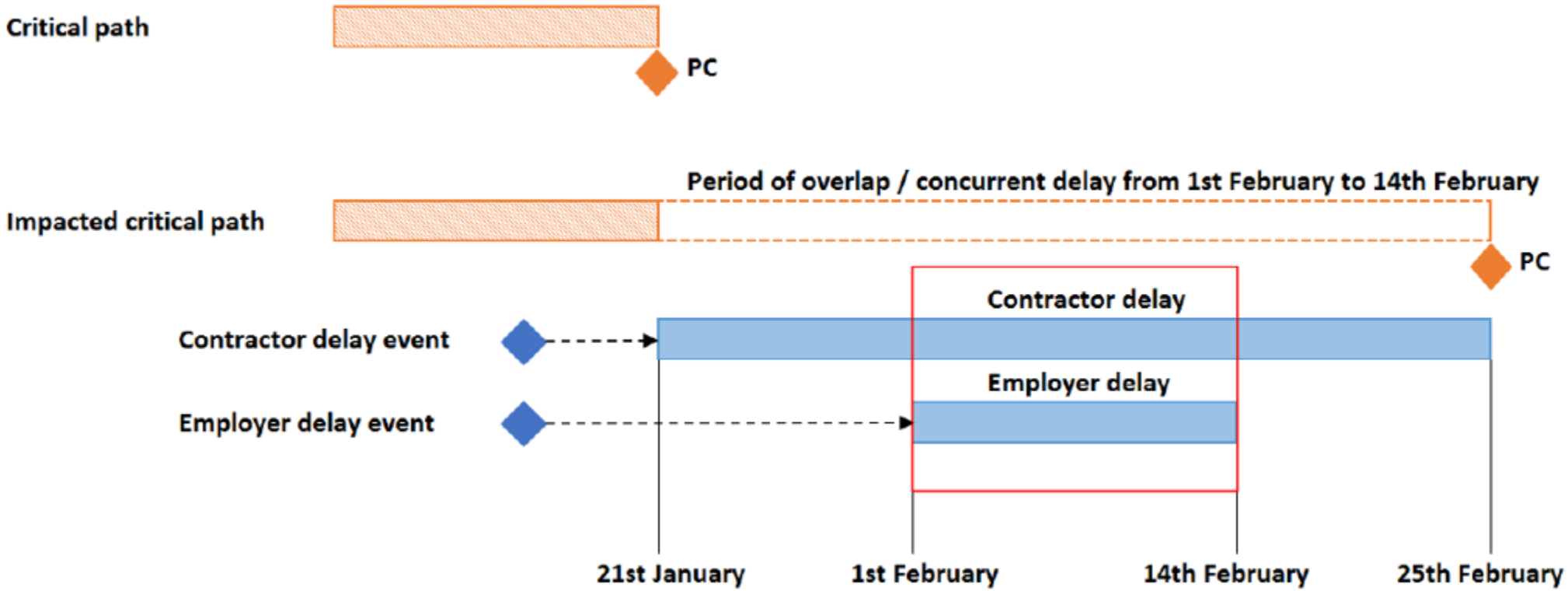
Concurrent Delay – Example 1

True concurrency



CLAIM MANAGEMENT

Concurrent Delay – Example 2



OBSERVATIONS AND RECOMMENDATIONS

- Industry culture
- Reluctance to planning and frequent updating
- Wait and see approach
- Rapid staff turnover
- Lack of communication between parties (lawyers, engineers etc.)
- Poor documentation and lack of sufficient data
- Poor record in quality achievement

POTENTIAL RESEARCH THEMES

- We cannot think of a construction industry independent of global problems.

∴ We need to focus on solution-oriented and high-impact research topics.

- **CLIMATE CHANGE AND SUSTAINABILITY** – CONSTRUCTION INDUSTRY CONTRIBUTES TO ACHIEVEMENT OF SUSTAINABLE DEVELOPMENT GOALS (SDG), ESPECIALLY;

  SDG 6 : Clean water and sanitation

  SDG 7 : Affordable and clean energy

  SDG 11: Sustainable Cities and communities

POTENTIAL RESEARCH THEMES

- **DIGITALISATION** AS AN ENABLER FOR A MORE EFFICIENT AND SUSTAINABLE CONSTRUCTION INDUSTRY SUCH AS DIGITAL TWINS, VR/AR.
- **RESILIENCE** AS A CRITICAL SUCCESS FACTOR FOR EXTREME EVENTS SUCH AS PANDEMICS (INC. COVID19), DISASTERS AND RISKS.
- **GLOCALIZATION** (Global + Local)
- **OFF-SITE AND MODULAR CONSTRUCTION**
- **PPP, BOT**
- **BIM, LEAN, GREEN**

TERMINOLOGY

- **Yapım Stratejisi**

  Construction Strategy

- **Yapı İşletmesi**

  Construction Management (ITU-CE, YTU, Akdeniz Univ., Ege Univ., YÖK)

- **Yapı Yönetimi**

  Construction Management (Eskişehir Tech. Univ., Beykoz Univ.)

- **Yapım Yönetimi**

  Construction Management (METU, Boğaziçi Univ., TÜBİTAK, KTU, Bilgi Univ., ITU-ARCH)

✓**Yapım Mühendisliği ve Yönetimi**

Construction Engineering and Management

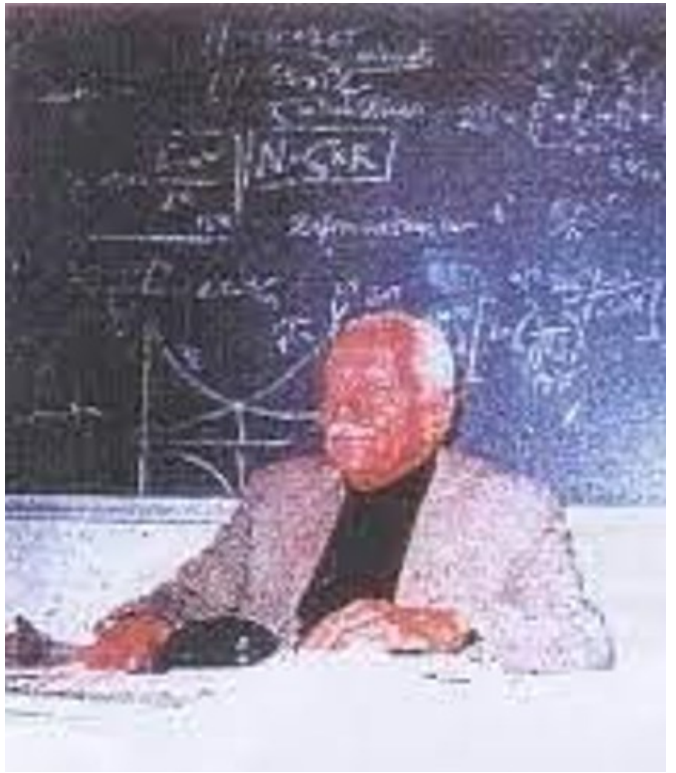
EKREM YEŞİLADA (1917-2005)

- 1917 –
- 1942 –

  (Istanb
- 1942-1
- 1949-1
- 1984-1
- 1980-1984, 1987-2005 – METU, Construction Engineering & Management Division (Part-time Lecturer)

Sheep's Foot Roller

Keçi Ayağı



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THANKS FOR YOUR ATTENTION

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