CHAPTER 4

TEAMS

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  - John Barkai, Professor of Law, University of Hawaii School of Law

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4.1 Team Organization

- A product must be completed within 3 months, but 1 person-year of programming is still needed
- Solution:
  - If one programmer can code the product in 1 year, four programmers can do it in 3 months
- Nonsense!
  - Four programmers will probably take nearly a year
  - The quality of the product is usually lower

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Task Sharing

- If one farm hand can pick a strawberry field in 10 days, ten farm hands can pick the same strawberry field in 1 day

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Programming Team Organization

- Example:
  - Sheila and Harry code two modules, `m1` and `m2`, say
- What can go wrong
  - Both Sheila and Harry may code `m1`, and ignore `m2`
  - Sheila may code `m1`, Harry may code `m2`. When `m1` calls `m2` it passes 4 parameters; but `m2` requires 5 parameters
  - Or, the order of parameters in `m1` and `m2` may be different
  - Or, the order may be same, but the data types may be slightly different

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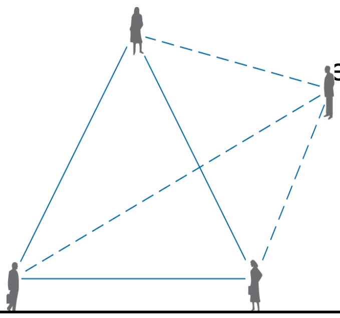
Communications Problems

- Example
  - There are three channels of communication between the three programmers working on a project. The deadline is rapidly approaching but the code is not nearly complete
- "Obvious" solution:
  - Add a fourth ...er to the team



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Communications Problems

- But other three have to explain in detail
  - What has been accomplished
  - What is still incomplete
- Brooks' s Law
  - Adding additional programming personnel to a team when a product is late has the effect of making the product even later

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Team Organization

- Teams are used throughout the software production process
  - But especially during implementation
  - Here, the discussion is presented within the context of programming teams
- Two extreme approaches to team organization
  - Democratic teams (Weinberg, 1971)
  - Chief programmer teams (Brooks, 1971; Baker, 1972)

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4.2 Democratic Team Approach

- Basic underlying concept — *egoless programming*
- Programmers can be highly attached to their code
  - They even name their modules after themselves
  - They see their modules as extension of themselves

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Democratic Team Approach

- Proposed solution
- Egoless programming
  - Restructure the social environment
  - Restructure programmers' values
  - Encourage team members to find faults in code
  - A fault must be considered a normal and accepted event
  - The team as whole will develop an ethos, a group identity
  - Modules will "belong" to the team as whole
  - A group of up to 10 egoless programmers constitutes a *democratic team*

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Difficulties with Democratic Team Approach

- Management may have difficulties
  - Democratic teams are hard to introduce into an undemocratic environment
- May not fit personality types

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Strengths of Democratic Team Approach

- Democratic teams can be enormously productive
- They work best when the problem is difficult
- They function well in a research environment
- Problem:
  - Democratic teams have to spring up spontaneously

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4.3 Classical Chief Programmer Team Approach

- Consider a 6-person team
  - Fifteen 2-person communication channels
  - The total number of 2-, 3-, 4-, 5-, and 6-person groups is 57
  - This team cannot do 6 person-months of work in 1 month

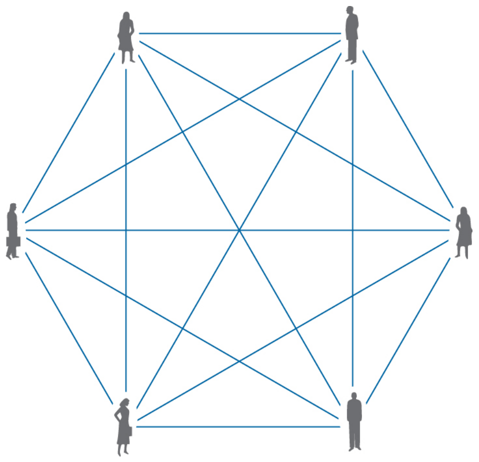
Figure 4.2

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Classical Chief Programmer Team

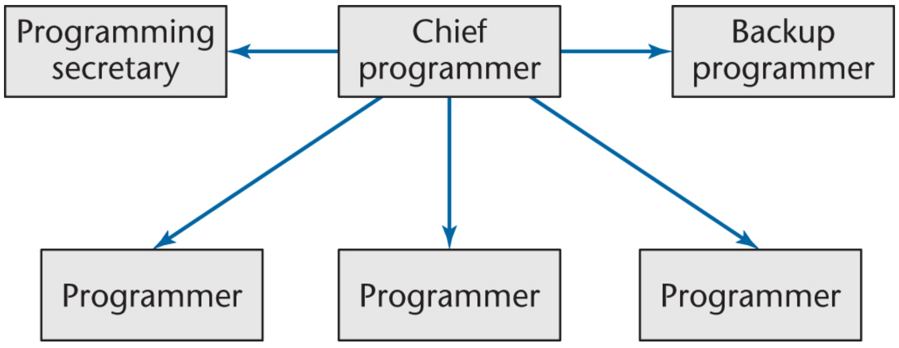

Figure 4.3

- Six programmers, but now only 5 lines of communication

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Classical Chief Programmer Team

- Chief programmer
  - Successful manager *and* highly skilled programmer
  - Does the architectural design
  - Allocates coding among the team members
  - Writes the critical (or complex) sections of the code
  - Handles all the interfacing issues
  - Reviews the work of the other team members
  - Is personally responsible for every line of code

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Classical Chief Programmer Team

- Programming secretary
  - A highly skilled, well paid, central member of the chief programmer team
  - Responsible for maintaining the program production library (documentation of the project), including:
    - Source code listings
    - JCL
    - Test data
  - Programmers hand their source code to the secretary who is responsible for
    - Conversion to machine-readable form
    - Compilation, linking, loading, execution, and running test cases (this was 1971, remember!)

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Classical Chief Programmer Team

- Programmers
  - Do nothing but program
  - All other aspects are handled by the programming secretary

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The *New York Times* Project

- Chief programmer team concept
  - First used in 1971
  - By IBM
  - To automate the clippings data bank (“morgue“) of the *New York Times*
- Chief programmer — F. Terry Baker

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4.4 Beyond CP and Democratic Teams

- We need ways to organize teams that
  - Make use of the strengths of democratic teams and chief programmer teams, and
  - Can handle teams of 20 (or 120) programmers
- A strength of democratic teams
  - A positive attitude to finding faults

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Beyond CP and Democratic Teams

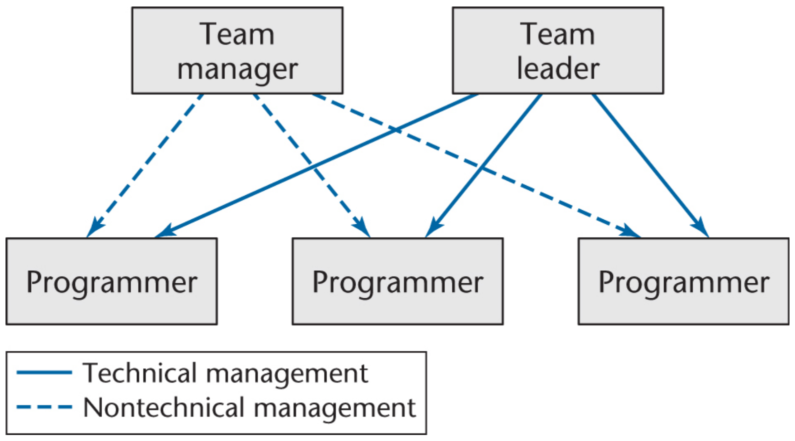

Figure 4.4

- Solution
  - Reduce the managerial role of the chief programmer

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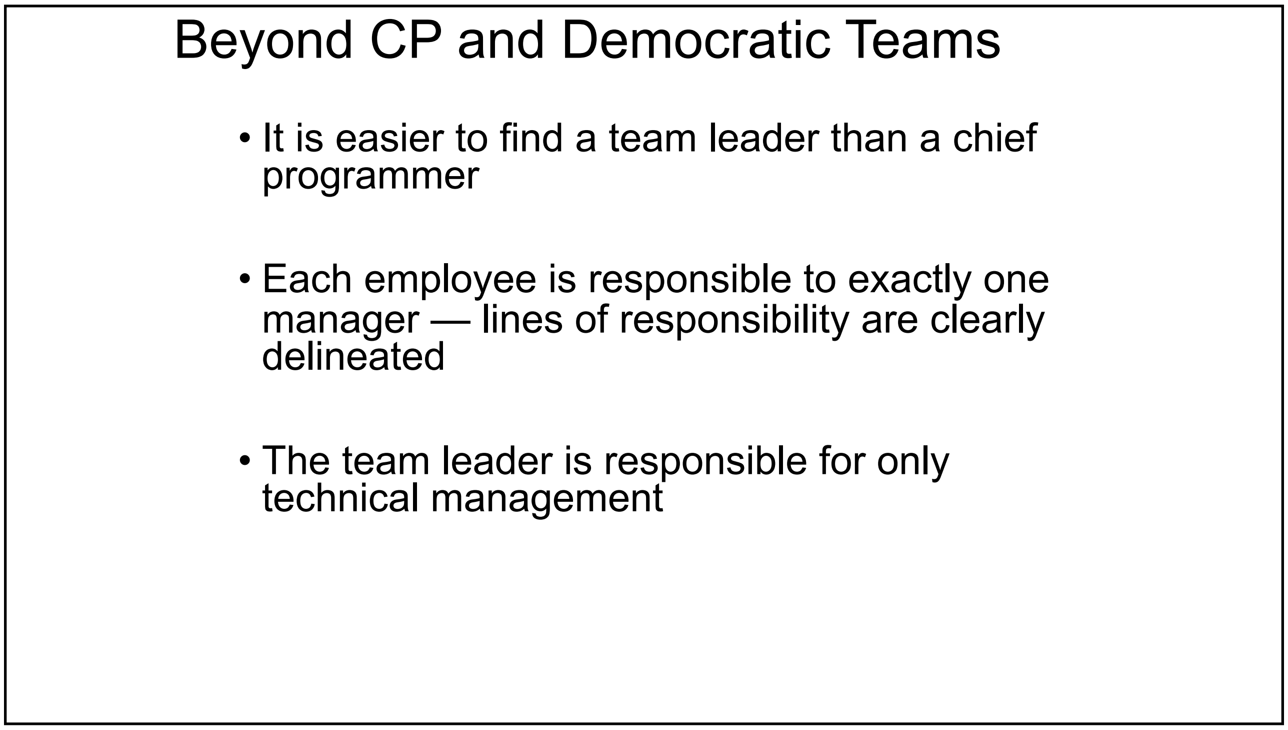

Beyond CP and Democratic Teams

- It is easier to find a team leader than a chief programmer
- Each employee is responsible to exactly one manager — lines of responsibility are clearly delineated
- The team leader is responsible for only technical management

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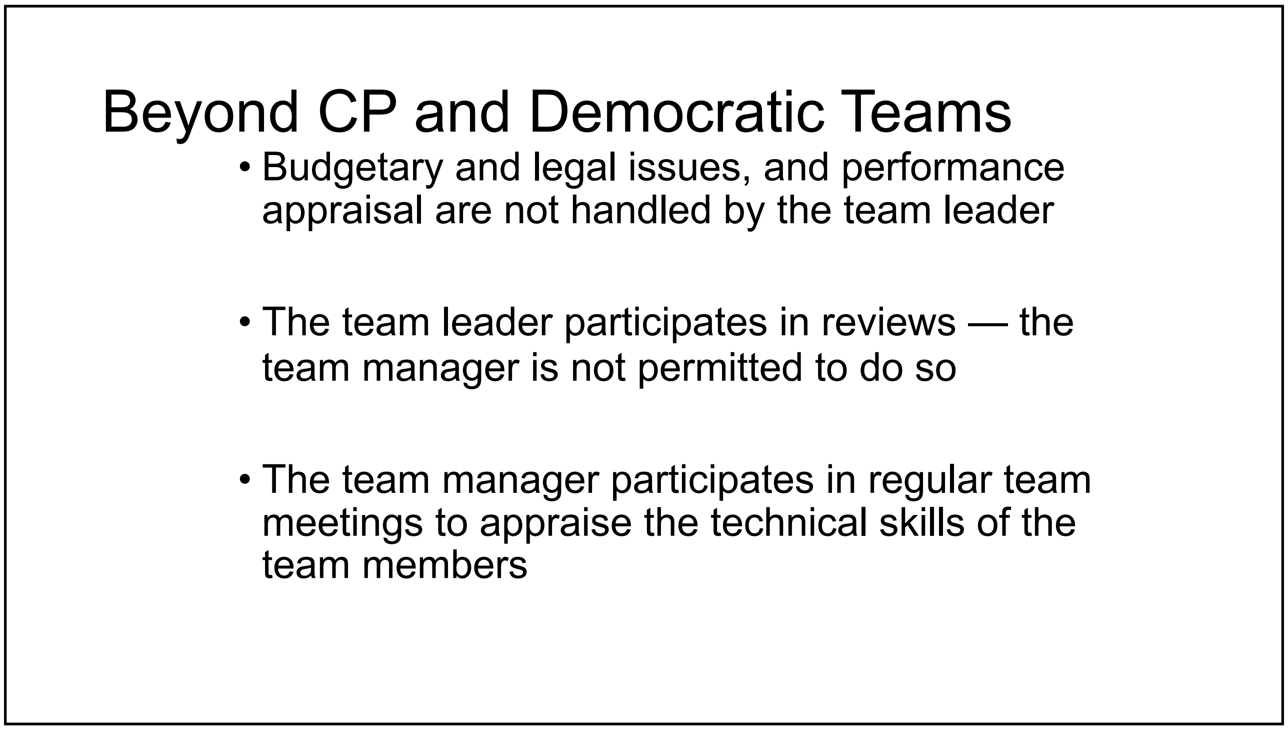

Beyond CP and Democratic Teams

- Budgetary and legal issues, and performance appraisal are not handled by the team leader
- The team leader participates in reviews — the team manager is not permitted to do so
- The team manager participates in regular team meetings to appraise the technical skills of the team members

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Larger Projects

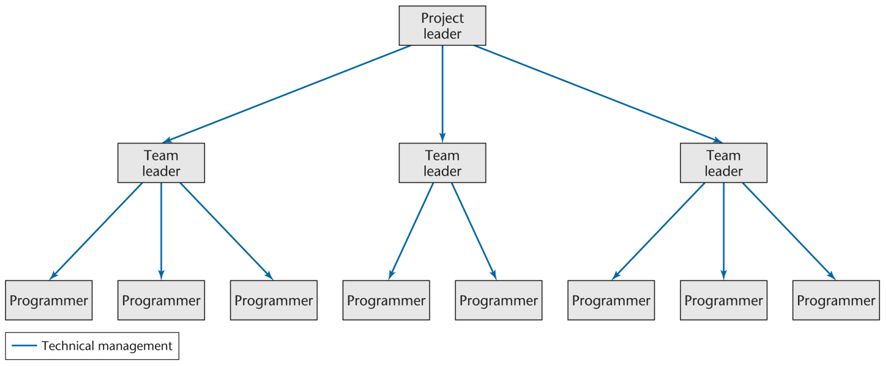

Figure 4.5

- The nontechnical side is similar
  - For even larger products, add additional layers

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Beyond CP and Democratic Teams

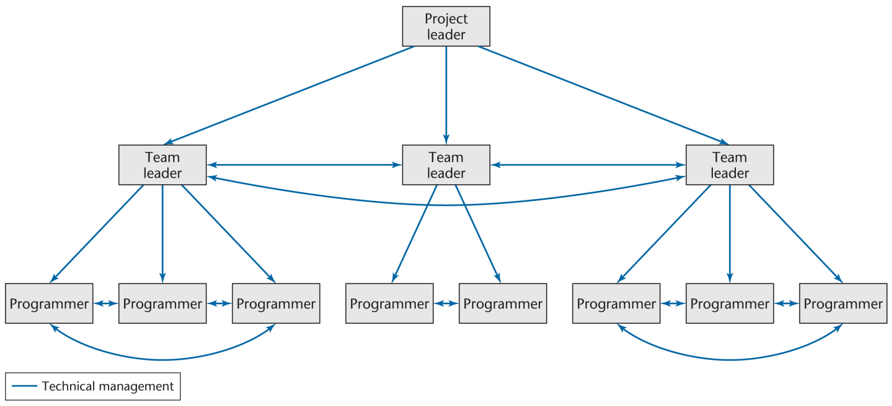

Figure 4.6

- Decentralize the decision-making process, where appropriate
  - Useful where the democratic team is good

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4.5 Synchronize-and-Stabilize Teams

- Used by Microsoft
- Products consist of 3 or 4 sequential builds

- Small parallel teams
  - 3 to 8 developers
  - 3 to 8 testers (work one-to-one with developers)
  - The team is given the overall task specification
  - They may design the task as they wish

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4.6 Teams For Agile Processes

- Feature of agile processes
  - All code is written by two programmers sharing a computer
  - "Pair programming"
- (This is no longer true)

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Open-Source Programming Teams

- Individuals volunteer to take part in an open-source project for two main reasons
- Reason 1: For the sheer enjoyment of accomplishing a worthwhile task
  - In order to attract and keep volunteers, they have to view the project as “worthwhile” at all times
- Reason 2: For the learning experience

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People Capability Maturity Model

- P–CMM is a framework for improving an organization’s processes for managing and developing its workforce
- No one specific approach to team organization is put forward

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Personality Types

- MBTI
  - Slides from Prof. John Barkai
  - William S. Richardson School of Law

    University of Hawaii
- 4 Basic Types of Personalities

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4.9 Choosing an Appropriate Team Organization

- There is no one solution to the problem of team organization
- The “correct” way depends on
  - The product
  - The outlook of the leaders of the organization
  - Previous experience with various team structures

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Choosing an Appropriate Team Organization

- Exceedingly little research has been done on software team organization
  - Instead, team organization has been based on research on group dynamics in general
  - Random??
- Without *relevant* experimental results, it is hard to determine optimal team organization for a specific product

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- The End Chapter 4

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