ENGR 301 Lecture Notes: Bodies of Knowledge

This lecture covers various *Body of Knowledge* ("BOK" or "BoK") frameworks. While the focus falls mostly on the Project Management Body of Knowledge (PMBOK) as a context-appropriate framework, discipline-specific BOKs are also examined.

Bodies of Knowledge are useful They do *not* provide a methodology or detailed prescription for action.

Project Management Body of Knowledge (PMBOK)

> The Project Management Body of Knowledge (PMBOK) is a set of standard terminology and guidelines for project management. The body of knowledge evolves over time and is presented in A Guide to the Project Management Body of Knowledge, a book whose seventh edition was released in 2021.
>
> — Wikipedia, Project Management Body of Knowledge (PMBOK)

The PMBOK Guide is published by the Project Management Institute: https://www.pmi.org/pmbok-guide-standards/foundational/pmbok

This lecture draws heavily from *Introduction to Project Management* 5th edition by Kathy Schwalbe, available from the University Library.

Project Management Hierarchy

Defining some terminology which we'll be using when talking about project management theory:

- **Framework:** a project management *framework* informs what needs to be done at a high-level. *Bodies of Knowledge* are *frameworks*.
- **Methodology:** a project management *methodology* describes in detail how things should be done.
- **Phases:** project *phases* (stages) are steps toward project goals.
- **Processes, Tasks and Activities** are the methodology implemented.

PMBOK Process Groups and Knowledge Areas

Process Groups

1. Initiation
2. Planning
3. Executing

4. Monitoring and Control
5. Closing

These are parts of a/the *project life cycle*. A *Process* is a series of actions directed toward a particular result.

1. Initiating processes

Include actions to begin projects and project phases. They answer the question:

- How do you start a project?

Typical actions:

- Create a Project Charter
- Hold a Kick-off meeting
- Identify project stakeholders

2. Planning processes

These include devising and maintaining a workable scheme to ensure that the project meets its scope, time, and cost goals as well as organisational needs.

3. Executing processes

Processes for coordinating people and resources to carry out the project plans and produce the deliverables of the project or phase.

A **deliverable** is a product or service produced or provided as part of a project.

4. Monitoring and controlling processes

These measure progress toward achieving project goals, monitor deviation from plans, and take corrective action to match progress with plans and stakeholder expectations.

5. Closing processes

Primarily: formalising acceptance of the project or phase and bringing it to an orderly end.

Characteristics of the Process Groups

The level of activity and length of each process group varies for every project.

- Normally, executing tasks require the most resources and time, followed by planning.
- Monitoring and controlling processes are done throughout the project's life span.

- Initiating and closing tasks are usually the shortest and they require the least amount of resources and time.
- Every project is unique, so there can be exceptions.
  Note: process groups apply to entire projects as well as to project phases.
- A phase is a distinct stage in project development, and most projects have distinct phases.

Process Group Time Guidance

How much time should be spent on each process group?

From the book *Alpha Project Managers: What the Top 2% Know That Everyone Else Does Not* by Andy Crowe (2006):

Process Group	”Alpha” PMs	”Sub-Alpha” PMs
Initiating	2%	1%
Planning	21%	11%
Executing	69%	82%
Monitoring & Controlling	5%	4%
Closing	3%	2%

Knowledge Areas

1. Integration
2. Scope
3. Time
4. Cost
5. Quality
6. Human Resources
7. Communication
8. Risk
9. Procurement
10. Stakeholders

Core Knowledge Areas are those which lead to specific project objectives: Scope, Time, Cost and Quality.

Facilitating Knowledge Areas are those through which objectives are achieved: Human Resources, Communication, Risk, Procurement and Stakeholder management.

Project integration management is an overarching function that coordinates the work of all other knowledge areas. It affects and is affected by all of the other knowledge areas.

1. Integration Management

An overarching function which coordinates all the other areas. It anticipates and deals with issues.

Tools:

- Project management methodologies
- Stakeholder analyses
- Project charters
- Project management plans
- Project management software
- Project review meetings

2. Scope Management

Defines, and gains agreement and common understanding with stakeholders, on the work required to complete the project successfully.

Tools:

- Scope statements
- Work breakdown structures
- Requirements analysis
- Statements of work
- Scope management plans
- Scope change controls

3. Time Management

Estimates how long it will take to complete the work, and develops an acceptable project schedule. Aims for timely completion of project!

Tools:

- Gantt charts
- Critical path analyses
- Fast tracking
- Schedule performance measurements

4. Cost Management

Preparing and managing the budget (expenditure plan) for the project.

Tools:

- Net present value
- Return on investment
- Payback analyses
- Cost estimates
- Cost management plans

5. Quality Management

Ensures the project satisfies the stated and implied needs of the stakeholders.

Tools:

- Quality metrics
- Checklists
- Quality control charts
- Statistical methods

6. Human Resource Management

Making effective use of your team

Tools:

- Motivation techniques
- Responsibility assignment lists/matrices
- Organizational charts
- Team building exercises
- Conflict resolution techniques

7. Communications Management

Manages generation, collection, dissemination and storage of project information.

Tools:

- Kickoff meetings
- Conflict management
- Status and progress reports
- Templates
- Project web sites

8. Risk Management

Identifying, analyzing and repsonding to risk related to the project.

Tools:

- Risk management plans
- Risk registers
- Probability matrices
- Risk rankings

9. Procurement Management

Making sure you have what you need, when you need it.

Tools:

- Make-or-buy analyses
- Contracts
- Requests for quotes
- Materials source selection
- Supplier evaluation

Note on "sub-processes"

9 knowledge areas x 5 process groups = 45 sub-processes.

Subject-Specific Bodies of Knowledge

There are many Bodies of Knowledge which complement each other in the context of projects.

- PMBOK Project Management Body of Knowledge https://www.pmi.org/pmbok-guide-standards/foundational/pmbok
- SWEBOK Software Engineering Body of Knowledge https://www.computer.org/education/bodies-of-knowledge/software-engineering/v3
- CYBOK Cyber Security Body of Knowledge https://www.cybok.org/
- SEBOK Systems Engineering Body of Knowledge https://sebokwiki.org/wiki/SEBoK_Introduction (see also https://ieeesystemscouncil.org/systems-engineering-body-knowledge-sebok)
- ISEBOK Industrial and Systems Engineering Body of Knowledge https://www.iise.org/details.aspx?id=43631
