THIS GUIDE IS TO BE READ IN CONJUNCTION WITH THE QUICK GUIDE TO MANAGEMENT SYSTEMS

Pedagogical advantages

All organisations and businesses – educational, for-profit, not-for-profit, government, large, small, medium sized or sole trader – have/need a management system. A management system is the framework of policies, processes and procedures, that define how tasks gets done to achieve the organisation's objectives. Management systems influence, and are influenced by, workplace culture(s) and the organisation's purpose. They are a means of mediating engagement between stakeholders – clients/customers, executive, managers, workers, external accreditation/compliance bodies, the general public, users of the products/services produced, etc.

They are also a means to facilitate compliance, consistency, quality and efficient use of resources. To ensure compliance organisations need individuals within the organisation to follow the requirements of the management system.

As well as giving individuals within an organisation structure, direction and confidence, management systems give insight, for those external to the organisation, on how business is undertaken, particularly in meeting legislative requirements and relevant standards

The management system will commonly impact on the resources available for engineering tasks/projects. They may also determine or influence all or some of the following: the timeframes, milestones, assumptions, exclusions and inclusions, how to communicate and otherwise engage with stakeholders/clients, design specifications, workload management. Therefore, both as students and as aspiring engineers, students must be able to identify and have a sound understanding of the management system and its requirements critical to effective practice.

Engineering students should therefore have an awareness of management systems, including those used by the institution they are studying in, how they are required to work within the system, and the types of management systems they may encounter in an engineering organisation.

While development, implementation, monitoring and update of management systems is driven from organisation management, it is the responsibility of everyone within the organisation to do the right thing and comply with the management system. Students should understand this duty for people at all levels of an organisation to comply. If the requirements and responsibilities of the management system are not understood raise this with management to get direction and/or clarification. If parts of the management system appear to be contradictory or detrimental to the organisation's purpose and objectives or to enacting assigned responsibilities, it is appropriate to raise concerns with management.

Assessment

Students should be introduced to the types of management systems used in commercial organisations and particularly those used in engineering. Engineering management systems define how engineering is done in that organisation. A way to teach engineering management systems, is to have students follow the principles of leading-practice engineering management systems within their projects and make them aware that those principles are deliberate and necessary and should be imposed at an organisation level and not left to the individual engineer to select or choose.

Where practical to do so, including reflection on the management systems influencing a particular project will enable students to understand the relationships between components of the management system and between the management system and the project work/engineering practice.

The emphasis of the assessment task should be on students demonstrating they know what the components are of a management system, and how they individually and collectively influence their work as students and as aspiring engineers.

Implementation

Educators should implement, as far as practicable, the concepts contained within these MaSEE guides and should make the students aware of the methods and systems implemented so they become familiar with both the concepts and their existence within a management system, and that they should expect similar in industry. This can be done through explanation on assessment materials and direct discussion with students.

Students should then be given the opportunity to reflect on the management systems implemented during the course, including both the engineering management systems and other management systems imposed by the university, and provide critical feedback on their performance. They will need access to organisational policies, procedures and process documents to do this. This exercise should let students identify the management systems implemented, reflect on their purpose, evaluate whether they have efficiently achieved that purpose, and suggest possibilities for improvement. This will be helped by explicit mention of these as drivers of practice incidentally and as relevant throughout the course, e.g. *"You need to abide by the university's WHS policy when working in the laboratory. We have this policy to ensure everyone is safe and to reduce risk of damages to people and property. It also helps to manage costs and ensure our legal requirements are met."*

It is useful to remind students that a system is a collection of inter-related components. While they may have studied and practiced the component parts separately – design, verification, validation, review, project management, meeting procedures, communication protocols, etc – they must function in practice as part of a whole that work together to create an effective system.

Indicative assessment

Ask students to investigate the components of a management system - work methods, practices, procedures or policies - that influenced their work as students and/or aspiring engineers (i.e. that impacted on their coursework or an engineering project they undertook.

They can then reflect on the impact of the components and the system as a whole on the scope and implementation of the project/coursework.

To demonstrate the relationship between practice and the management system, they can then, based on understanding of the management system and reflections on its impact/influence, recommend improvements to the system that would benefit quality/compliant outputs, operational continuous improvement and/or efficient use of resources.

Sample instructions

Identify some of the work methods, engineering practices, procedures or policies that are part of the management systems you have had to comply with during this course. Aim to list 6.

For each item:

1. Reflect on its purpose and why an organisation might implement such an item. Consider the benefits to individuals internal and external to the organisation, and to the organisation itself.
2. Evaluate how the item met its purpose. Was it efficient and deliver the desired value?
3. Suggest how the item could be improved to better achieve its purpose.

Indicative Rubric

	Not Satisfactory	*Satisfactory*	*Very Good - meets Satisfactory criteria plus…*
Identifying and understanding management systems	☐ Less than 6 items listed	☐ 6 items listed with answers for each to each question	☐ Student demonstrates an understanding of how each item fits within the overall objectives of the course and the university.
Reflections and evaluation	☐ Statements describe what was done but not reflecting on the relationship between purpose and effect	☐ Reflections and evaluations demonstrate an understanding of the purpose of work methods, engineering practices, procedures or policies identified and influence on undertaking work in this course	☐ Reflections demonstrate an insightful understanding of the influence of management system on practice/work ☐ Evaluation demonstrates an insightful understanding of the purpose of the work methods, engineering practices, procedures or policies identified and the effect on practice/work
Recommendations	☐ No recommendations made ☐ Recommendations made without reference to how they may lead to improvement	☐ Recommendations made for improvements with reference to the purpose of work methods, engineering practices, procedures or policies identified	☐ Recommendations supported with a clear argument based on experience, reflections and evaluation

Frequently asked questions

1. ***What is a management system?***

   "Management Systems are systematic frameworks designed to manage an organization's policies, procedures and processes and promote continual improvement within. The implementation of a proven and effective Management System ... can help a business to improve operations, manage risk and promote stakeholder confidence." ("What is a management system?: A management system can fine-tune your performance and manage the risks, while operating in more efficient and sustainable ways," 2019)

2. ***What is systems engineering management?***

   "[Engineering managers apply] sound engineering principles to projects and [manage] the financial, administrative, and planning activities that support project development from conception to completion. Systems engineering management is "... the overall process of defining, developing, operating, maintaining, and ultimately replacing quality systems (International Council on Systems Engineering (INCOSE)." ("Engineering management vs systems engineering - Which is right for you?,")

3. ***Can a higher education institution be defined as a type of organisation?***

   An organisation is "A social unit of people that is structured and managed to meet a need or to pursue collective goals. All organisations have a management structure that determines relationships between the different activities and the members, and subdivides and assigns roles, responsibilities, and authority to carry out different tasks. Organisations are open systems - they affect and are affected by their environment." ("Organization,")

   A higher education institution, e.g. university, meets this definition. The collective goals are outlined in the policies and plans of the institution. Roles, responsibilities and tasks are assigned to executive, administrative and academic staff as well as to students, partners and stakeholders.

Further Reading & References

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