Project Management for PV technologist

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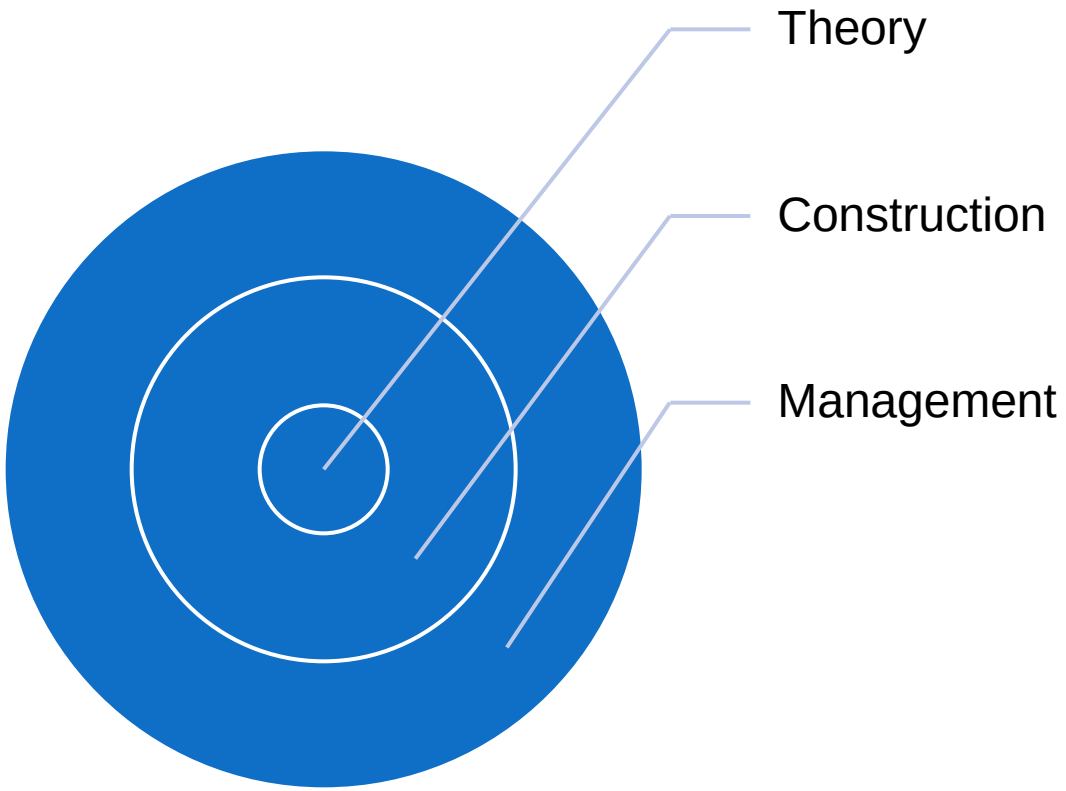
Structure of discourse

- Introduction
  - Why we need a project management at all?
- Product Life Cycle
- Agile Project Management Process
- Quality Assurance
- FMEA
- Conclusion

Why project management?

- A construction of solar system is a complex engineering activity which demanded us to resolve:
  - Plan
  - Design
  - Realise
  - Monitor
  - Control
  - Deploy
  - Asses
  - Support
  - Dissimilate



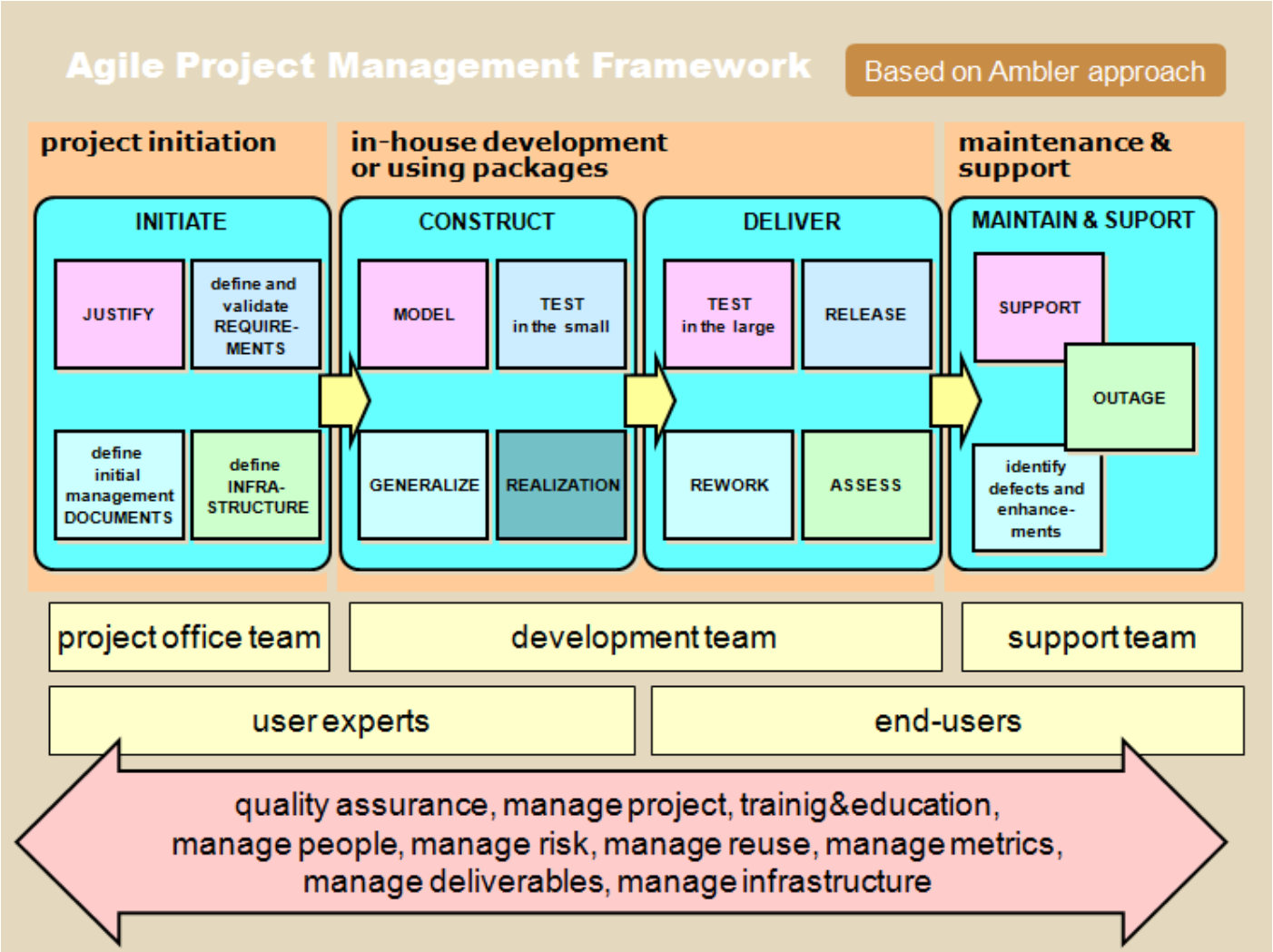
Project Life Cycle

The basic cycle of project management activities through the time of product lifetime.

Product lifecycle management (PLM) is the process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal.
(Excerpt from Wikipedia)

Agile Project Management

The agile project management is a flexible and well defined project management framework.



More details on next slides

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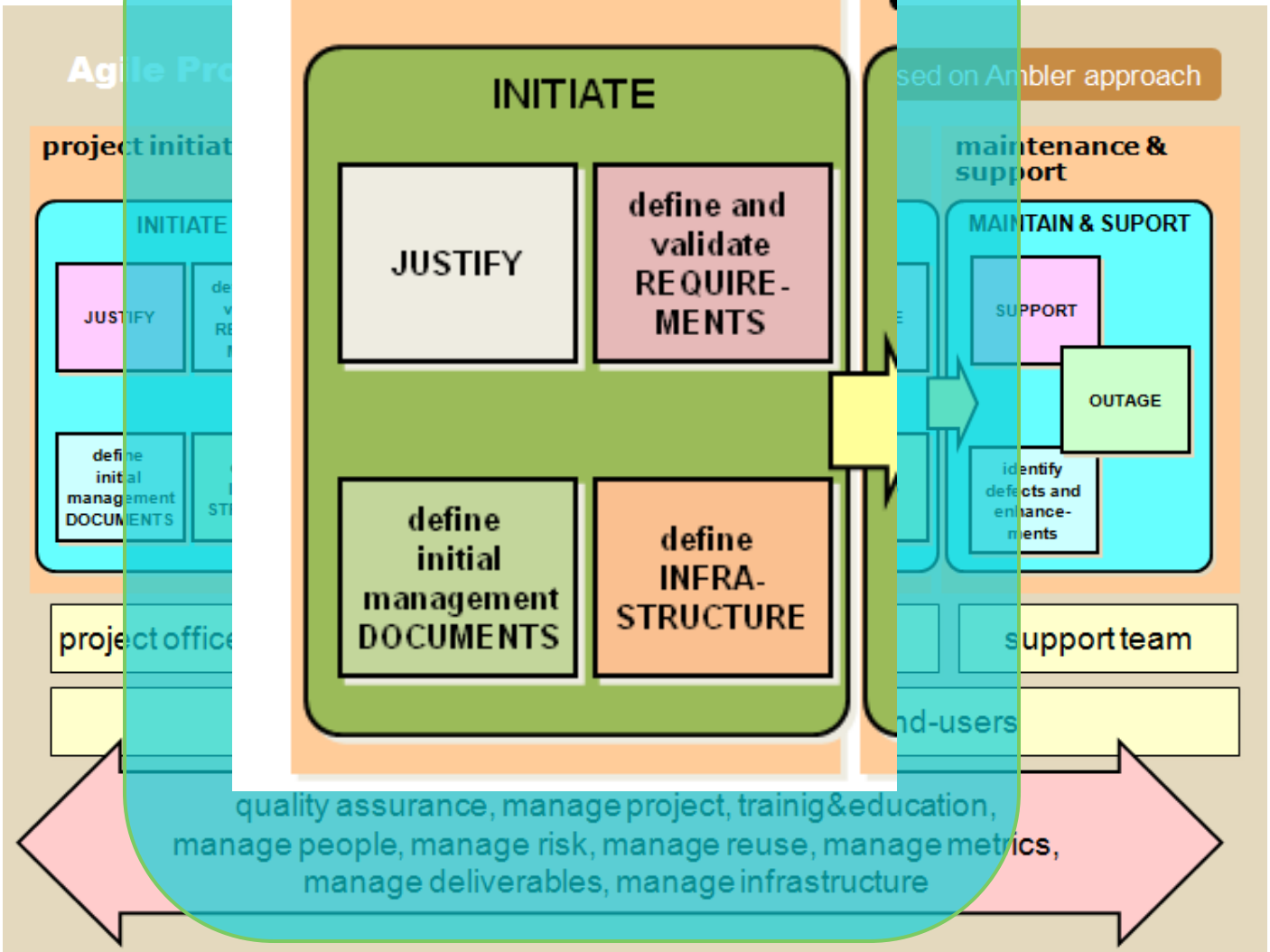

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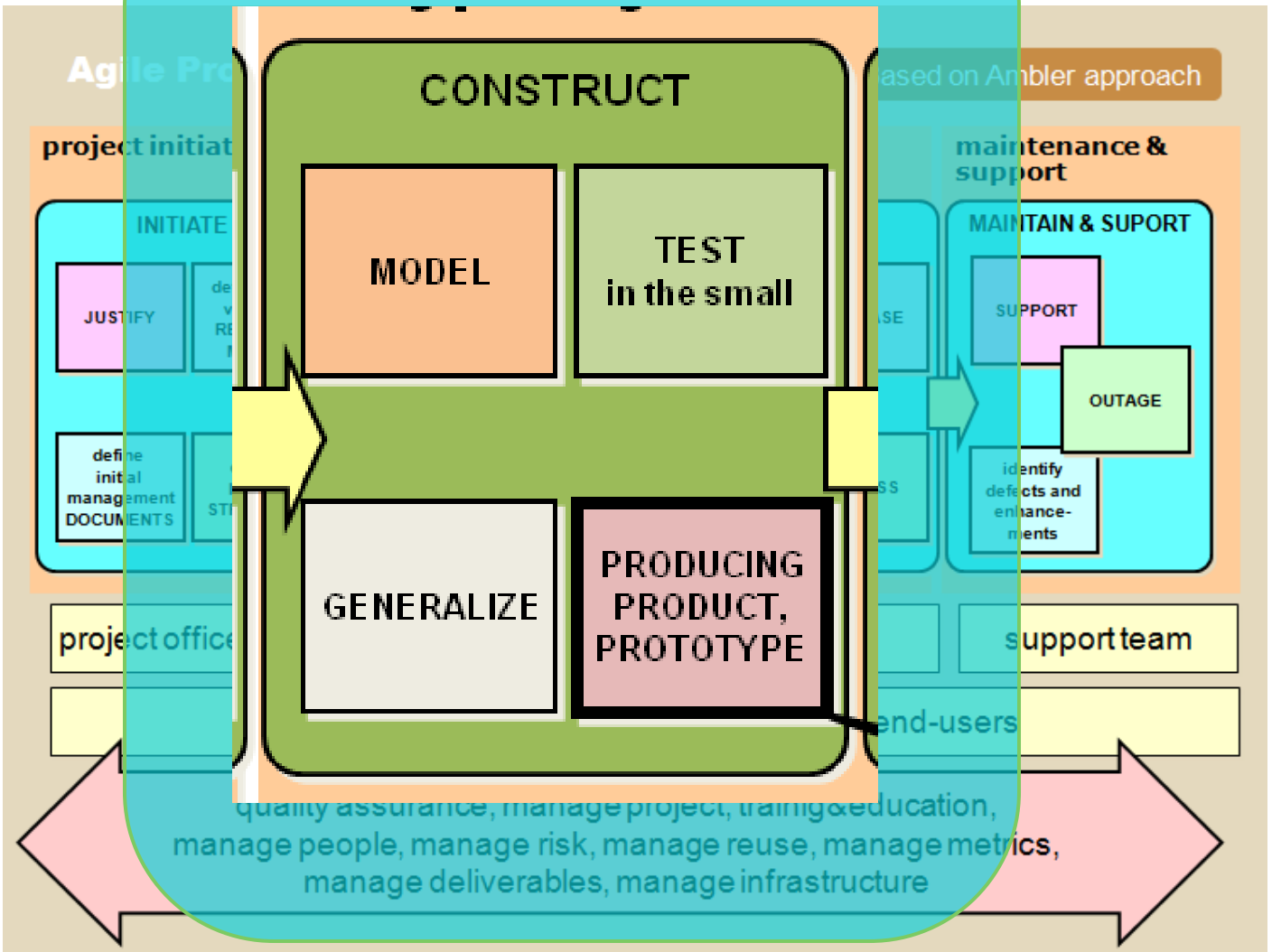

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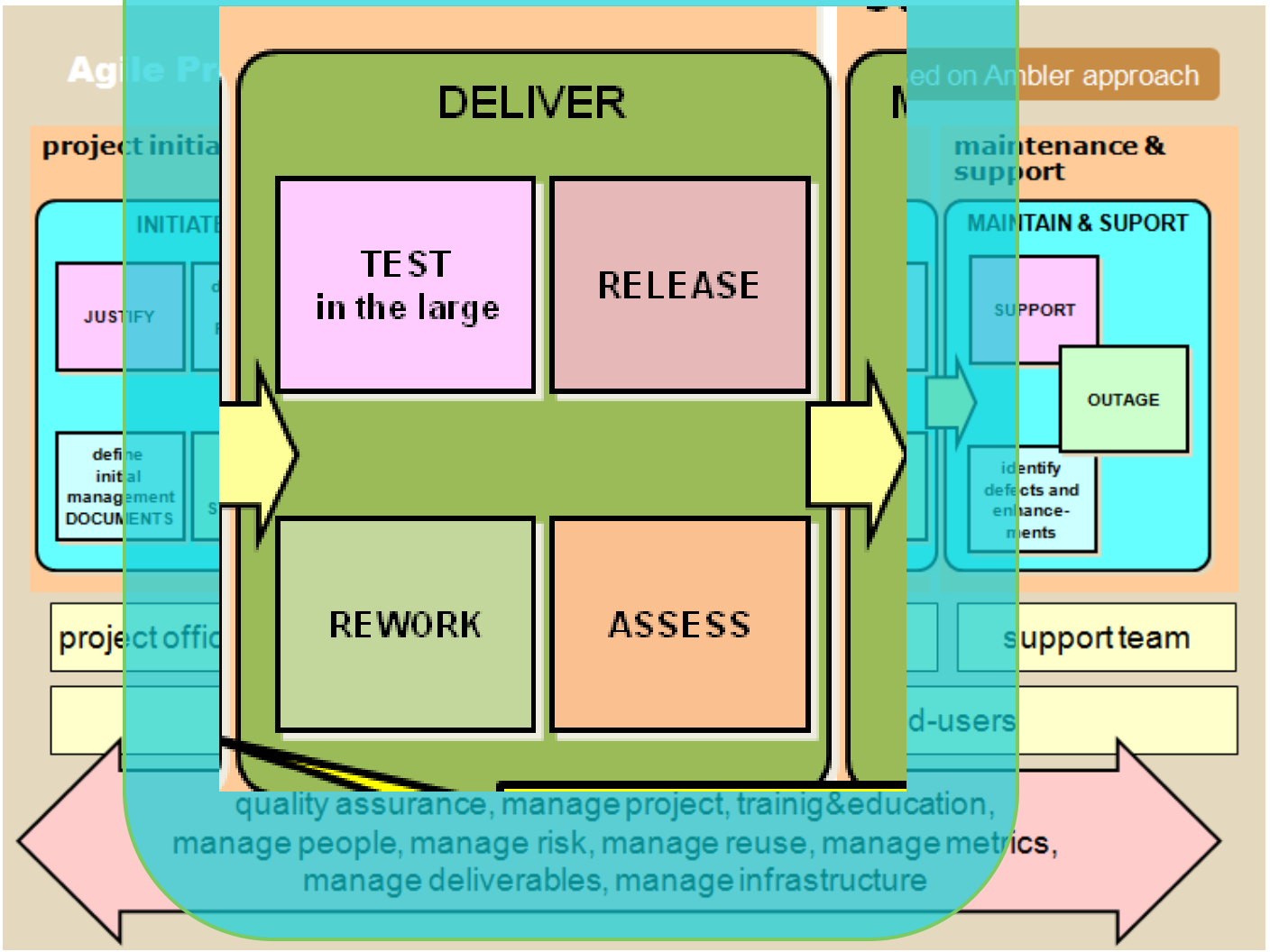

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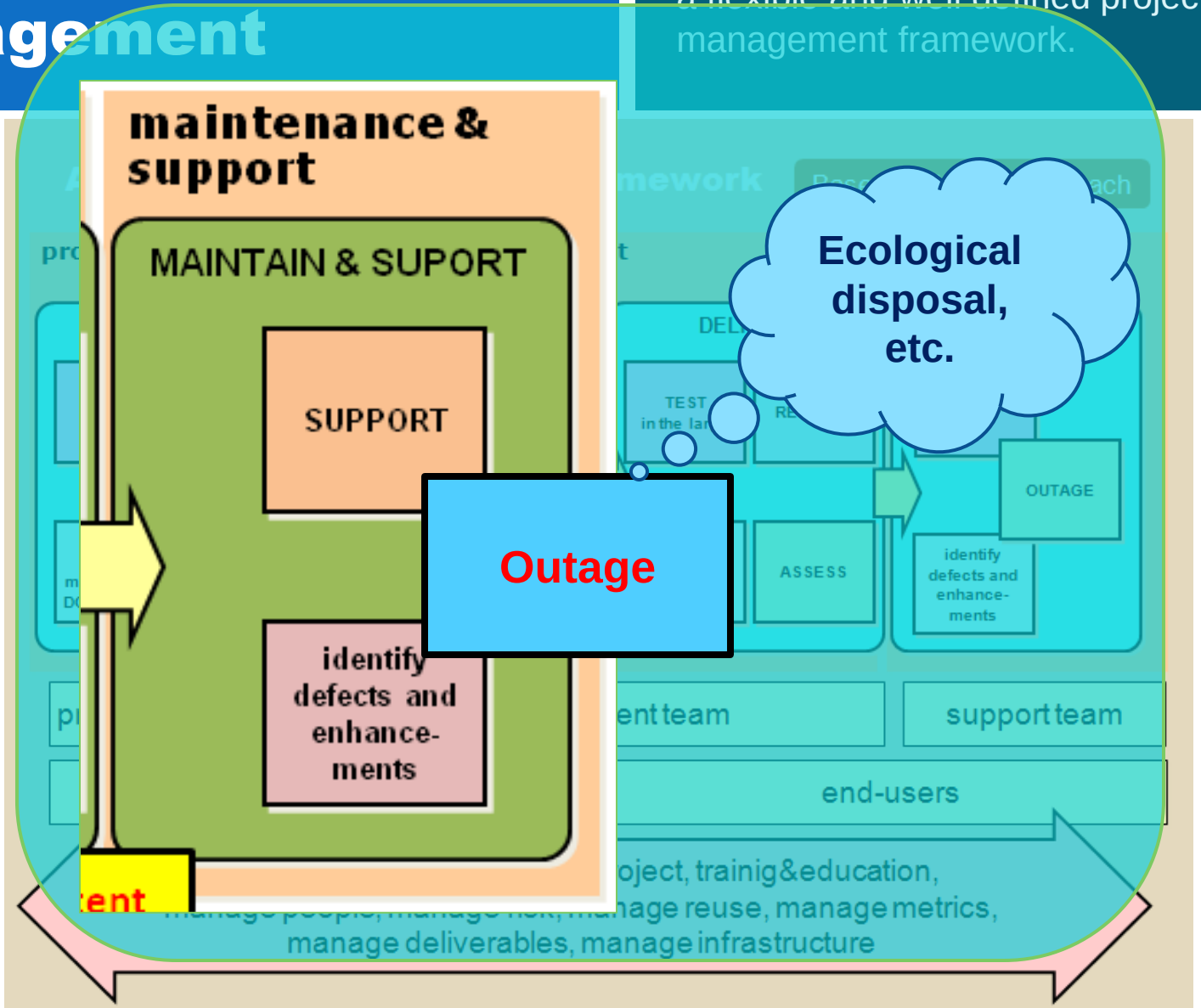
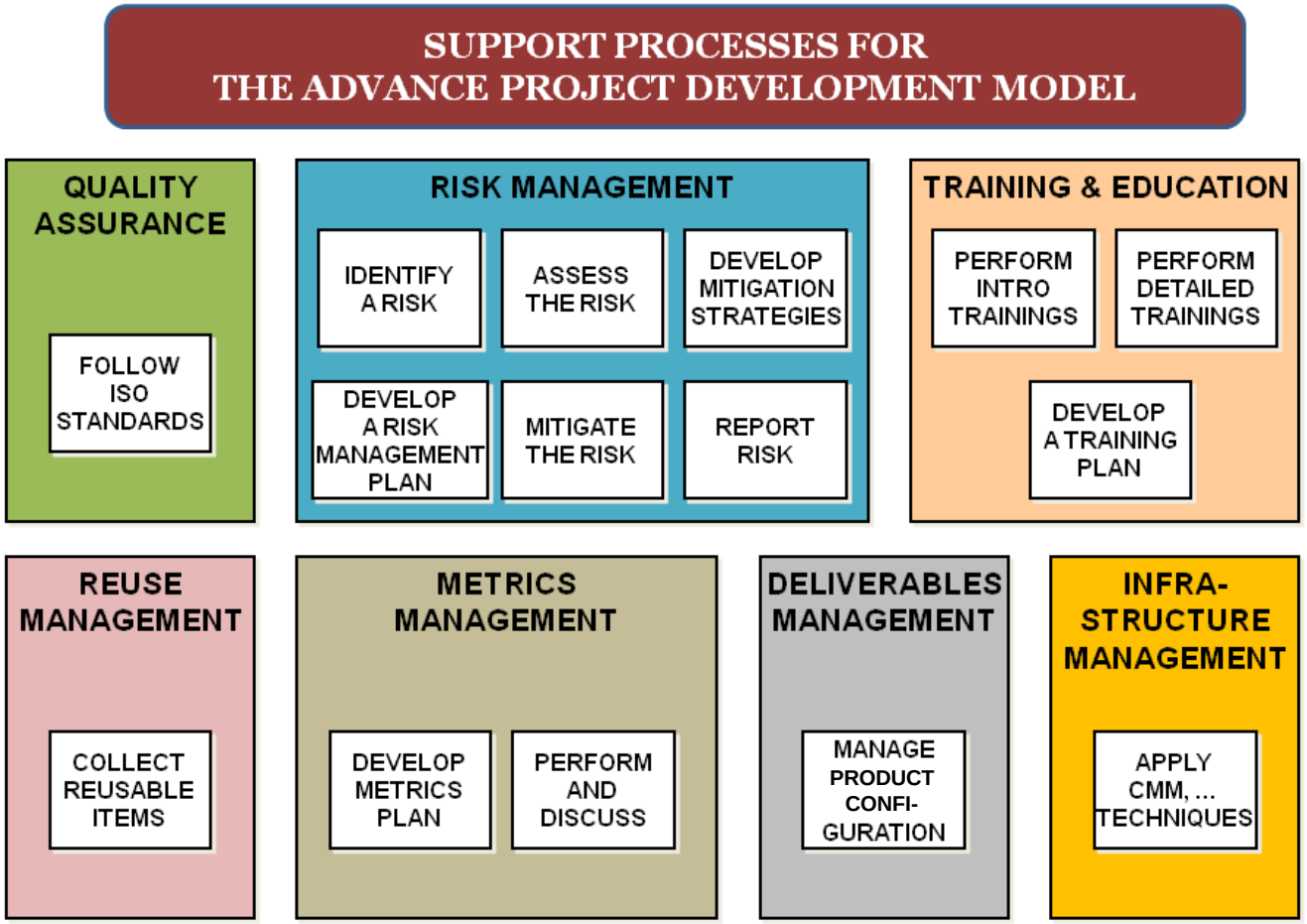


Agile Project Management

There are support processes which persist through all phases of project lifetime.



Quality Assurance

How permanently achieve a high product quality?

- There are many methods for increasing a product quality
  - Statistical Quality Method
  - CMMI (Capability Maturity Model Integration)
  - Six Sigma
  - Measurement Systems Analysis
  - FMEA (Failure Mode And Effects Analysis)
    - Described in more detail on following slides

FMEA

Failure Mode And Effects Analysis

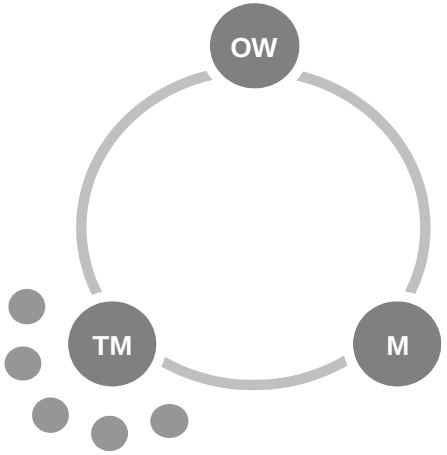
- FMEA is a tool that examines potential product or process failures and evaluates risk priorities. It also helps to determine remedial actions to avoid potential problems.
- FMEA is a systematic approach, which makes identification of potential failure modes in a product (caused by design) and manufacturing process possible.
- The most significant problem of FMEA is that this procedure is not formalized or that its formalization is on a very low level.
- The computer processing of FMEA having a standard structure is therefore difficult, or impossible.

Example FMEA Worksheet

Function	Failure mode	Effects	S (severity rating)	Cause(s)	O (occurrence rating)	Current controls	D (detection rating)	CRIT (critical characteristic	RPN (risk priority number)	Recommended actions	Responsibility and target completion date	Action taken
Fill tub	High level sensor never trips	Liquid spills on customer floor	8	level sensor failed level sensor disconnected	2	Fill timeout based on time to fill to low level sensor	5	N	80	Perform cost analysis of adding additional sensor halfway between low and high level sensors	Jane Doe 10-Oct-2010	

FMEA is usually conducted in following steps:

- Product or process is described.
- Functions are defined.
- Potential failure modes are identified.
- Effects of failures are described.
- Causes are determined.
- Detection methods are chosen.
- Possible risk is calculated.
- Actions are taken.
- Results are assessed.



Composition of a FMEA team.
OW ... owner of FMEA, TM ... team manager, M ... moderator.

FMEA problems

- A big complexity of analyzed system.
- The usage of natural language.
- Usually not possible to reuse, always we start from a scratch, so the results are often incomplete.
- Already performed FMEA are hardly comprehensible.
- In case of large systems examined in FMEA, it is barely possible to avoid inconsistencies.
- Not exist a formal description or notation.

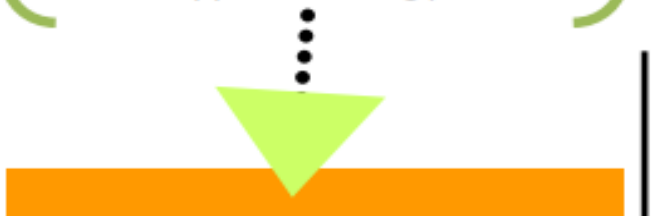
Ontology based FMEA

(*a modern approach in quality assurance)*

Ontology (from *onto-*, from the Greek *ὤν, ὄντος* "being; that which is", present participle of the verb *εἰμί* "be", and -λογία, -logia: *science*, *study*, *theory*)

- We propose a strong support of the analysis process by performing ontology of FMEA domain.
  - First, it offers a common understanding of the concepts of the domain of our focus and the FMEA procedure ourselves as well.
  - Second, the knowledge held in the ontology based model can be computationally processed.

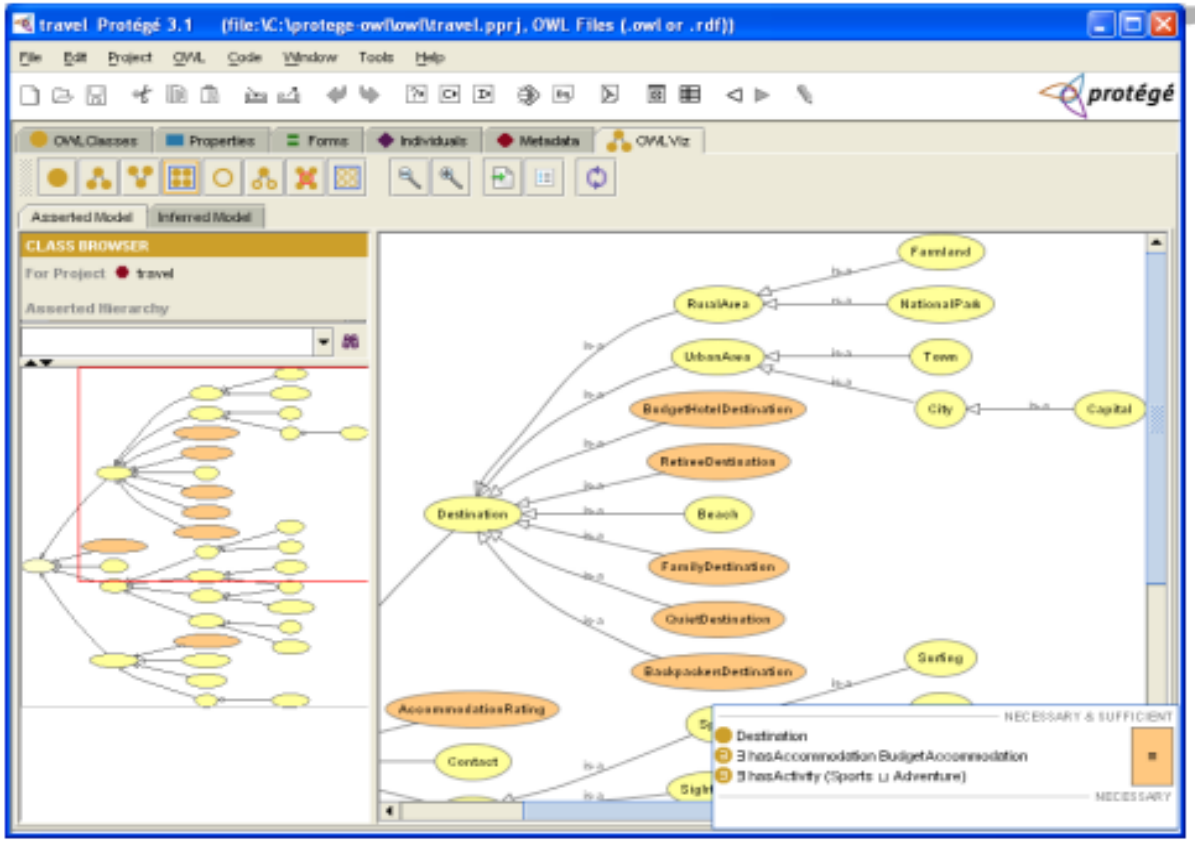
Our approach is based on ontology paradigm. Ontology in philosophy is the study of the nature of being, existence or quality in general, as well as of the basic categories of being and their relations. In our work we deal with the more specialization kind of ontology, i.e., the informatics or upper ontology.



ONTOLOGY

A formal description of real world. Based on philosophy, logic and reasoning.

Ontology based FMEA



- This approach have been utilized in our courses of *Management of Production Quality* and *Complex Quality Control* provided by our department.

An ontology editor suitable for our needs has been chosen. Three types of editors of such the type have been examined, Protégé. SWOOP and JOE. It has been decided that the best one will be Protégé for our application.

Protégé

OWL ontology

Conclusion

- The knowledge of technical project management is a necessary cognisance for all technologist students.
- We need to teach not only the theory, i.e., how solar panels works and how we can construct them, but we need to teach how to manage a complex solar system installation as a complete technical project management process too.
- With respect of quality assurance as a most important aspect of project management process, preferably by using FMEA method.

Questions?

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Thank You!