

Knowledge Management and Sharing



VIVACE

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Act 7 Scene 1 General Summary

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|------|----------|-----------------------------------|--------|
| Part | 1 | Introduction to KEE | 20 min |
| | | Daniele Gulmini | |
| Part | 2 | The Software Platform | 25 min |
| | | Romarc Redon | |
| Part | 3 | Methods & Guidelines | 20 min |
| | | Paul Nuzzo | |
| Part | 4 | Conclusions | 15 min |
| | | Daniele Gulmini & Andreas Larsson | |



Act 7 Scene 1 - Part 1

Introduction to Knowledge Enabled Engineering

Daniele Gulmini
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Summary of Presentation Topics

- **Knowledge Enabled Engineering**
- **The Knowledge Lifecycle**
- **Main Business Drivers**
- **Knowledge Challenges and Requirements Flow Down**
- **The Knowledge Enabled Engineering Solution**





Knowledge Enabled Engineering

Knowledge Enabled Engineering: the exploitation of Knowledge Management within an engineering context.

This means:

- Leveraging sources of data, information and knowledge to enable engineers to complete their tasks quickly and correctly
- Being aware of the options available
- Documenting decisions and the rationale behind them
- Sharing the information with those who need to know
- Learning within the organisation and across the supply chain
- Overcoming the boundaries of the Extended Enterprise

In the end, Knowledge Enabled Engineering is about providing the right information to the engineer in the right format, at the right time!

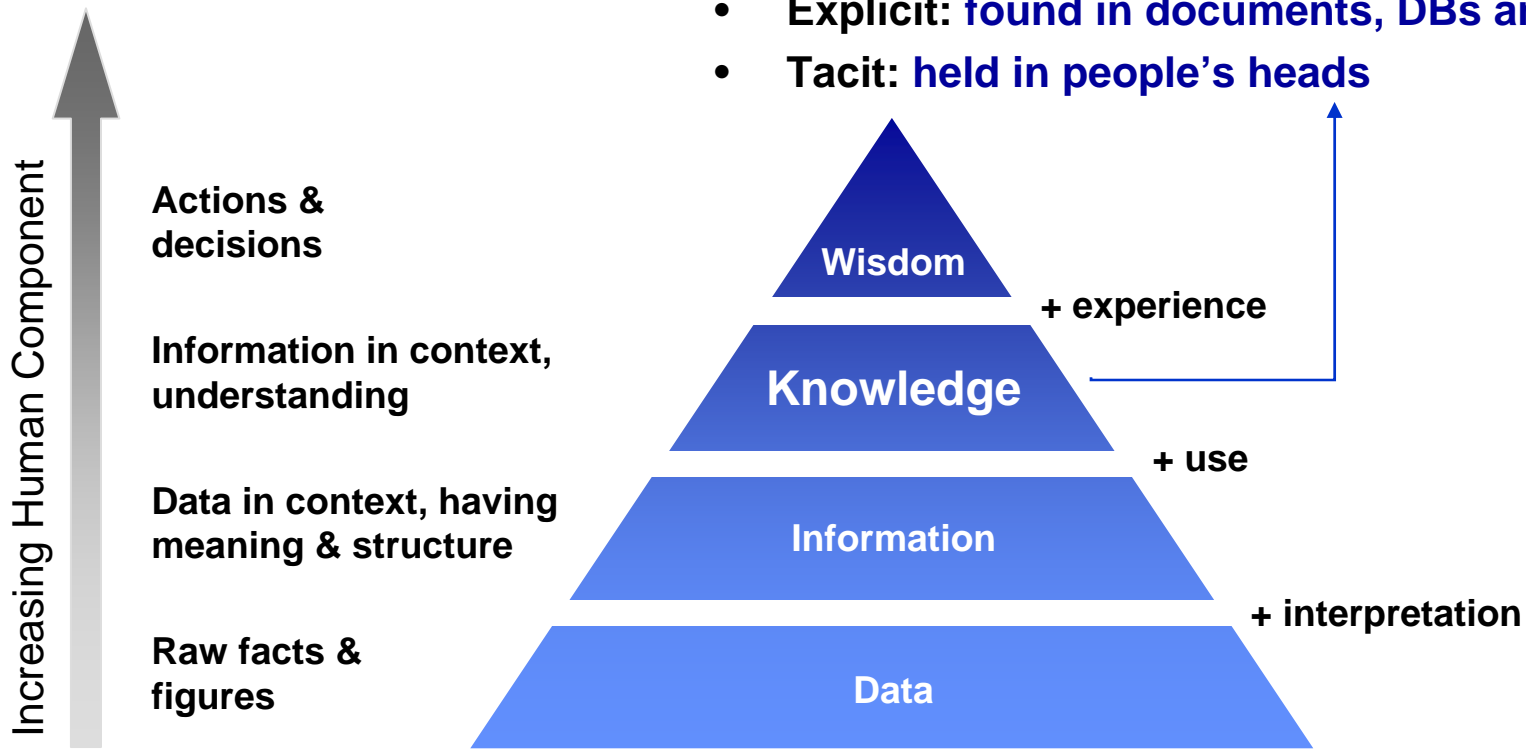


What is Knowledge?

The “Knowledge Hierarchy” allows to easily comprehend the concept of Knowledge

Types of Knowledge

- **Explicit:** found in documents, DBs and files
- **Tacit:** held in people’s heads





From Knowledge to Knowledge Elements

From an operational point of view, elementary pieces of Knowledge are known as **Knowledge Elements**. Some examples of engineering K-Elements are:



Process Descriptions



Contacts



Tools



Web Pages



Design Practices



Lessons Learnt



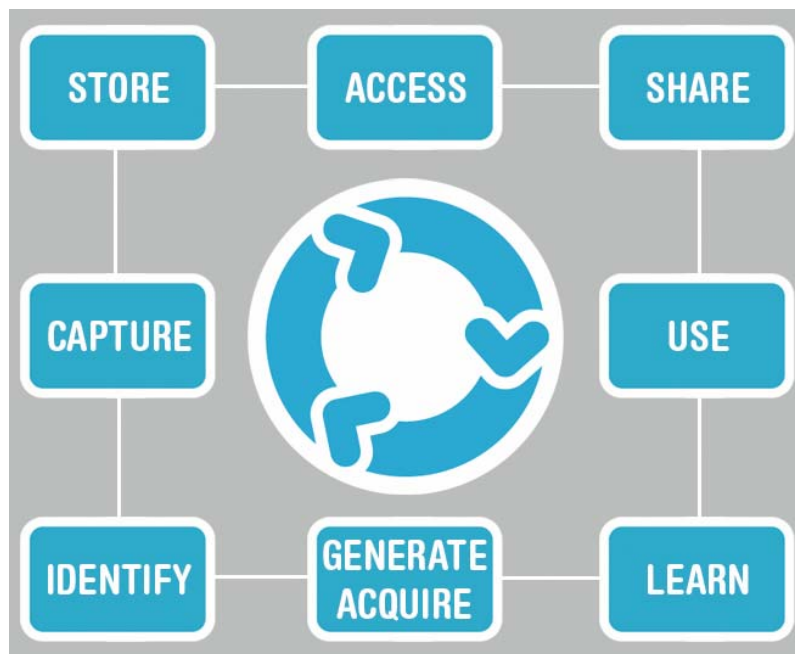
Technical Documents



Product Data

The Knowledge Lifecycle

Recognizing that Knowledge is such a wide-range term, we chose to take a Life Cycle perspective to Knowledge Engineering. The Knowledge Lifecycle:



- allowed to group the Knowledge Challenges, and to highlight similarities in the underlying requirements
- provided the capability to communicate abstract terms



Main Business Drivers

To comply with the **VIVACE High-Level Objectives...**

- 5% cost reduction of the development phase of a new aircraft design
- 30% reduction in the lead time for a new gas turbine engine
- 50% reduction in development costs for a derivative gas turbine engine

... we are asked to:

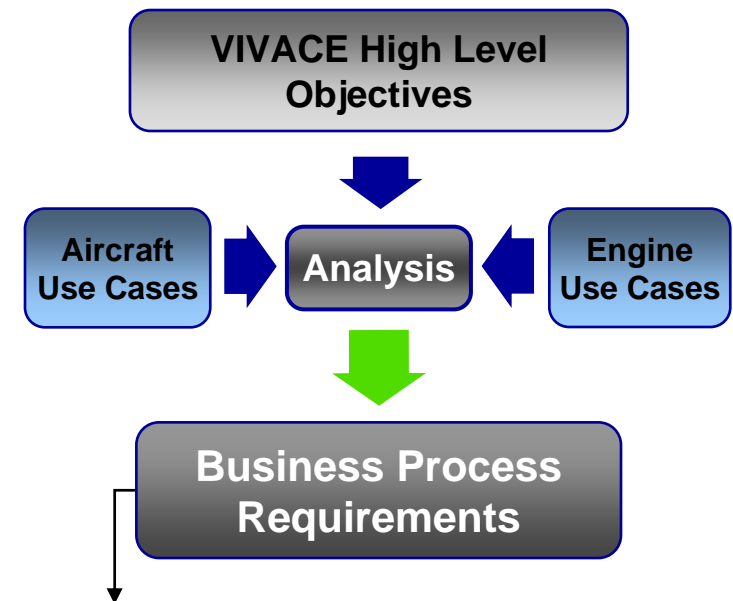
- Make better use of time, reducing the duration of design activities
- Do things better and make better decisions, improving the robustness of the product development process
- Enable collaboration within our team, and across teams and organisations



VIVACE Uses Cases: Where the problems come from

Deploying the VIVACE High-Level Objectives down to knowledge-related Business Process Requirements was done through the analysis of selected aircraft and engine Use Cases.

- **TRD** - management of technical knowledge in the multidisciplinary robust design of Turbine Rotor Disks
- **KEWE** - knowledge exchange of teams working across organisational and functional boundaries within the EE
- **7DP** - reduction of time and costs when developing a new proposal
- **Compass** - re-use of information objects obtained in analysis activities in various domain contexts



KNOWLEDGE CHALLENGES!



Knowledge Challenges

Important Knowledge Challenges were identified.

- **Allow to leverage past design experience**
- **Supply means to share knowledge**
- **Facilitate finding information**
- **Reuse knowledge from existing designs and proposals**
- **Migrate process knowledge and process changes**
- **Learn from experience (project learning)**
- **Manage information overload: exchange / manage huge amounts of information**

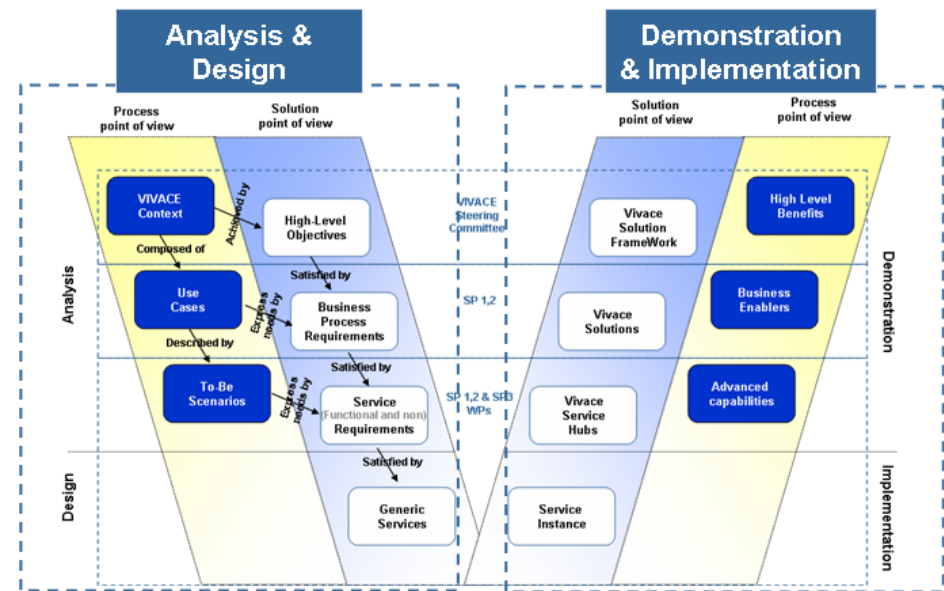


Requirements Flow-Down

Requirements flow-down was guided by the VITC¹ Requirement Management Structure together with QFD methodology.

- High-Level Objectives
- Business Process Requirements
- Functional Requirements
- Generic Services

(1) VIVACE Integration Technical Committee

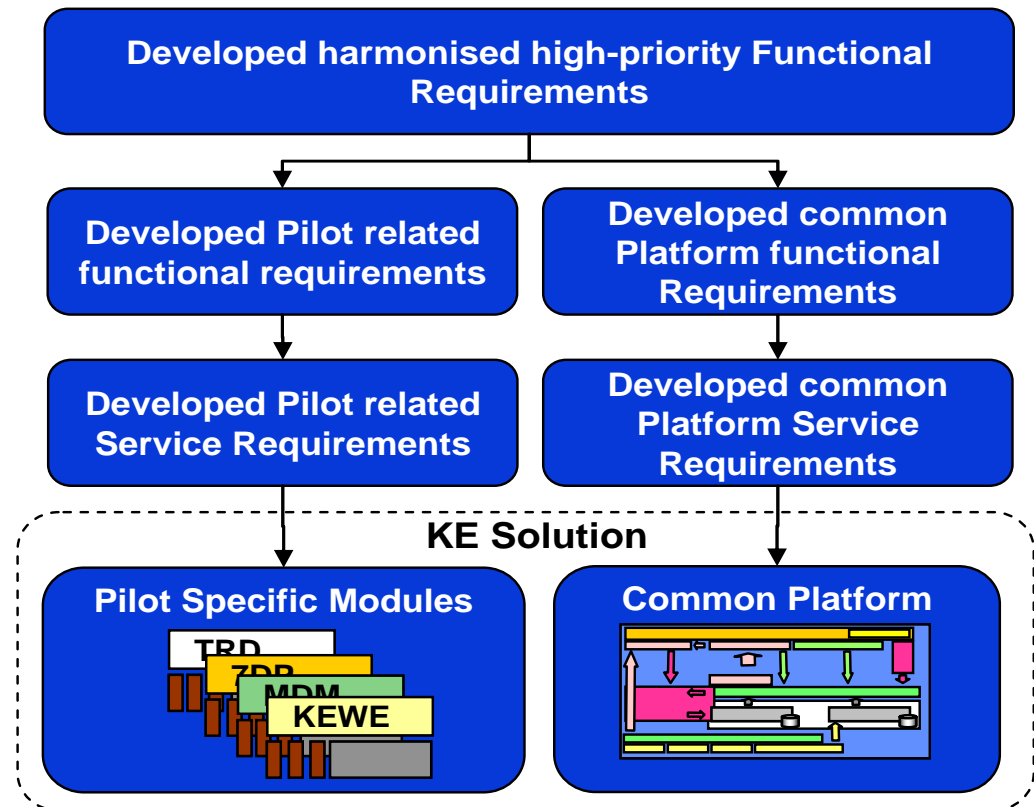




Functional Requirements

An important activity of the adopted work approach was **Functional Requirements' harmonization**

The Functional Requirements common to all Use Cases allowed to define the Knowledge Enabled Solution Platform, while remaining requirements will be satisfied by pilot-specific modules.





KEE Generic Services

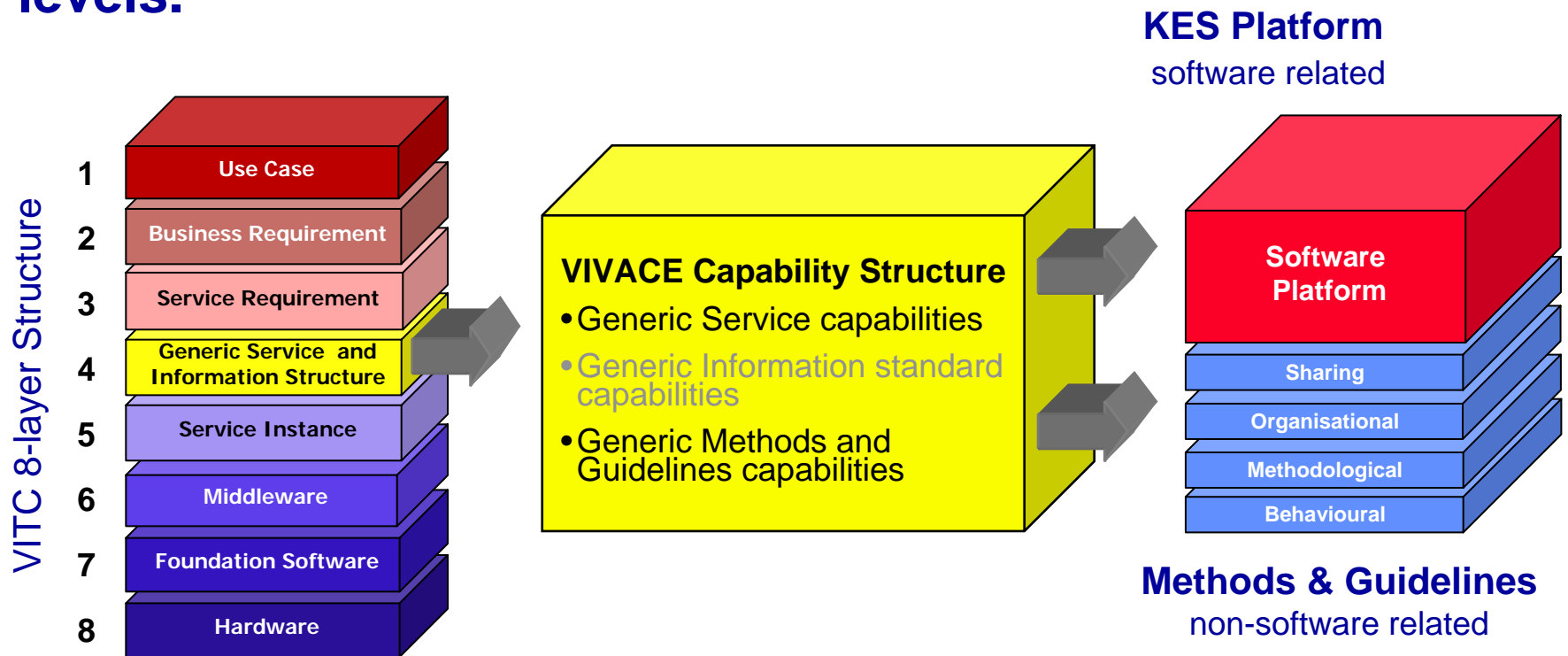
As required by the VITC Structure, the outcome of the requirements flow-down activity are the Generic Services.

1. Context definition services
2. Context-based knowledge search service
3. Knowledge full-text search in EE knowledge sources
4. Knowledge applicability learning services
5. Interface with EE knowledge sources



The Knowledge Enabled Solution vs. VIVACE Toolbox Layer

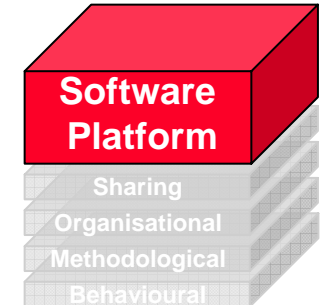
The final result was a set of tools and guidelines that enable Knowledge Management in an Extended Enterprise engineering environment. The solution is composed of two levels.





KES Platform

The KESP is “a self-learning software system that enables the user to search for knowledge applicable to his context in a multi-source environment across the Extended Enterprise”

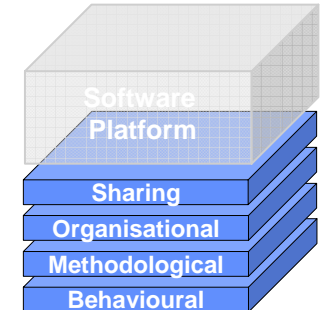


- Is based on user Context identification and subsequent pushing of applicable information
- Allows to “capture” and save how Knowledge is used
- Allows full-text search directly into the Knowledge Sources
- Is open to integration with existing or future Knowledge Sources that might be used within the Extended Enterprise



Methods & Guidelines

Managing Knowledge, whilst enabled by software such as the KES Platform, must also focus on knowledge processes, individual behaviours and interactions between persons, teams and organisations.



This also means managing change to promote a knowledge culture, enabling knowledge sharing, learning, and re-use.

Guidelines have been produced to show good practice in:

- Sharing lessons learnt across the supply chain
- Measuring and managing supply chain relationships through a Relationship Evaluation Tool
- Sharing knowledge within a collaborative environment



Questions & Answers