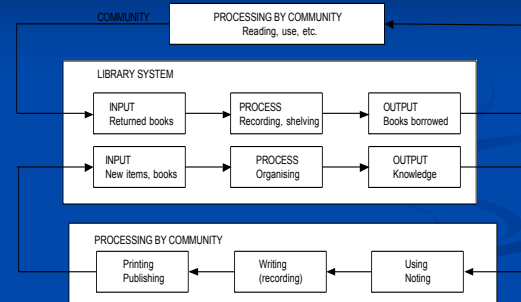


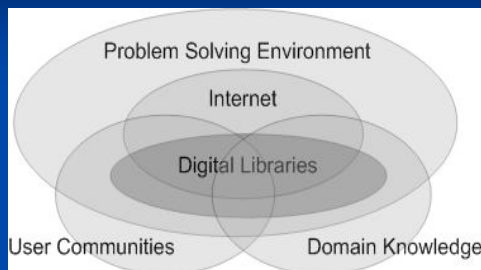
# Grounding Knowledge of Engineering Applications in Systematic Terms

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## Knowledge Management (KM) Is Not New



## Missing Objects in New Contextures



## Where is the K?

- Engineering Domain
- Computing Technologies
- Data
- Human
- Infrastructures
- Interactions of All These Dimensions

## Engineering

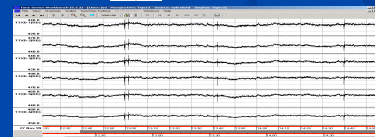
Engineering is a human effort to change or facilitate a kind of environment in order to make that environment more suitable or responsive to human's need and wants.

Much knowledge is derived from human observations, designs and experiments.

This involves engineers, designers, managers, etc.

## Example: Airplane's Engine Maintenance

Date	Time	TTXD-1	TTXD-2	TTXD-3	TTXD-4	TTXD-5	TTXD-6
27/11/1999	12:02:19	430.56	450.88	429.27	481.40	452.13	463.38
27/11/1999	12:02:20	430.98	451.15	429.27	481.68	451.99	463.93
27/11/1999	12:02:21	430.84	451.29	429.59	481.09	452.27	463.80
27/11/1999	12:02:22	431.12	451.15	429.27	481.40	452.27	464.21
27/11/1999	12:02:23	431.25	451.85	429.59	481.68	452.27	464.35
27/11/1999	12:02:24	431.53	452.40	429.00	481.40	451.85	464.07



## In Systematic Terms (1)

- System
- System observers
- Observables
- Observing Instruments

## Some Principles

- A System has no existence independent of its observers.
- A system observable must exist between a system and its system observers
- In order to “see” a system, a system observer of that system often needs instruments

## Our Position

- Within a given engineering domain, knowledge is generated from interactions among systems, system observers, observables, engineering objects and instruments
- Knowledge lives in infrastructures where all the interactions take place
- Knowledge is usable, if it flows through the interactions

## Physics Based Infrastructures

- System to be observed: an engine turbine and its properties such as time, function, conditions, or states
- Observers: engineers, engineering objects, acceptable engine conditions
- Instruments: embedded sensors, test appliances, computers, data processors, engine monitors
- Observables: time series data and interesting patterns

## Human

- It is human who must observe the data
- It is human who must solve the problems when an engine is broken down
- Sensors are increasingly used and becoming sophisticated, thereby
- Absolutely environment where human depends on data
- Relative environment where human depends on its own knowing experiences

## Why Does KM Need Data (1)

- At a level of business management, the system maintenance is very important to sustain their productive. 44% of Rolls-Royce's revenue comes from the maintenance and services of its engines in aircraft, ships and power stations
- The sooner engineers can be made aware of problems, the quicker they can solve the problems and earning money

## Why Does KM Need Data (2)

- Engineers can properly analyze systems or equipment failures by clustering data testing, making recommendations, reporting major factors affecting system's life.
- Business managers planning spare parts and organising reports, and making the engineering processes take place all in a technical and timely manner.

## So far we have argued that

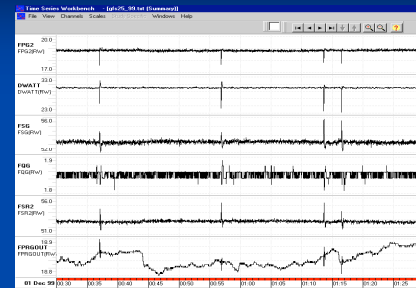
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## Web Infrastructures

The web lives on the internet by a set of protocols running over the net. The web is part of the net. More and more coded layers are to be built over the web: the web ontology, the semantic web, gateways, portals, etc.

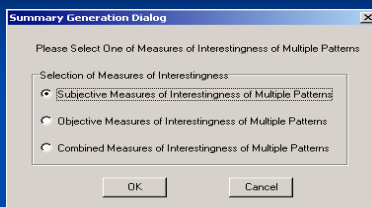
They must be dedicated to the interactions among human, data, systems and instruments.

## Research Outcomes (1)



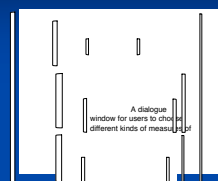
Channels under the subsystem

## Research Outcomes



A dialogue window for users to choose different kinds of measures of interestingness

## Research Outcomes (3)



```

type: PPSAbstractSyntax
type: PPSAbstractSyntax
head: NameDesi
subject: features: plural: false
indefinite: true
modifier: lexicalise(PatternRange.AndShape)
    
```

Lexicon Templates

## Conclusions

- Management of Knowledge is not new
- Web based knowledge management is new
- In engineering domains, many objects in system terms are missing in web based knowledge management
- These objects in system terms are knowledge sources
- For engineering applications, web based infrastructures should be dedicated to the interactions between human and these objects