

GOT – Postgraduate by Research

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Generalities

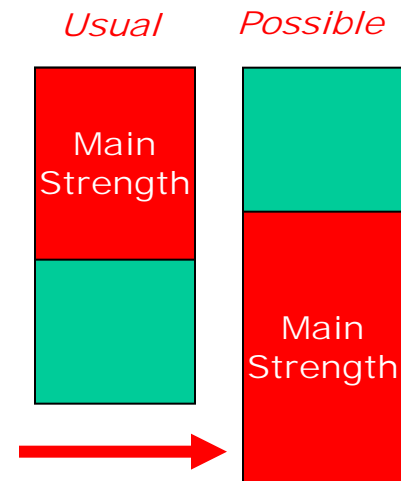


Some Definitions

- R:  knowledge
- D: usage of known knowledge
- Academic R&D
 - MSc (r&D): mastery of domain
 - PhD (R&d): license for independent R&D
 - Papers
- Industrial r&D (&C)
 - Social Impact: quality of life
 - Economic Impact: ROI
- University R&D&c (realities)
 - Knowledge Creation
 - Making Academic Programmes '*COME ALIVE*'
 - Supplementing Budget & Staff Income

To Do (Essence)

- Introduction
→ the What, How & Why
- Literature Survey
→ Situating the Contribution
- Design
→ Main Contribution
(▲ knowledge)
- Implementation
→ test design & discussions
- Conclusion & Future Work
→ What next



Some Realities

◆ *Postgraduate programmes (especially by coursework) should ONLY be offered if there is:*

- *Expertise*
- *Active R&D*

◆ A Masters/PhD thesis is:

- 25% supervisor
- 20% choice of project
- 25% actual work
- 30% writing (presenting) → THESIS WRITING

Supervisor \ Student	Dictatorial	Proactive	Reactive	Passive
Dictatorial	Red			Red
Proactive	Blue	Green	Blue	Blue
Reactive	Green	Green	Pink	Pink
Passive			Pink	Red

Supervisor (25%)



Some Realities

◆ *Needed from supervisor (Dictatorial):*

- ❑ *Ready-made solution to be implemented*
- ❑ *Know and can arrange for the external examiners*

◆ *Needed from supervisor (Proactive):*

- ❑ *Big picture*
- ❑ *Problem to be solved*
- ❑ *Point out the 'R' factor*
- ❑ *How to write*

◆ *Needed from supervisor (Reactive):*

- ❑ *Point directions (where to read/refer to)*
- ❑ *Listen and advise accordingly*
- ❑ *Check the work*

◆ *Needed from student:*

- ❑ *Listen*
- ❑ *Follow orders but check everything*
- ❑ *Be proactive to add information, and offer alternatives*
- ❑ *Ask (intelligent questions)*
- ❑ *Write, write and write (with lots of diagrams)*

◆ *Needed from supervisor (Passive):*

- ❑ *Lots of luck*

Choice of Project (20%)



Essence

- a) Determine and make clear the **concept** and get some level of proof
 - Original
 - Extension
 - Improvement
 - Hybrid

- b) The **deliverables** must be very clear
 - System
 - Modules
 - Methodology
 - Process

- c) Determine the '**R**' value
 - not research activities but the contribution to knowledge

- d) The **impact** must also be clear
 - Addition to the body of knowledge
 - Improvement to some existing concept/item
 - Economic (ROI)
 - Social

Actual Work (25%)



Essence

Introduction

In order to be clear of what to do

Literature Survey

*Has to be very focused, targeted
(less exploratory)*

Main Contribution

This is the material 'end' of the thesis

Implementation & Testing

*Essentially as a proof of concept
(not the main part of the thesis)*

Conclusion &
Future Work

Need to 'close' the thesis

Writing up

Psychologically good to see the thesis building up

Research
Proposal

*c.f. Essence
(≤ 3 months)*

Thesis Writing (30%)



WRITING (in general)

Thesis writing is the most fundamental training for all technical writing...

➤ ESSENTIALS

- What
- Why
- How
- Who
- When
- Where
- How Much

Blueprint

- Vision
- Goals
- Objectives
- Functions
- Implementation
- Tools
- Costs
- Challenges

➤ BUILDING A CASE

- Executive Summary
- Problem statement
- Background
- Solution
- Operationalisation
- Implications
- Future
- Conclusion

➤ EXECUTIVE VERSION

- Problem statement
- Solution
- Operationalisation
- Relevance to background
- Forcing a decision

➤ PAPERS

- What
- Why (what difference)
- Main Contribution (e.g. Design)
- Basic info on implementation
- Conclusion & What next

Some Realities

- A thesis is a comprehensive document
 - *but it is not a text book (or novel!!)*
 - *nor it is a user / implementation manual*
- A thesis shows
 - *mastery of domain*
 - *clarity of academic contribution*
 - *ability to carry out independent work*
- A thesis is read (and not experienced..)
 - *language & presentation is part of evaluation*
 - *the WHAT, HOW & WHY are very important*
 - *abstract, introduction and summary are read first*
 - *main contribution (design) is looked for IN DETAIL*
 - *implementation is read last*
 - *a good implementation includes design, well justified tests and proper documentation*
- A VIVA shows
 - *candidate did the work*
 - *mastery of contents of thesis*

Chapters in Thesis (Basis)

Chapter I:

INTRODUCTION

- what domain
- where in the domain
- what is to be done
- why
- main contributions
- impact
- summary of chapters

Chapter II:

LITERATURE SURVEY

- what have been done before
(strictly relevant to yours)
- analysis of contributions
- abstraction/categorisation
- situating your work

Chapter III:

MAIN CONTRIBUTION

- design
- implications
- why better

Chapter IV:

IMPLEMENTATION

- platform/environment
- implementation issues
- implementation design
- some strengths
- test design
- test results (statistics)
- discussion of results

Chapter V:

CONCLUSION

- summary
- main contributions
- future work

Supporting Components

ABSTRACT

- where in the domain
- what is to be done
- why
- main contributions

LIST OF FIGURES / DIAGRAMS

- thesis in diagrammatic form
- equivalent to a PRESENTATION

REFERENCES

- relevant to contributions only
- all own publications

APPENDICES

- supporting but lengthy explanations
- proofs and justifications
- implementation details

Chapter I:
INTRODUCTION

- *what domain*
- *where in the domain*
- *what is to be done*
- *why*
- *main contributions*
- *impact*
- *summary of chapters*

Chapter II:
LITERATURE SURVEY

- *what have been done*
- *analysis of contributions*
- *abstraction / categorisation*

**SITUATING
THE RESEARCH**

- Situating the research via
 - domain conceptualisation
 - existing roadmap
- Declare methodology & contributions
 - overall methodology – via a diagram
 - contributions – in point form
- Chapter by chapter summary
 - should be based on overall methodology
- Literature Survey
 - never more than needed
 - quickly focus to related ones only
 - very recent ones (*old ones have to be very generic*)
 - analyse their contributions
 - make comparisons between the approaches
 - make an abstraction / at least categorise them
 - list their features within the categories
 - in order to show yours are better

DOMAIN CONCEPTUALISATION

... If there is one, USE it (saves a lot of time & thinking) ...

Knowledge Management Framework



C. O'Dell & C.J. Grayson *If We Only Knew What We Know: Identification and Transfer of Internal Best Practices*. Best Practices White Paper, American Productivity & Quality Center, 1997.

Natural Language Processing



Knowledge

Discourse

MEANING

Syntax

Morphology

Text

Speech

APPLICATION SYSTEMS

Processing Tools

Analysers:
Speech
Lexical
Structural

Generators:
Speech
Lexical
Structural

Compilers
& Mappers:
Lexical
Structural

Data

Corpus

Lexicon

Grammars

Knowledge
Bases

Data Collection & Management Tools

Search
Engines &
Text/ Speech
Analysis
System

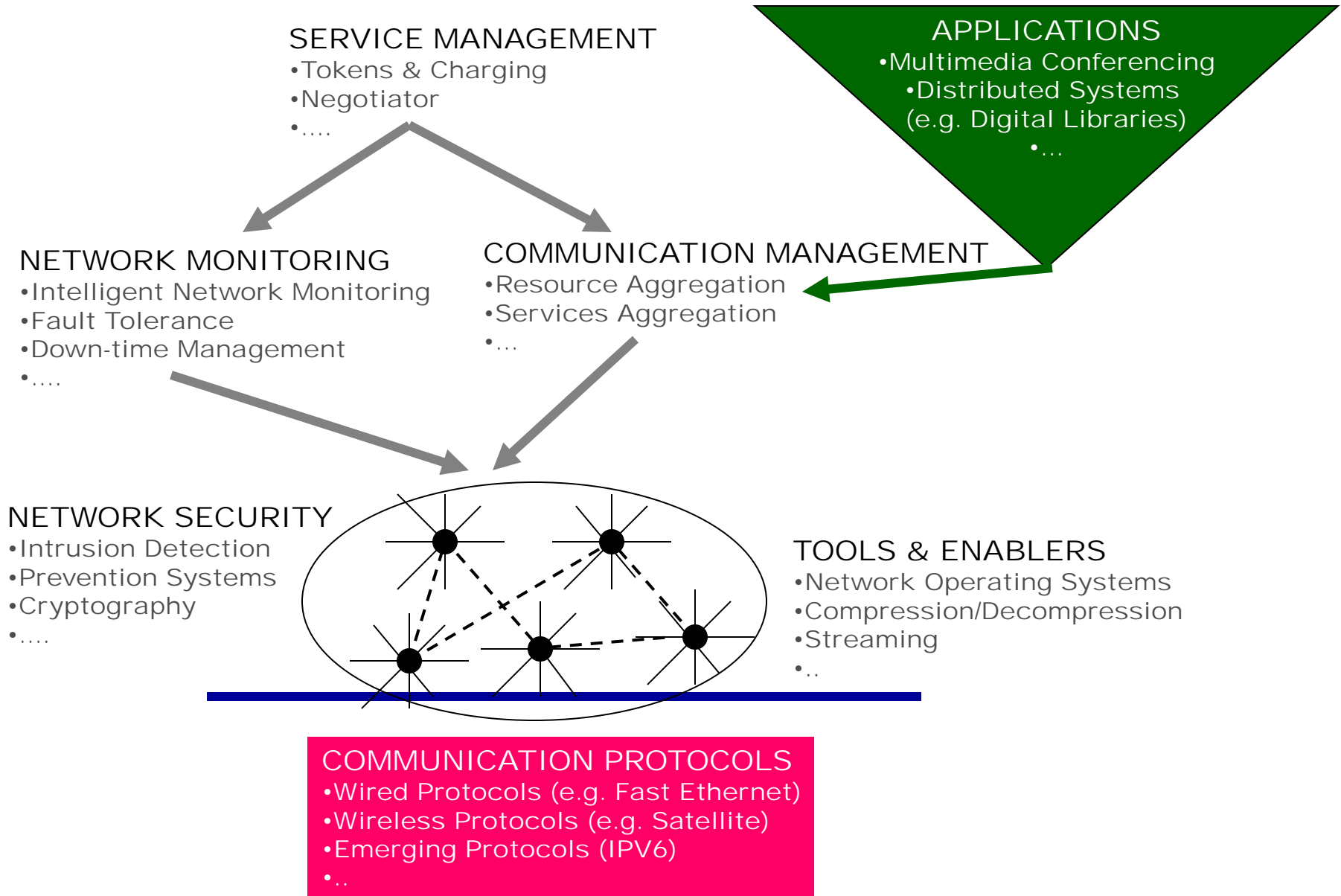
Corpus
System &
Text/ Speech
Manipulation
System

Lexical
Database &
Manipulation
System

Grammar
Systems:
Editors,
Learning,
etc.

Knowledge
Engineering
&
Management
System

Computer Networks



Grid Computing Domains

SERVICE MANAGEMENT

- Managing Users & Applications
- Managing lower level technical components
- Utility grid management modules
-

APPLICATIONS

- Compute-Intensive
- Data Intensive
- On-Demand
- Collaborative
- ...

RESOURCE MONITORING

- Detecting faults
- Managing faults
-

RESOURCE ALLOCATION

- Service Aggregation
- Resource Aggregation
- Scheduler (load balancing)
- ...

GRID DATA WAREHOUSE

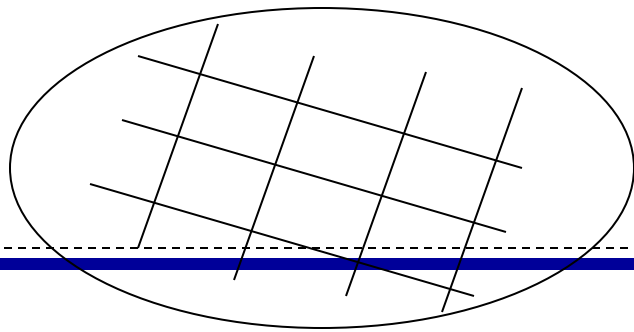
- Grid Database
- Data Replication
-

GRID SECURITY

- Component security
- Data security
-

TOOLS & ENABLERS

- Tools for specific applications
- Tools for grid construction
- Data warehousing
- Grid Algorithms
- Mobile Agents & Software agents
- Grid Protocols
- ...



GRID INFRASTRUCTURE (incl. Networks)

GRID INFOSTRUCTURE

SECURITY

SPECIFIC APPLICATION ORIENTED

- Secure game-play
- e-Voting
- ...

Enterprise

Applications

Data

OS
(incl. Drivers & Registeries, H/W Interfaces)



Physical Network

TRUST

- Digital Signature
- Public key infrastructure
-

- Biometrics
- Smart Card
- One time password

- Authentication
- Non-repudiation
- Integrity
- Tripwire

- Network security
- Mobile IPv6 security
- Tunneling
-

CONFIDENTIALITY

- Enterprise level security
- Agent-Server Security
- Radius/Kerberos
- Honeypot/Honeynet

- Database security
- Web-based Application Security
- SSL, SSH

- Cryptography (inc. encryption, braid)
- steganography
- Parallelising crypto operations
- Video/Image security

- IPSec
- VPN
- Firewall
- Intrusion Prevention
- Trusted OS

PROTECTION

ABUSE

- Man-in-the-Middle (MIM)
- Dos/DDoS
- Virus/Worm, Spam
- Drone Armies

- Buffer Overflow
- Format String
- Client-side (XST,XSS)
- SQL Injection
- Phising

- Packet Spoofing
- Cryptanalysis
- Brute Force
- ISN Predictions
- Cache Poisoning

- Rootkit
- Trojan Horse
- OS Fingerprinting
- Sniffing
- Hijacking
- Re-routing

ANALYSIS

- Forensics
- Enterprise Audit
- Enterprise PenTest

- Appl. Forensics
- Appl. Audit
- Appl. Pentest

- Data Forensics
- Log/Alert Analysis
- False Positive Reduction

- OS Forensics
- OS PenTest
- Intrusion Detection

BIOINFORMATICS

Wet Lab Experimentation (DNA/Genome Sequencing)



DNA / Genome
String of Nucleic Acids (A,T,C,G)



Amino Acids
(V,S,W, .. - 20)



Proteins / Peptides



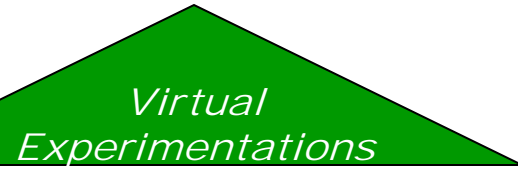
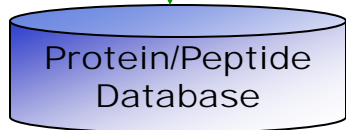
Junk DNA / UNKNOWN GENES (NEW !!)

SEQUENCE ANALYSIS

- Sequence search
- Verification
- Cleansing
- Parsing
- Classification
-

LITERATURE SEARCH

- Meaning-based
- Literature Manager
-



1&2D→3D TRANSFn

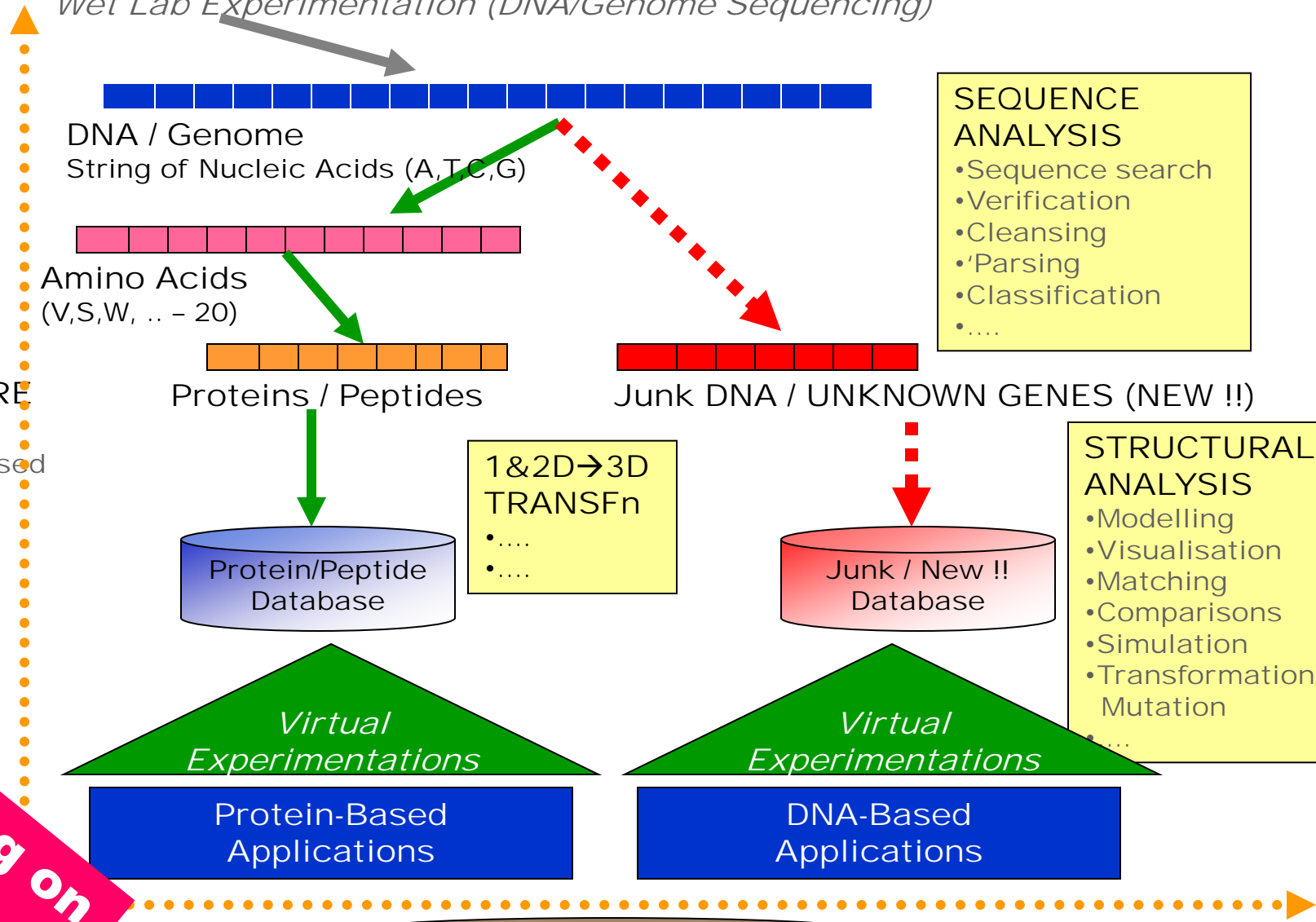
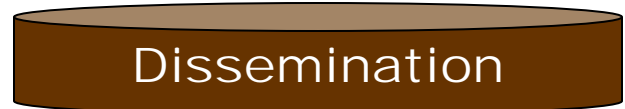
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STRUCTURAL ANALYSIS

- Modelling
- Visualisation
- Matching
- Comparisons
- Simulation
- Transformation/ Mutation
-

Riding on GRID

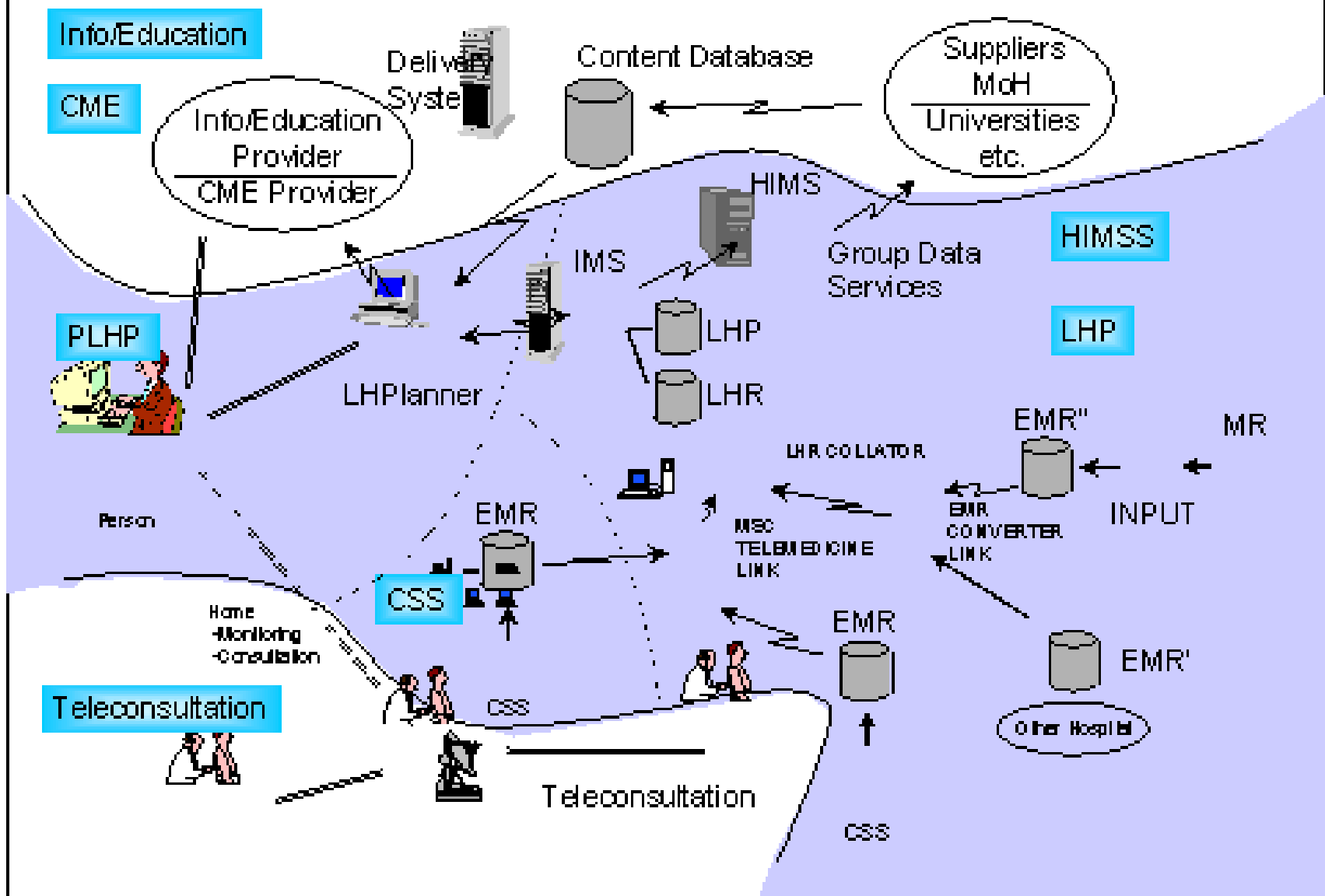


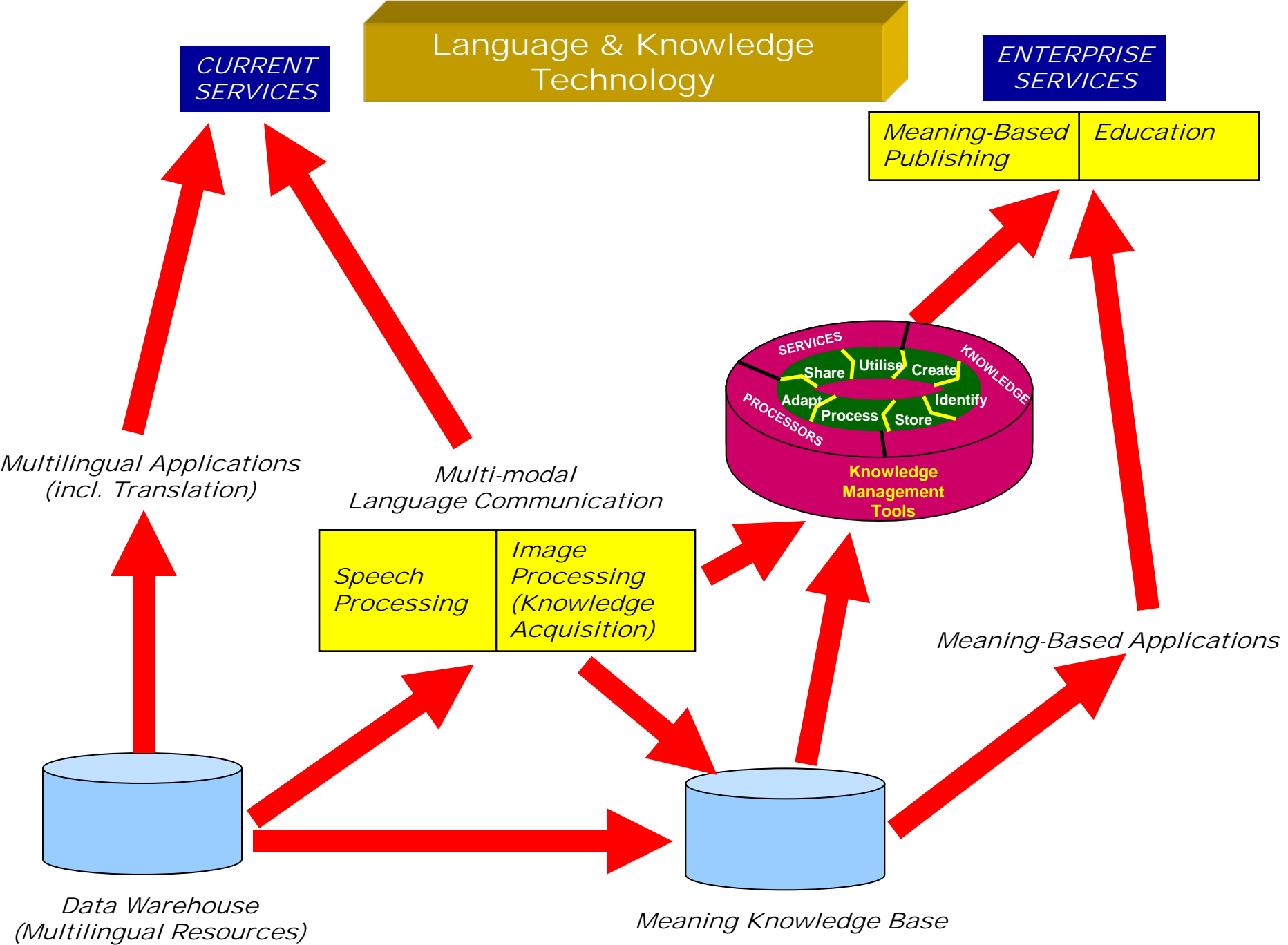
ROADMAPS

*... So much better if there is one of these,
then use it and start pointing...*

MSC Tele-Medicine Project

Entire Scope of Telemedicine Pilot Projects



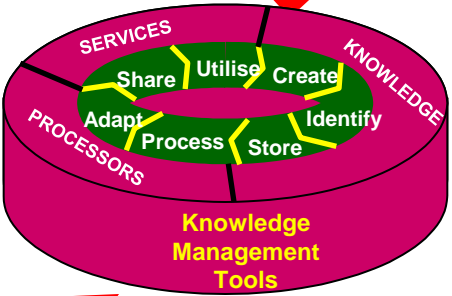


Language & Knowledge Technology

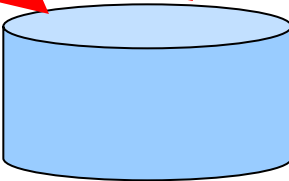
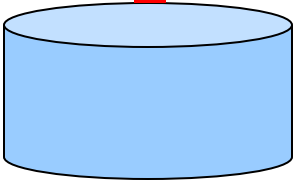
CURRENT SERVICES

ENTERPRISE SERVICES

Meaning-Based Publishing | Education



Speech Processing | Image Processing (Knowledge Acquisition)



Multilingual Applications (incl. Translation)

Multi-modal Language Communication

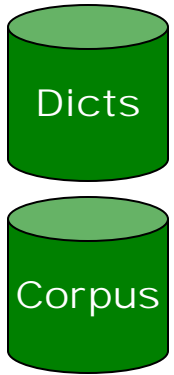
Meaning-Based Applications

OVERALL METHODOLOGY

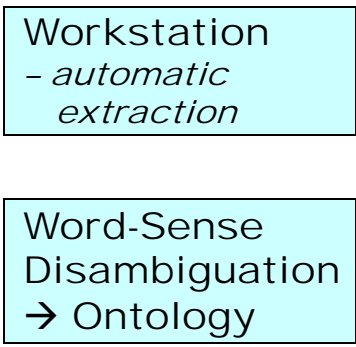
*... Helps you more than the reader/examiner:
if you don't know how to get there - he definitely won't ...*

Language Data → BM Linguistic Data → Multilingual Data

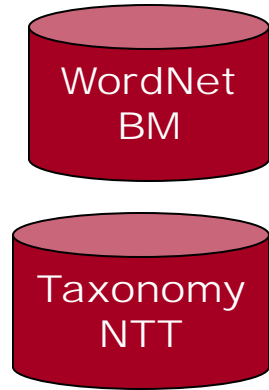
Raw Data



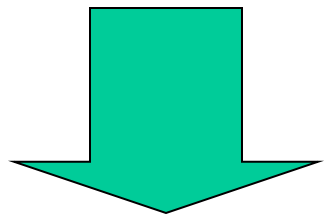
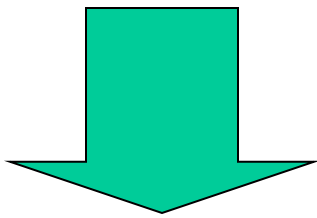
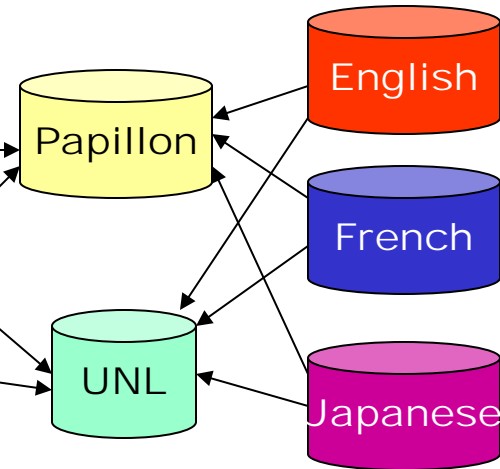
Linguistic Tools



Ontologies (BM)



Multilingual Initiatives

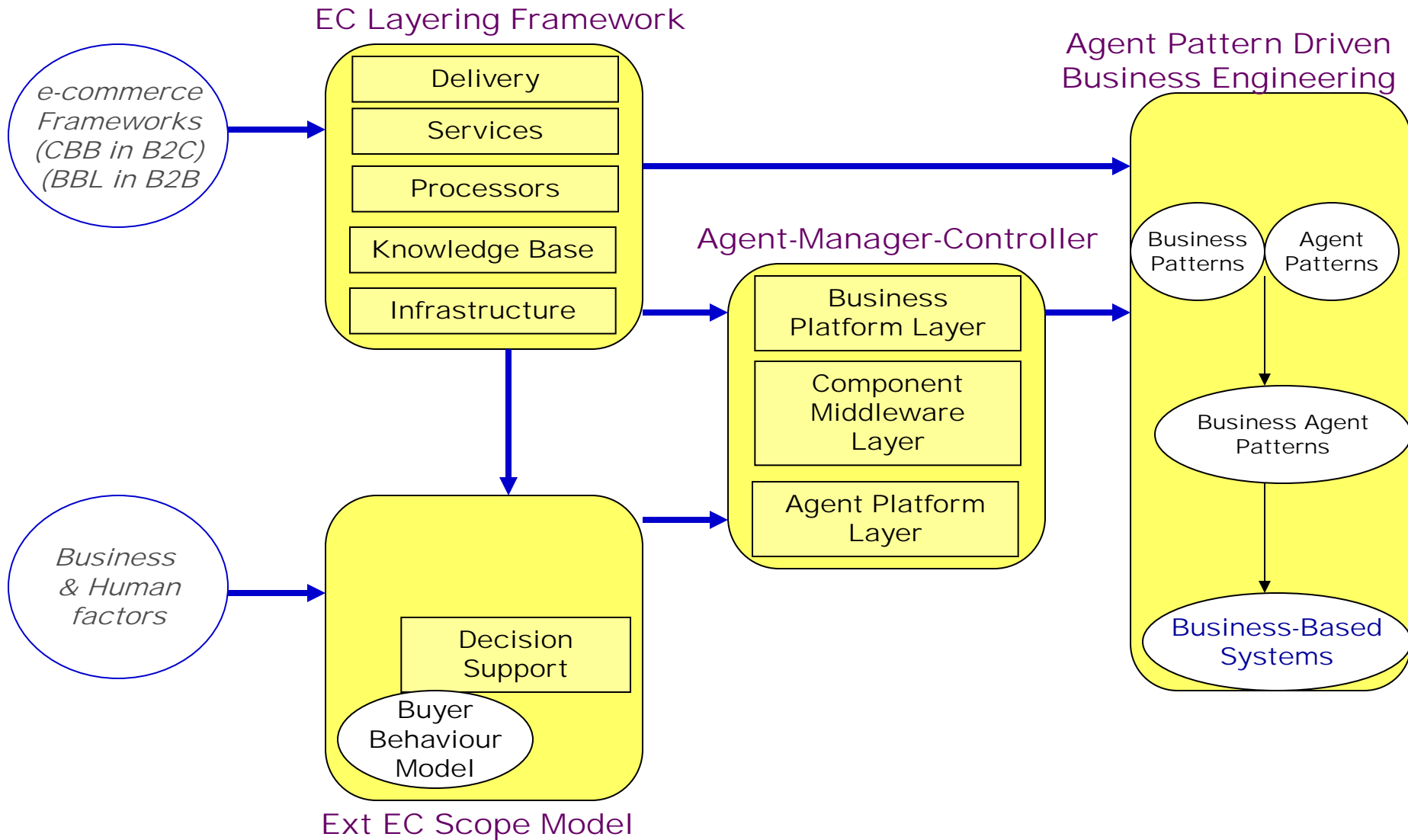


- Linguistic Dictionaries
- Thesauri
-

- Concept/Meaning Network
- Multilingual Dictionaries
-

Publications / Multilingual Data

Agent Based Design Patterns for e-Commerce

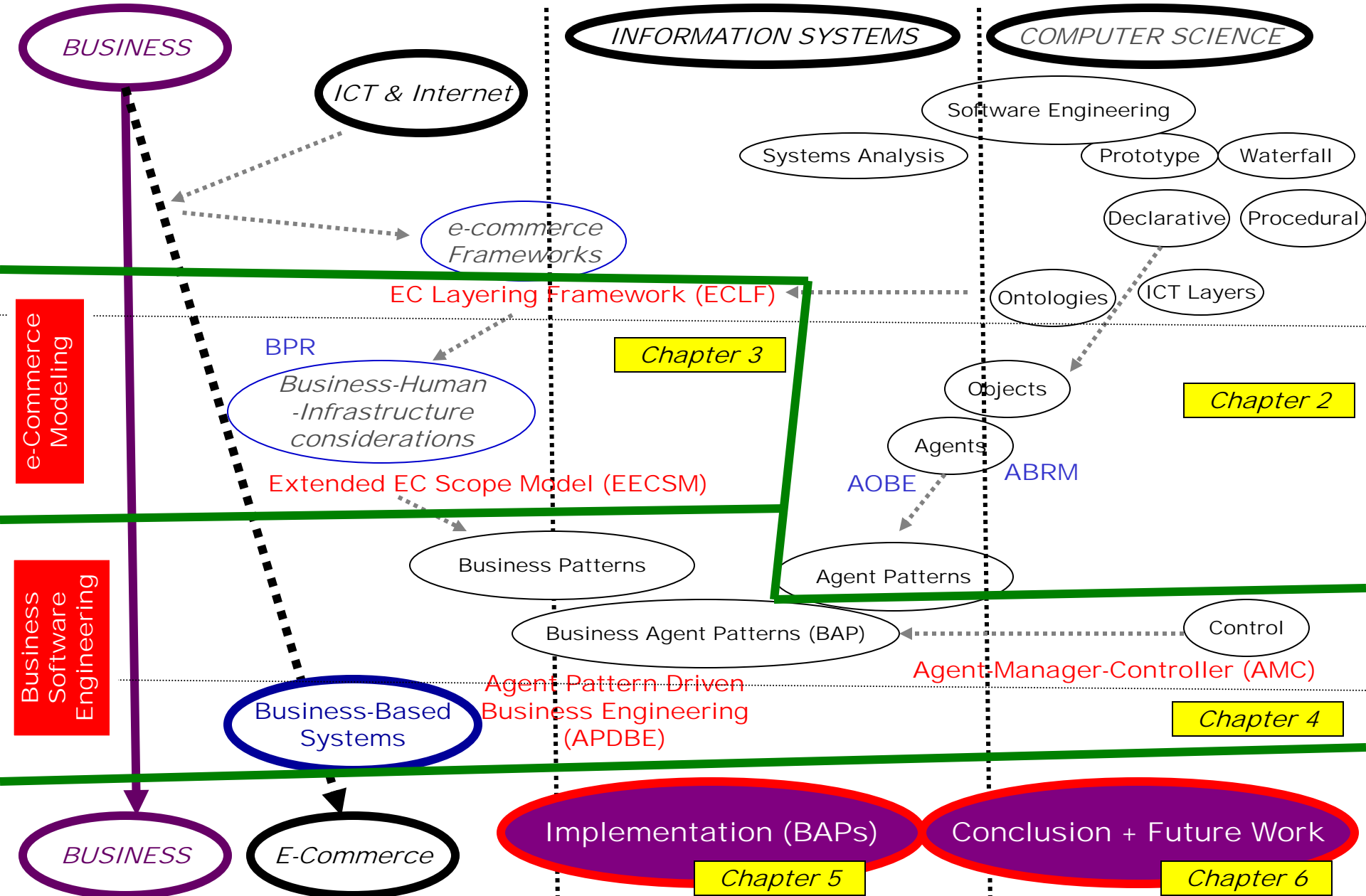


Chapter by Chapter Summary

*... Again, this helps you more than the reader/examiner,
if you don't know how to write it / make it flow
- he won't know how to read it...*

Flow of Arguments → Chapter Division

Chapter 1



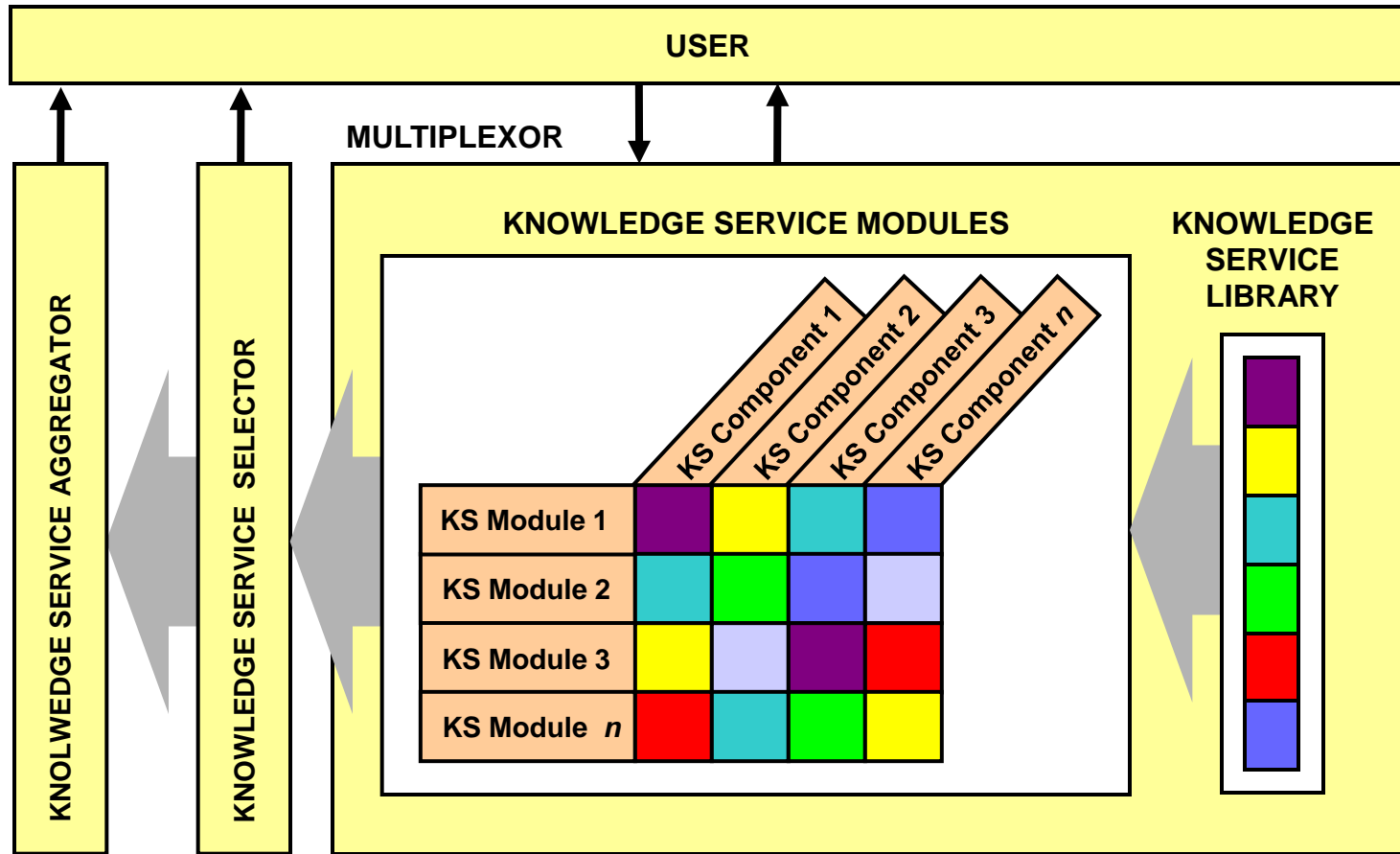
Chapter III:
MAIN CONTRIBUTION

- *design*
- *implications*
- *why better*

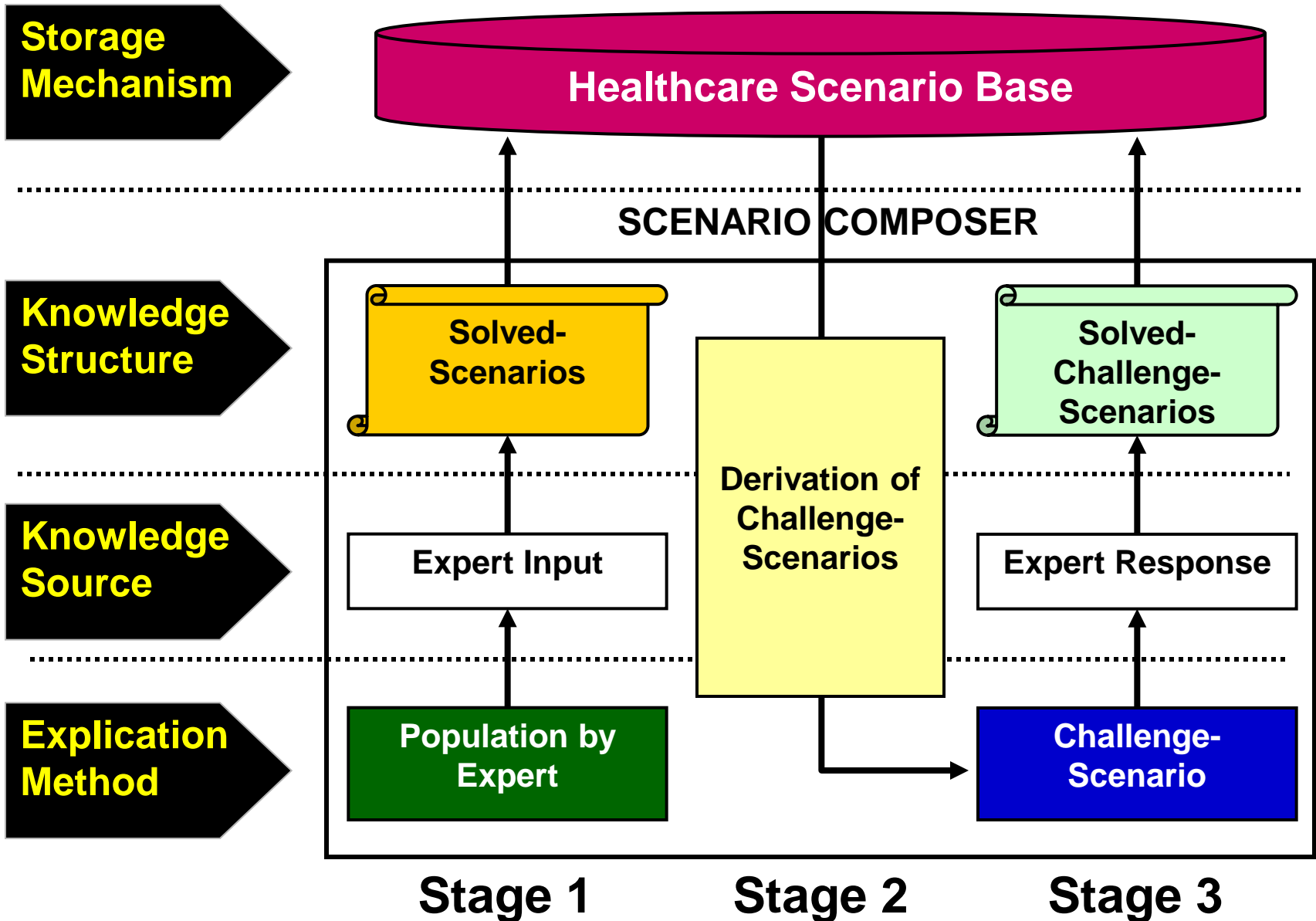
... *THIS is your thesis,*
and a picture paints a thousand words
→ *have a diagram and start pointing ...*

- Design
 - main design must fit one diagram
 - component based (not necessarily flow)
 - if possible, supported by workflow diagram
- Implications (compared to current)
 - quantum leap
 - extension, modification, efficiency, ...
 - explication
- **Why better (≥ 2)**
 - formal (mathematics-based)
 - simplicity (modularity, incrementality, ..)
 - convenience (plug & play, swappability, ..)
 - efficiency (accuracy, speed, ..)
 - maintainability (code, data, ...)
 - universal standards (inter-operable, ..)
 - genericity (resusable) / generality (encompassing)

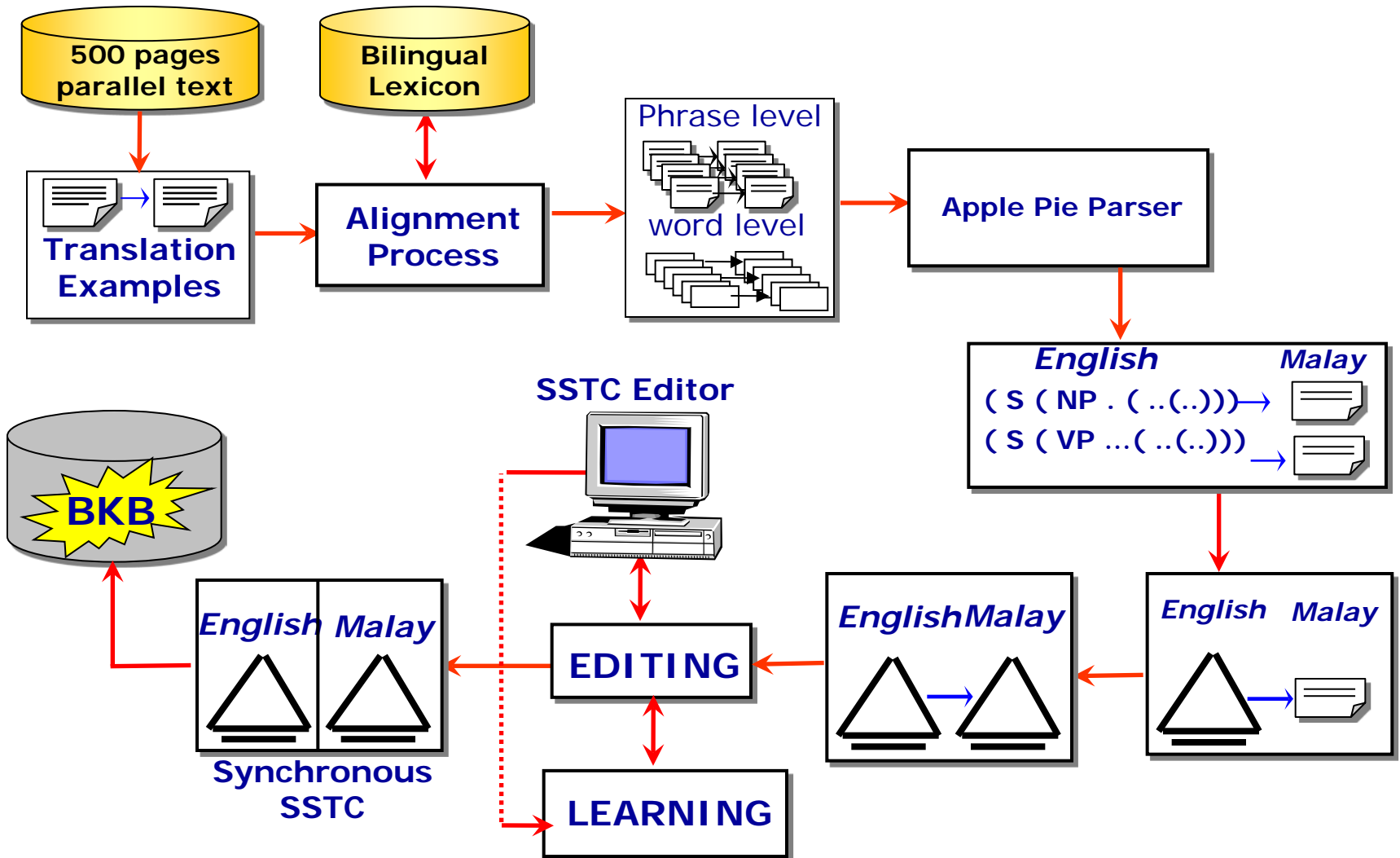
Example: The Knowledge Service Multiplexor



Example: Tacit Knowledge Explication



Example: Bilingual Knowledge Bank Development from Domain Parallel Texts



Chapter IV:
IMPLEMENTATION

- *platform/environment*
- *implementation issues*
- *implementation design*
- *some strengths*
- *test design*
- *test results (statistics)*
- *discussion of results*

*... If your design is elegant → show you can implement;
but if you only know how to implement, PROVE that it works ...*

Implementation

- Platform/ environment
(choice should not be based solely on comfort level)
 - convenient development/ scalability/ maintenance
 - efficiency
 - inter-operability
- Implementation issues/ design
(long term benefits should be considered)
 - convenient development/maintenance vs efficiency
 - prototype vs. deployment
 - available modules vs. from scratch
- Some implementation strengths
(there may be originality in programming techniques)
 - formal (mathematics) based
 - specific code components
 - data organisation techniques
 - higher accuracy or speed
 - ...

Tests

- Test design
(a test is only as good as its design)
 - sample size suitably large and comprehensive
 - list tests, justifications and expected outcomes
 - establish control conditions
- Test results (statistics)
(only formal proofs can replace statistical analyses)
 - analyse generated data or subjective (survey) data
 - tables, bar/pie charts and graphs are not sufficient
 - GET HELP FROM STATISTICIANS (from test design) !!
- Discussion of results
(to confirm success or to explain failure)
 - is an analysis and not a text version of figures
 - outliers are to be explained
 - success by coincidence need to be recognised
 - success is 80% predictability 20% accuracy/speed
 - *there was an excellent PhD thesis on a failed experiment*

Chapter V:
CONCLUSION

- *summary*
- *main contribution*
- *future work*

*... There has been a lot of pages/words.
You need to STOP somewhere, and FAST ...*

Conclusion & Future Work

- Summary
 - not chapter-by-chapter nor of activities
 - summarise deliverables
- Main contributions
 - highlight main contributions within deliverables
 - same as in Introduction (*but not cut & paste*)
 - point out the shortcomings
- Future Work
 - ideas to resolve the shortcomings (*given time*)
 - prioritise closely related components in roadmap
 - point out how they may benefit from current work
 - *why not also throw in as well how others (researchers, government, industry, ..) can benefit immediately*

THANK YOU

TERIMA KASIH

MERCI

ARIGATO/ OKINI

GRAZZIE

GO MA SSEUM NI DA

GRACIAS

SHUKRIYA

SPASIBA

XIE-XIE NI

DANKE

KAMSI AH / MMKOI

MANGE TAK

JABAI INAU

NAN DHRI

NGGO BUTE KABU

CAM ON

KOP KUN KAH

