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Towards an Environmental Management Approach for Collaborative Networks

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Economic sustainability is paramount to the enduring business – but history has shown there are other essential factors that can ensure success or bring downfall.

Thus, the bottom line needing to be met is (at least) *triple* (Elkington, 1998):

1) economic

2) environmental

3) social

I.e. a business cannot be successful in the long term unless it also treats its environment and its workers properly…

The focus of this work is on the proper integration of environmental *management within all aspects of the business.*

Environmental Management (EM) state of the art: all is not well

- EM was seen as necessary – mandated -> for image -> really useful
- CNO participants approach EM at different detail levels / pace
- no EM effort coordination / coherence -> loss of aggregate capabilities
- EM reporting hard to use: language, format, aggregation level, …

What most companies / networks do (for themselves and VOs):

- Implement an Environmental Management System (EMS): alone, it does not trigger cultural change; current regulation is weak…
- Attempt to use an EM framework and environmental assessment and reporting frameworks: unfortunately the essential life cycle coverage is limited mostly to the products – what about the company, its information system (IS), the EM setup project(s), the EMS …?

What also appears to be missing is the *strategic integration* of EM in the VO / CN participants… however this implies that other business components (e.g. its IS) must (at least partially) also change. The EM project becomes a complex endeavour…

Some of the major concerns:

- consistent EM approach, inside and between CN participants
- acceptance of EM artefacts by the target audience (leading to real and *permanent* changes in the way people do things),
- appropriate resources and authority for the EM project, consideration of all relevant entities involved and their life cycle phases.

It is hereby proposed that since Enterprise Architecture (EA) has been effectively addressing such concerns in the past, it could also help integrate environmental aspects in the management and operation of the business.

But… what is EA?

Many definitions exist – we propose for this context:

"a change management approach bridging management and engineering best-practice"

So… how can EA solve the problem?

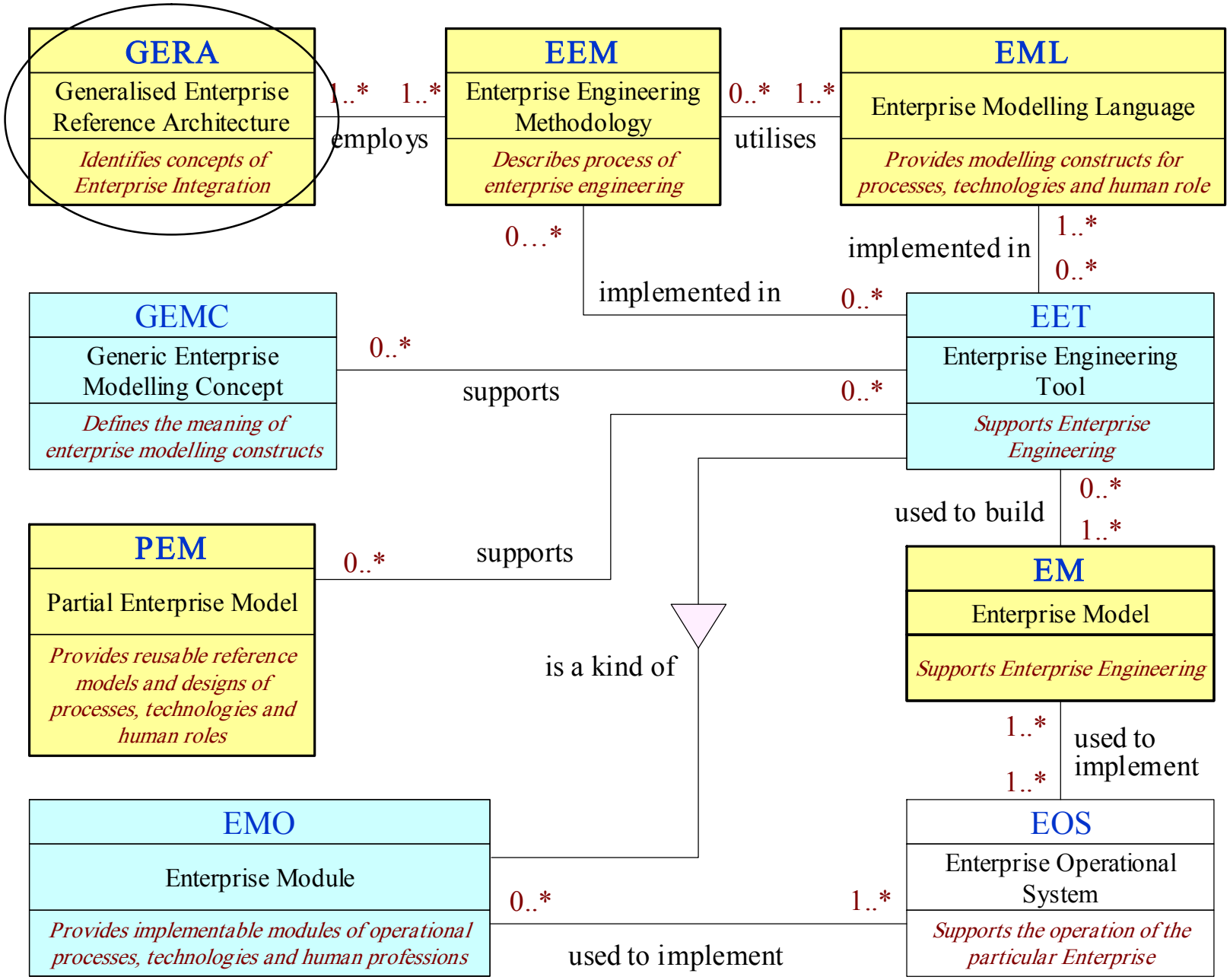
The following tries to give an example…

It presents the use of typical EA artefacts - i.e. an Architecture Framework and a Meta-methodology for EA projects - in the creation and operation of an EMS, so as to ensure that all relevant aspects are tackled in a life cycle context, for all relevant entities involved.

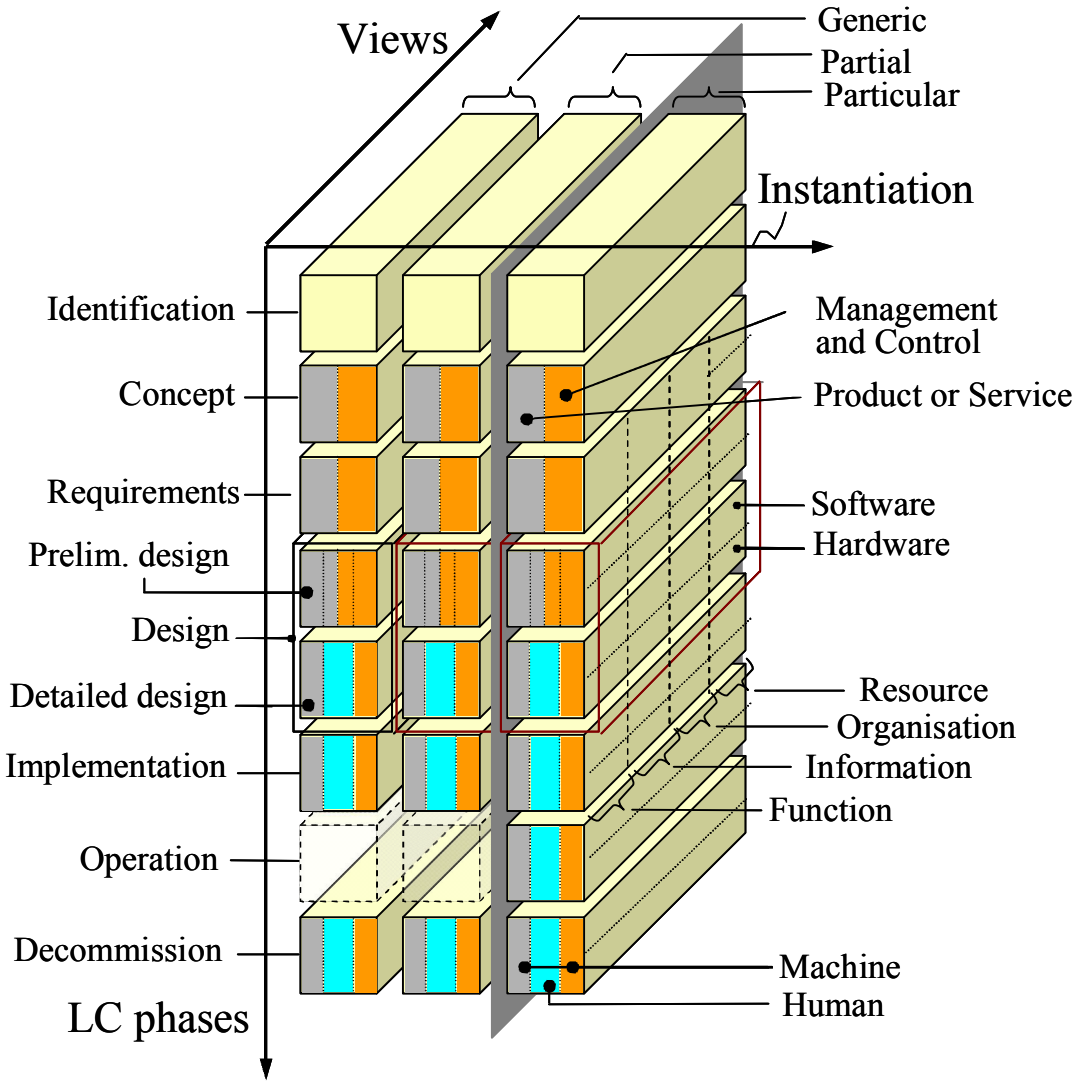
(Previous work tested their use in VO formation and operation; here they are employed to solve the (new) issue of the century: Environmental Sustainability via proper management / practices)

Initially developed at strategic level, this approach can be naturally detailed to operational /real time level once the basics are right.

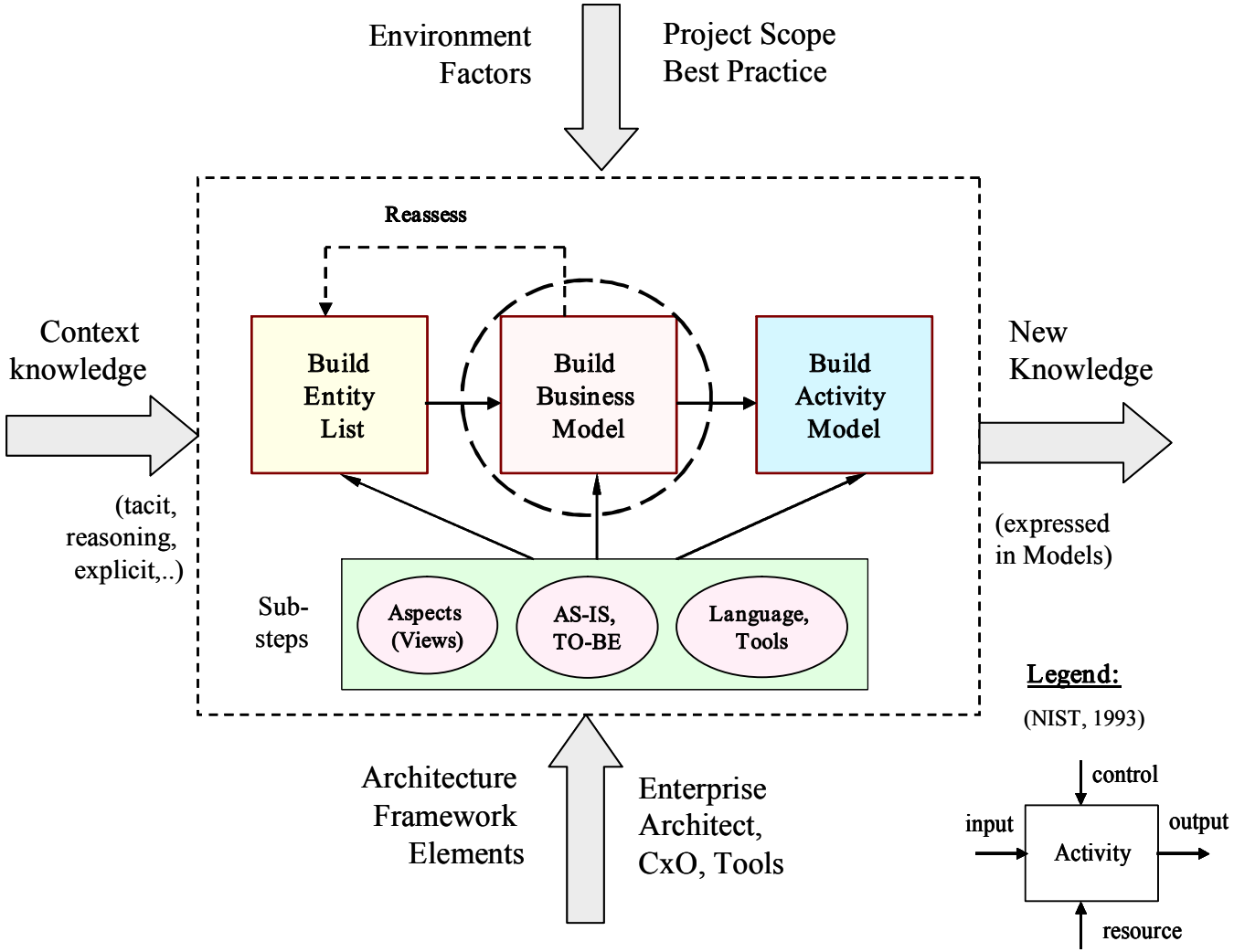
The Architecture Framework: ISO 15704:2000 Annex A (GERAM)



The Modelling Framework of GERA



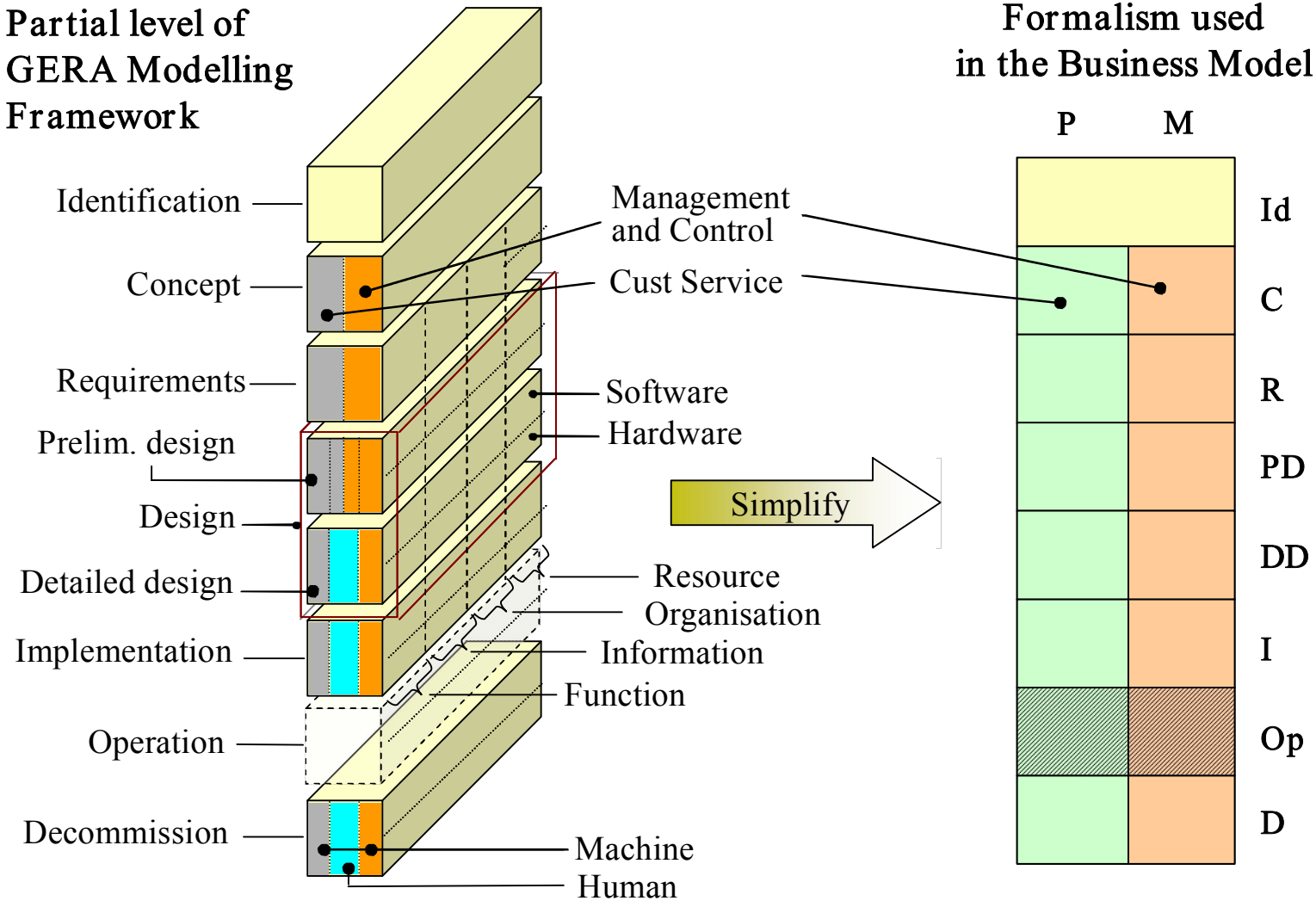
The Meta-methodology (to be applied to the EM aspect)



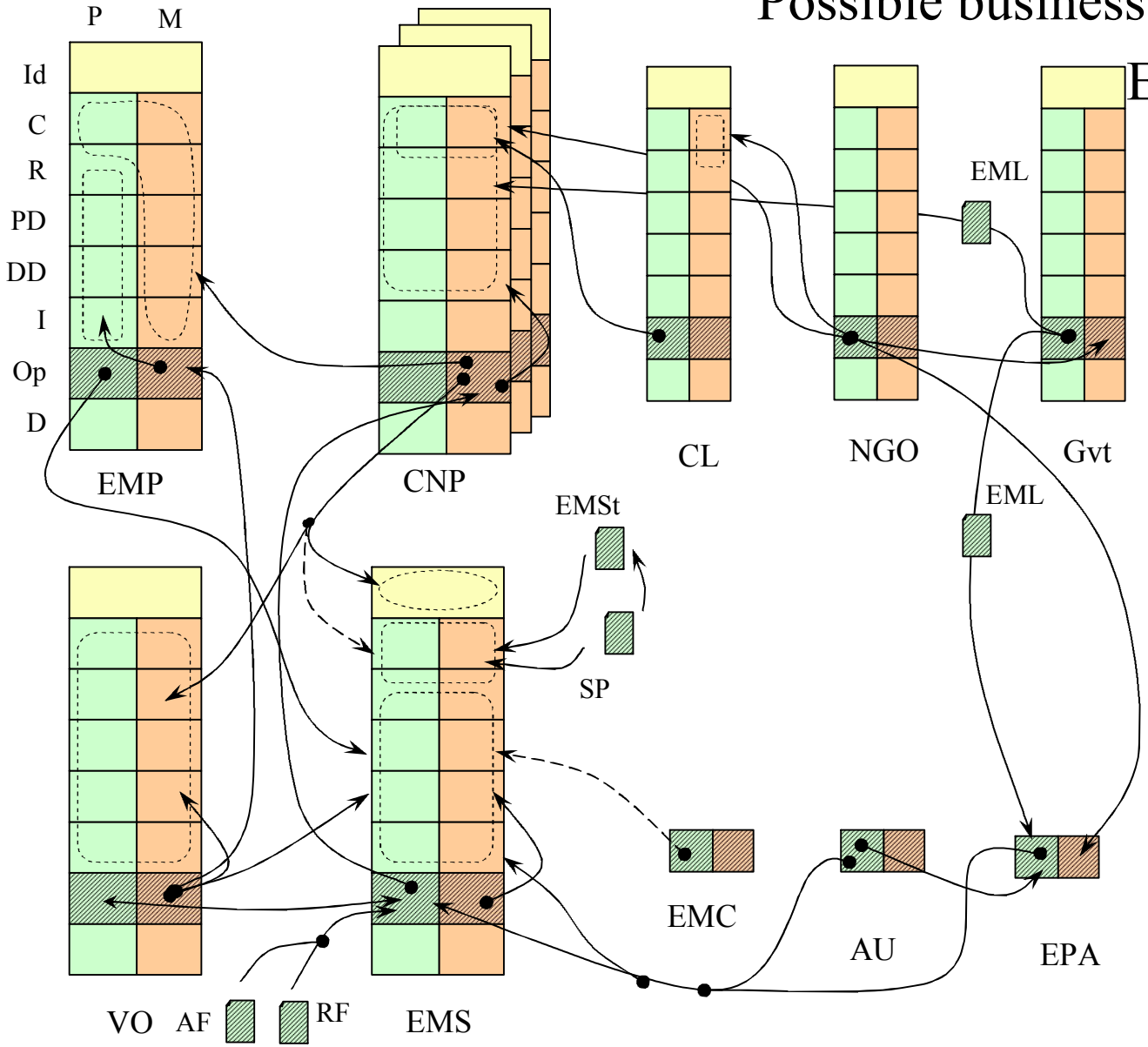
Can be easily customised for the EM (and many other) aspect(s)

(Noran, 2009)

Sample Step Two: preparing the business model



Possible business (network) model of EMS / EMP creation and operation



Legend:

CNP: CNO Participants;
EMS: Env. Mgmt System
EMP: Env. Mgmt Project
EML: Env. Mgmt Laws
EMSt: Env. Mgmt Standards
EMC: Env. Mgmt Consultants;
EPA: Env. Protection Agency
NGO: Non-Gov't Organisation
VO: VO set up by CNO
AF: Assessment Framework
RF: Reporting Framework
SP: Sustainability Principles
Gvt: Government
AU: Auditor
CL: Client

: Op. phase-Prod & Mgmt

: Op. Phase-Prod. only

: Possible scenario

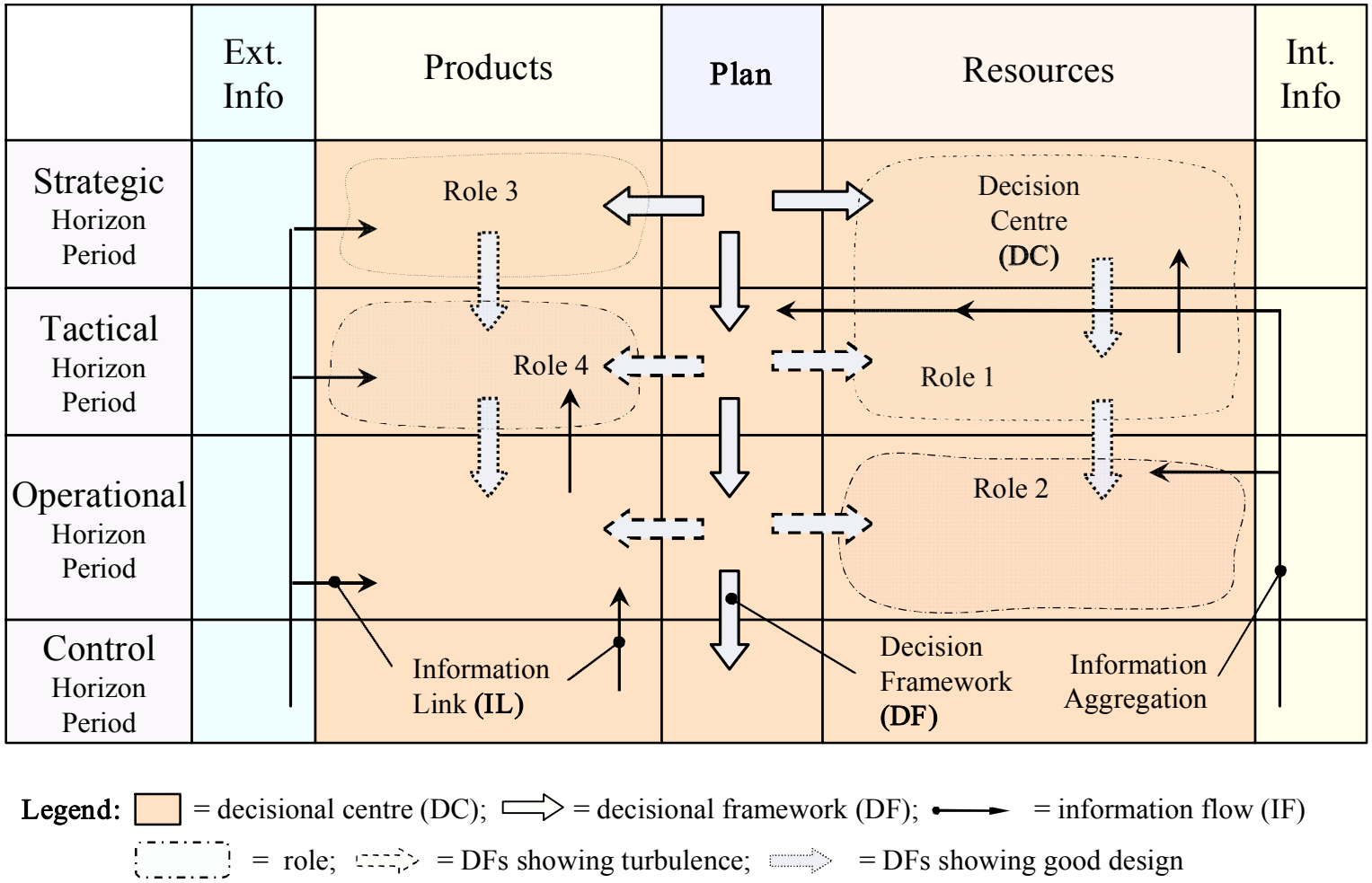
Life cycle phases: Id: Identification; C=concept; R=requirements, PD=preliminary design DD=detailed design, I=implementation, Op=operation, D=decommissioning
Other aspects: P=Production / Service, M=management

Some Notes regarding the Business Model:

- The arrows represent ‘influences’ of the various entities on one or more life cycle phases of other entities
- Some life cycle diagrams have been collapsed to represent only relevant phases
- The influences can be thought of *stakeholder concerns* translating into changes in the ‘influenced’ (target) entity/ies
- The model represents a combined AS-IS / TO-BE state.
- The model helps common understanding, building consensus and thus buy-in of the stakeholders.

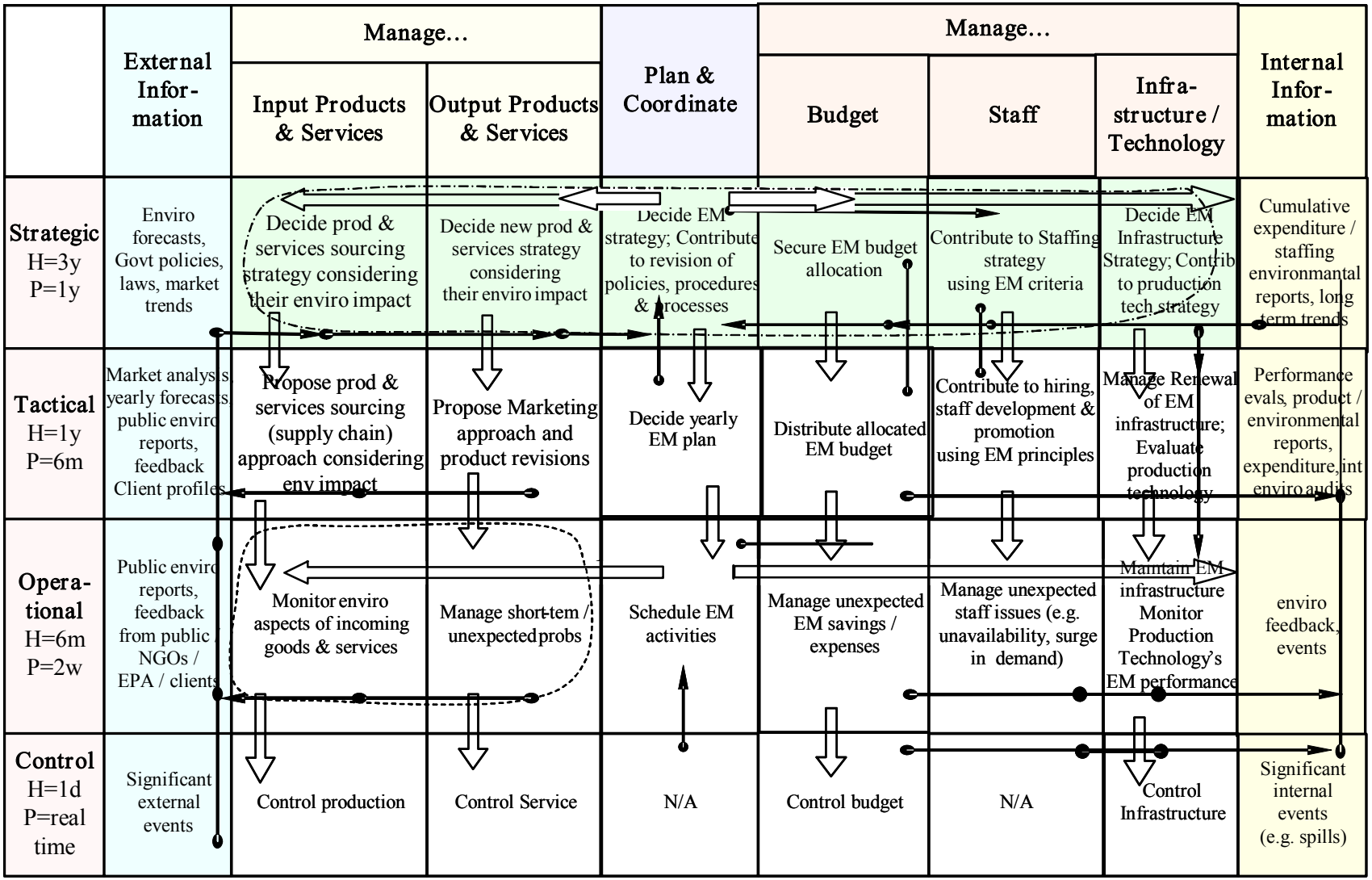
Step Two (cont): Modelling the Decisional Aspect: GRAI Grid

(generic example showing a potential problem)



(Doumeingts et al, 1998)

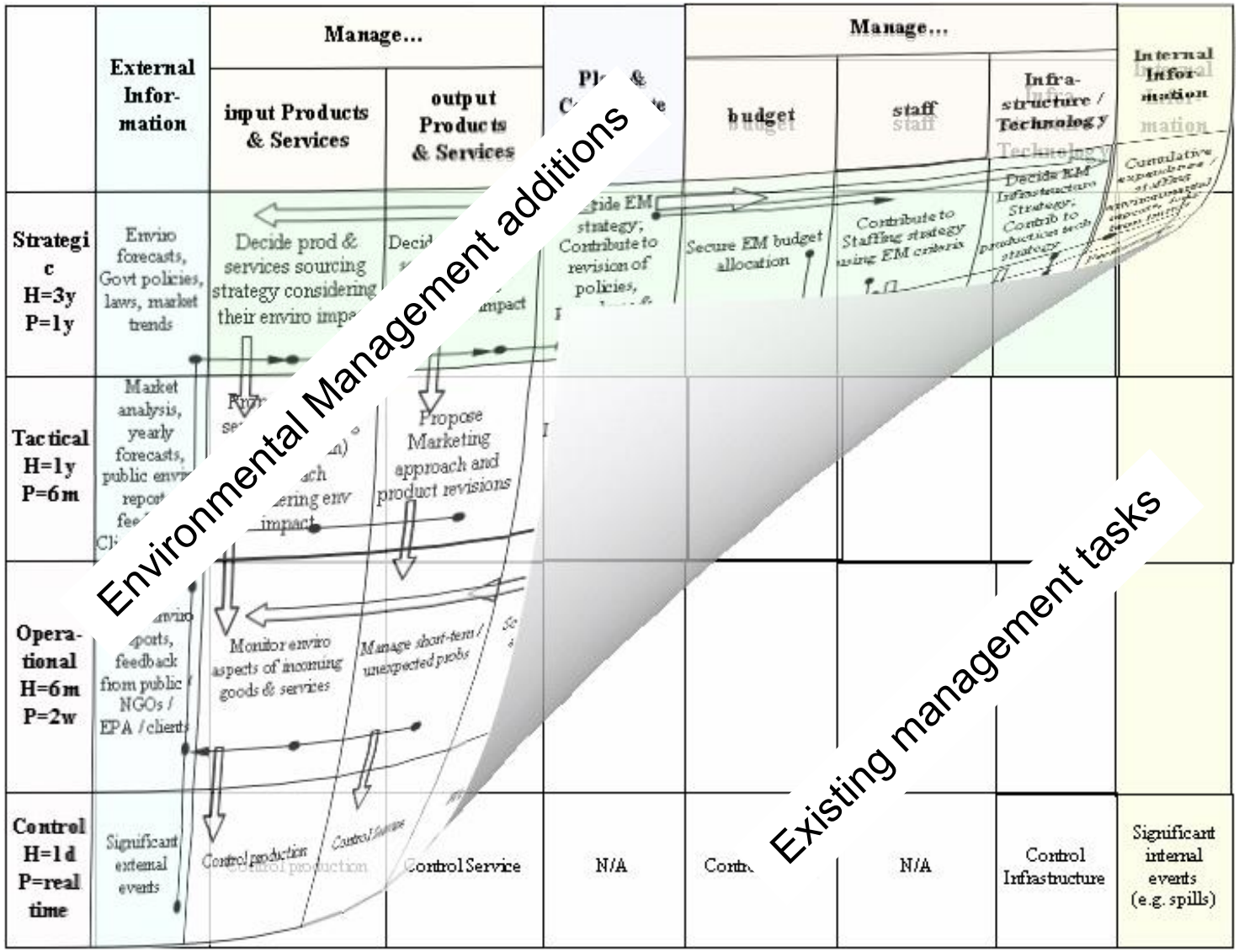
A Possible Decisional Model for the EM Project / EMS



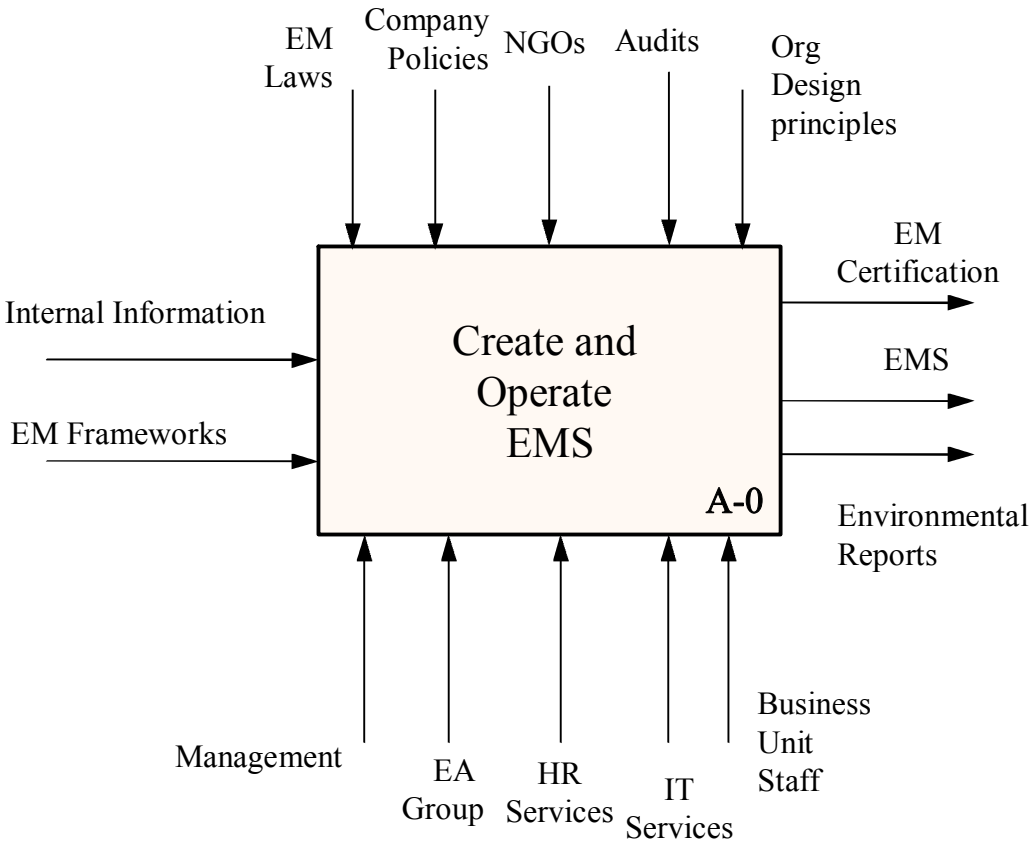
⇨ = decisional framework (DF); ⟶ = info. link (IL); -·-·- = Enviro manager / Board; - - - = EMS auditor

H = horizon; P = period

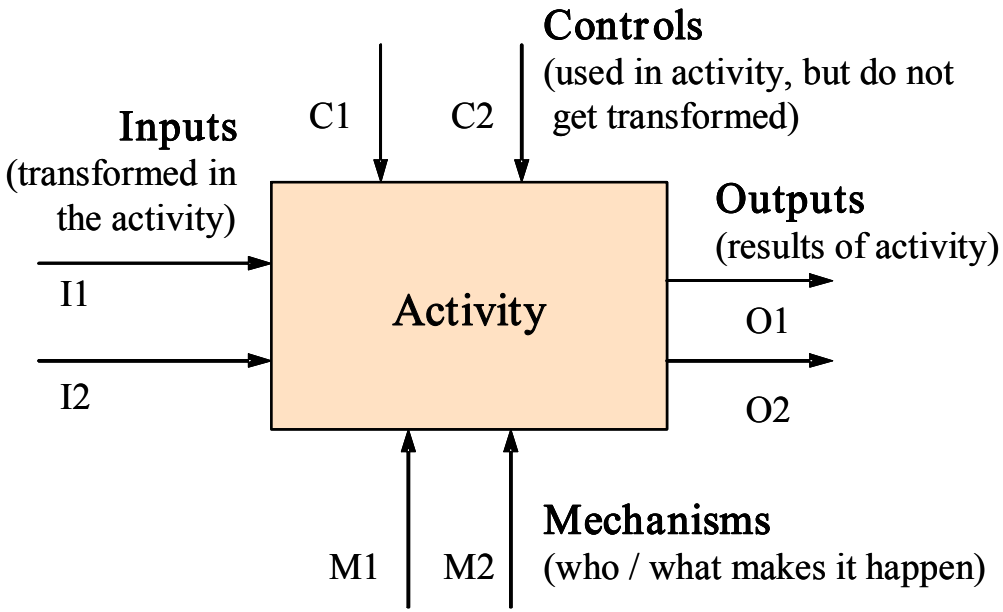
Superimposing EM Decisional Model on the existing Management Model



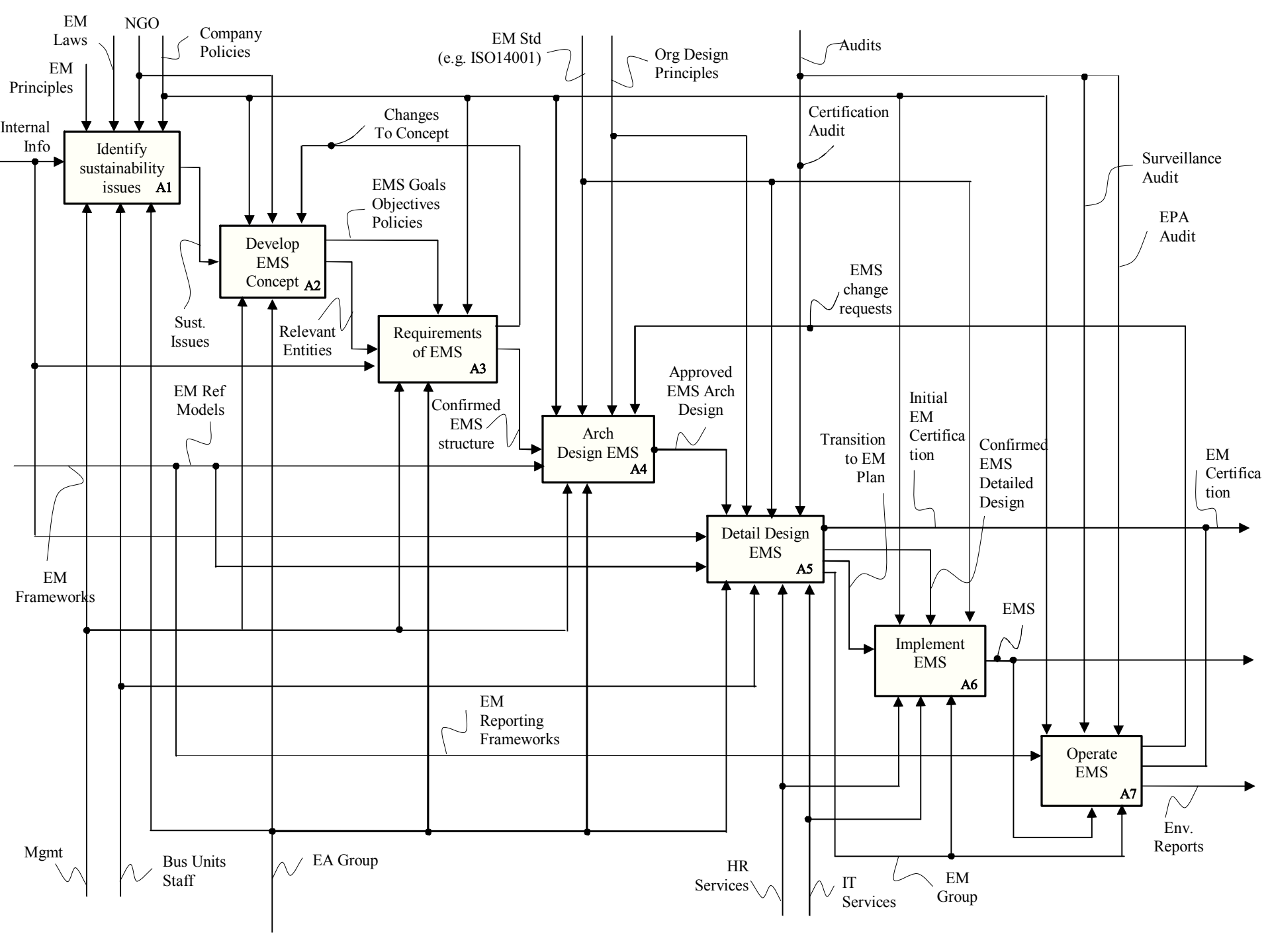
Sample Step Three: generating the step-by-step method

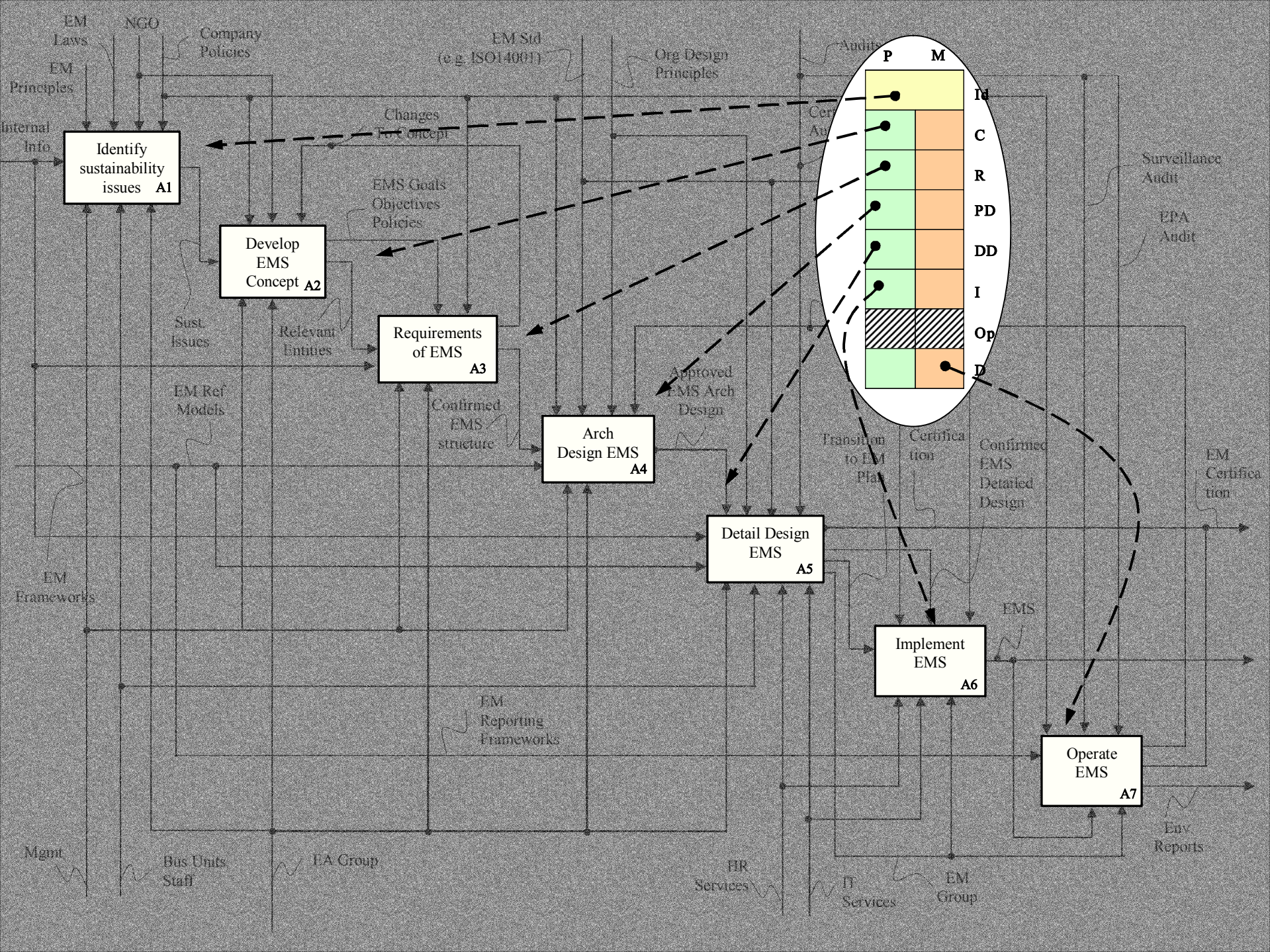


Modelling the Functional Aspect: IDEF0



(NIST, 1993)


EM Laws
NGO
Company Policies
EM Principles
EM Std (e.g. ISO14001)
Org Design Principles
Audits
Internal Info
Identify sustainability issues A1
Changes To Concept
Certification Audit
Surveillance Audit
EMS Goals Objectives Policies
EPA Audit
Develop EMS Concept A2
EMS change requests
Sust. Issues
Relevant Entities
Requirements of EMS A3
Approved EMS Arch Design
EM Ref Models
Confirmed EMS structure
Initial EM Certification
Arch Design EMS A4
Transition to EM Plan
Confirmed EMS Detailed Design
EM Certification
Detail Design EMS A5
EM Frameworks
EMS
Implement EMS A6
EM Reporting Frameworks
Operate EMS A7
Env. Reports
Mgmt
Bus Units Staff
EA Group
HR Services
IT Services
EM Group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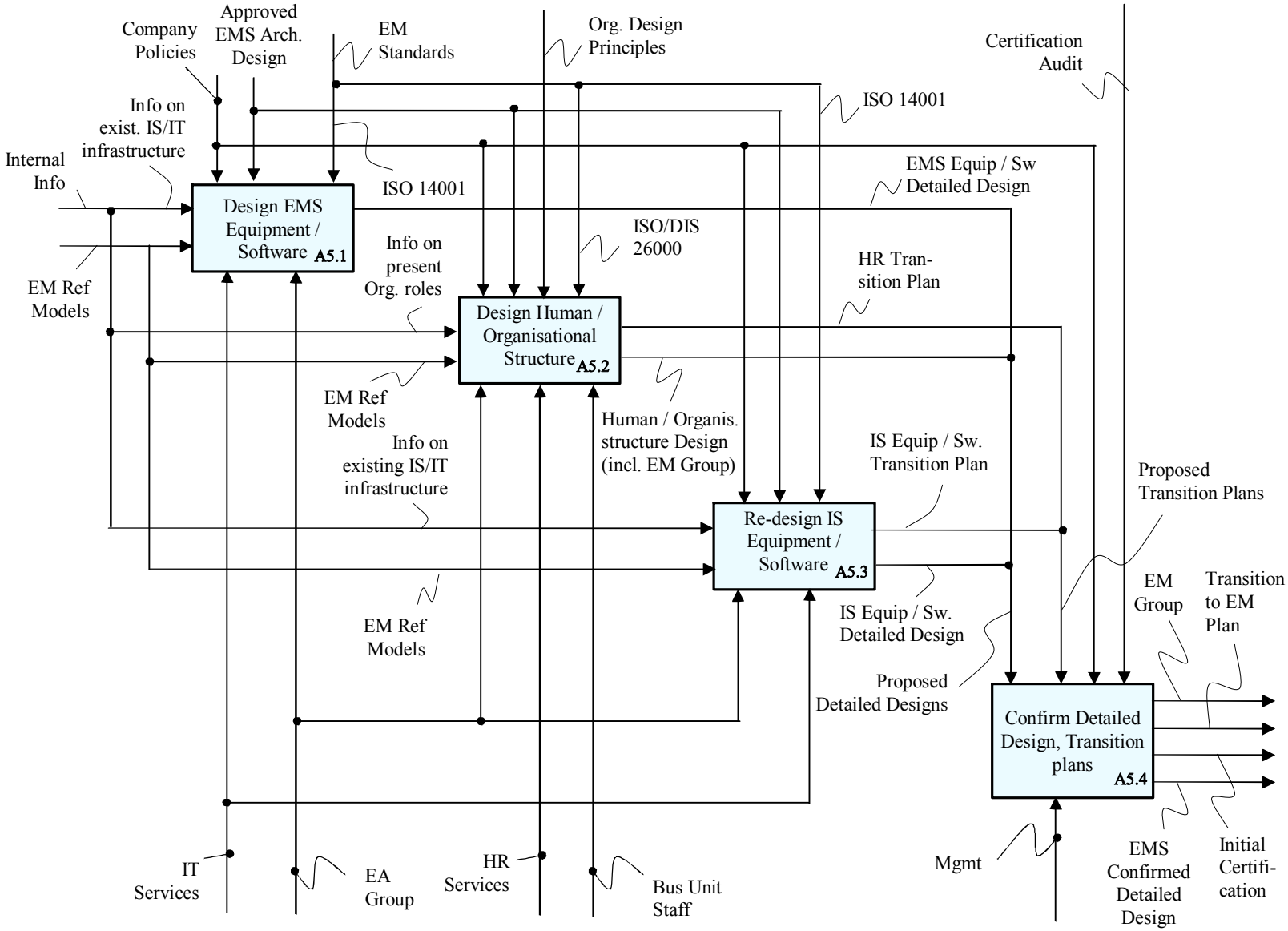
Confirmed EMS Detailed Design
EM Certification
Detail Design EMS A5
EM Frameworks
EMS
Implement EMS A6
EM Reporting Frameworks
Operate EMS A7
Env Reports
Mgmt
Bus Units Staff
EA Group
HR Services
IT Services
EM Group


Company Policies
Approved EMS Arch. Design
EM Standards
Org. Design Principles
Certification Audit
ISO 14001
Info on exist. IS/IT infrastructure
Internal Info
ISO 14001
EMS Equip / Sw Detailed Design
Design EMS Equipment / Software A5.1
ISO/DIS 26000
Info on present Org. roles
HR Tran-sition Plan
EM Ref Models
Design Human / Organisational Structure A5.2
EM Ref Models
Human / Organis. structure Design (incl. EM Group)
Info on existing IS/IT infrastructure
IS Equip / Sw. Transition Plan
Proposed Transition Plans
Re-design IS Equipment / Software A5.3
EM Group
Transition to EM Plan
EM Ref Models
IS Equip / Sw. Detailed Design
Proposed Detailed Designs
Confirm Detailed Design, Transition plans A5.4
IT Services
EA Group
HR Services
Bus Unit Staff
Mgmt
EMS Confirmed Detailed Design
Initial Certifi-cation

Conclusions

The use of an EA approach in the EM project brings benefits such as:

- All relevant entities participating in an EM project are taken into account, whether inside / outside the CN and/or the CN participants themselves (e.g. business units)
- The relations between these participants are considered in the context of their life cycles; combined with other relevant aspects they will infer new valuable information
- Provision of repository/ies of potentially useful modelling frameworks / aspects and method(s) to select these

Thus it appears that EA can provide the necessary artefacts / prerequisites for a coherent, cross-departmental/participant and culture-changing approach to EM

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Doumeingts, G., Vallespir, B., Chen, D.: GRAI Grid Decisional Modelling. In: Bernus, P., Mertins, K., Schmidt, G. (eds.) Handbook on Architectures of Information Systems, pp. 313-339. Springer Verlag, Heidelberg (1998)

NIST, Integration Definition for Function Modelling (IDEF0). 1993, Computer Systems Laboratory, National Institute of Standards and Technology.

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