A HYDRA project case-based training session

HYDRA

A business modelling framework to crate business cases for Hydra enabled applications

<Presenter goes here>

Information Society
Technologies

Preface – introduction to the project

Preface from the Hydra Project Team:

- Hydra middleware facilitates application development based on a Service-oriented Architecture (SOA), to which the underlying communication layer is transparent.

- The Hydra platform allows the developers to rapidly develop solutions that are not only technically but also commercially viable.

- Hydra has developed three case-based training courses in which researchers, technology developers and business managers meet to exchange information and jointly create, analyse and augment realistic business models and business cases.

IST-2005-034891

More information: www.hydra.eu.com

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The HYDRA project

IST-2005-034891

- Middleware for Networked Embedded Systems
  - Embedded intelligence architecture
  - Wireless networks & devices
  - Service oriented architecture (SoA)
  - Trust, privacy and security
- Four year European research project
- Project budget 15 m€
- Co-funded by the EU Commission with 8 m€
- Ends in 2010

Partners in the Hydra project

- **14 partners**
- **6 universities and research institutions**
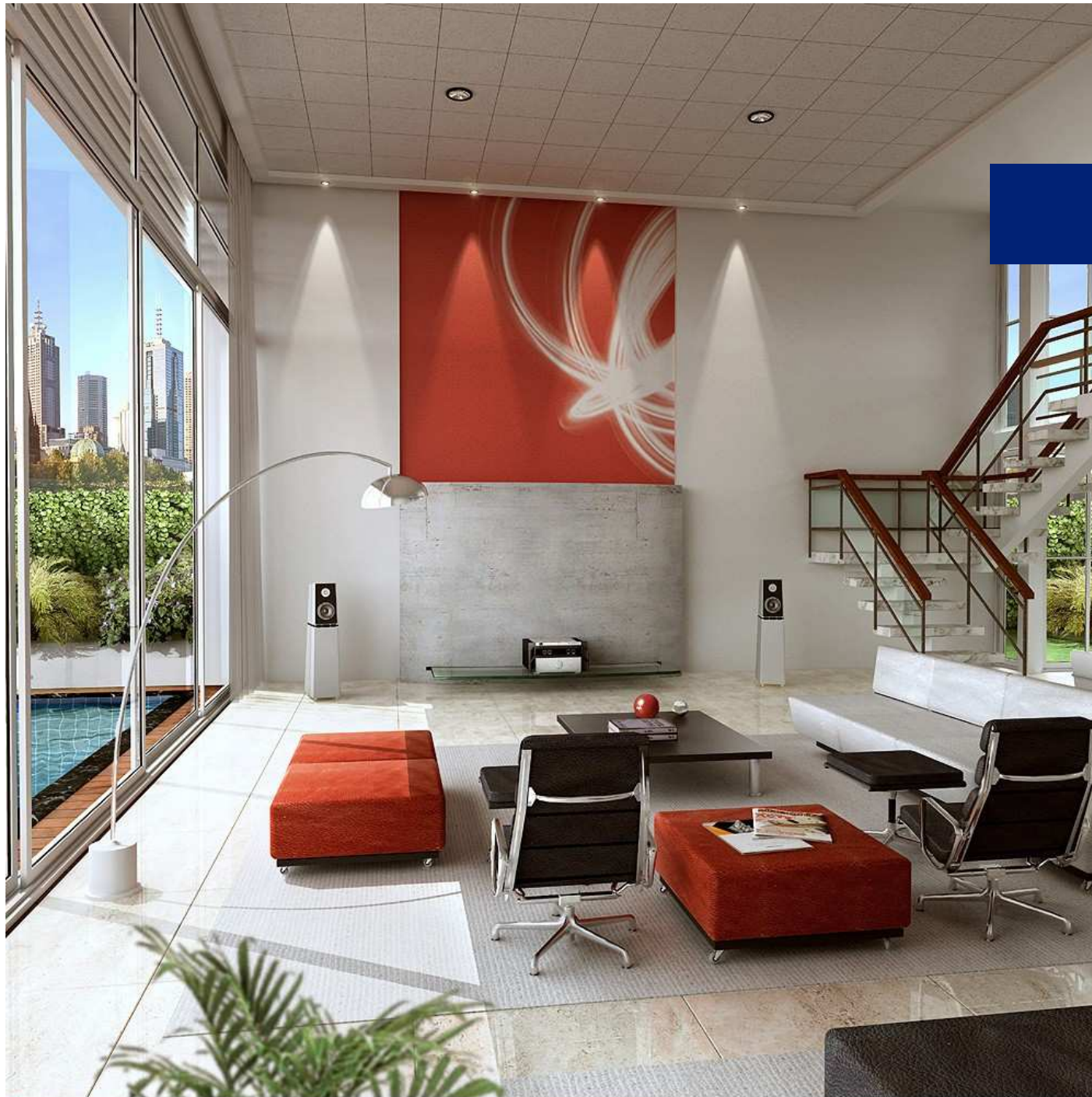- **6 SME's**
- **8 countries**

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C international CONSULTING

FIT

SIT

CNet SVENSKA AB

IN-JeT ApS

T-connect

INNOVA

PRIWAY Security in Context

UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

SIEMENS

SOLIDUM PETIT IN PROFUNDIS · UNIVERSITAS ARHUSIENSIS

Telefónica
TELEFÓNICA
INVESTIGACIÓN Y DESARROLLO

The University of Reading

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Hydra Training: Business Modelling
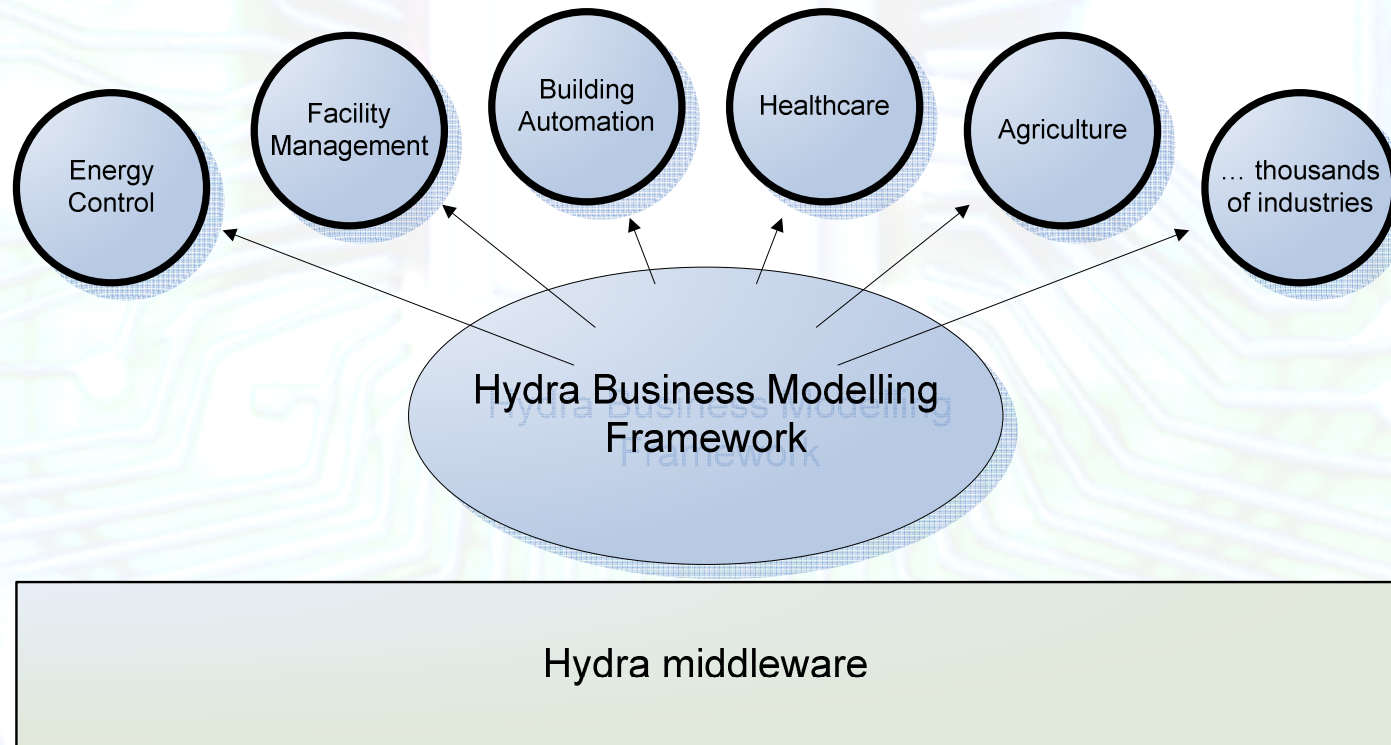
Our Future

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Imagine…

Project objectives

- Develop a middleware based on a Service-oriented Architecture to which the underlying communication layer is transparent

- Provide development tools (SDK and DDK) for cost-effective development of Ambient Intelligence applications and enabling of devices for interoperability

- Develop a business modelling framework for creating sustainable business cases based on Hydra enabled devices and applications

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Hydra business modelling framework

Millions of company specific applications

Energy Control

Facility Management

Building Automation

Healthcare

Agriculture

… thousands of industries

Hydra Business Modelling Framework

Hydra middleware

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Objectives of this training session

- Describe what business relevant services and applications the Hydra middleware can provide and create awareness among peers.
- Understand and analyse the business purpose of the Hydra middleware in applications involving embedded systems.
- Learn how to use Hydra middleware to enhance the business potential from existing applications.
- Create business models and apply various boundary conditions relevant for the business ecosystem in case.
- Identify new value offerings and actors. Analyse the value creation process arising from Hydra enabled applications and devices.
- Make informed judgements of the business potential of specific Hydra enable devices and perform profit assessment for each actor.
- Create business proposals based models of value creation and value exchange in Hydra enabled eBusiness services.

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Agenda for day 1: Analysis

- Business modelling
  - Brief introduction to business modelling, dynamic value constellations, etc.

- Existing business ecosystem
  - Existing product and service value chains

- Business opportunities
  - Main aspects of the Hydra middleware and how it can provide new business opportunities

- Business scenarios
  - Possible scenario, which could be a likely implementation of the Hydra middleware

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Business modelling

Brief introduction to business modelling,
dynamic value constellations etc.

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BM: buzzword or meaningful artifact?

- A buzzword with no precise definition?

  - Executives, reporters and analysts who use the term don't have a clear idea of what it means. They use it to describe everything from how a company earns revenue to how it structures its organization

  or …

- An artifact aggregating …

  - the value a company offers to one or several segments of customers, and

  - the architecture of the firm and its network of partners

  - for creating, marketing and delivering this value and relationship capital,

  - in order to generate profitable and sustainable revenue streams
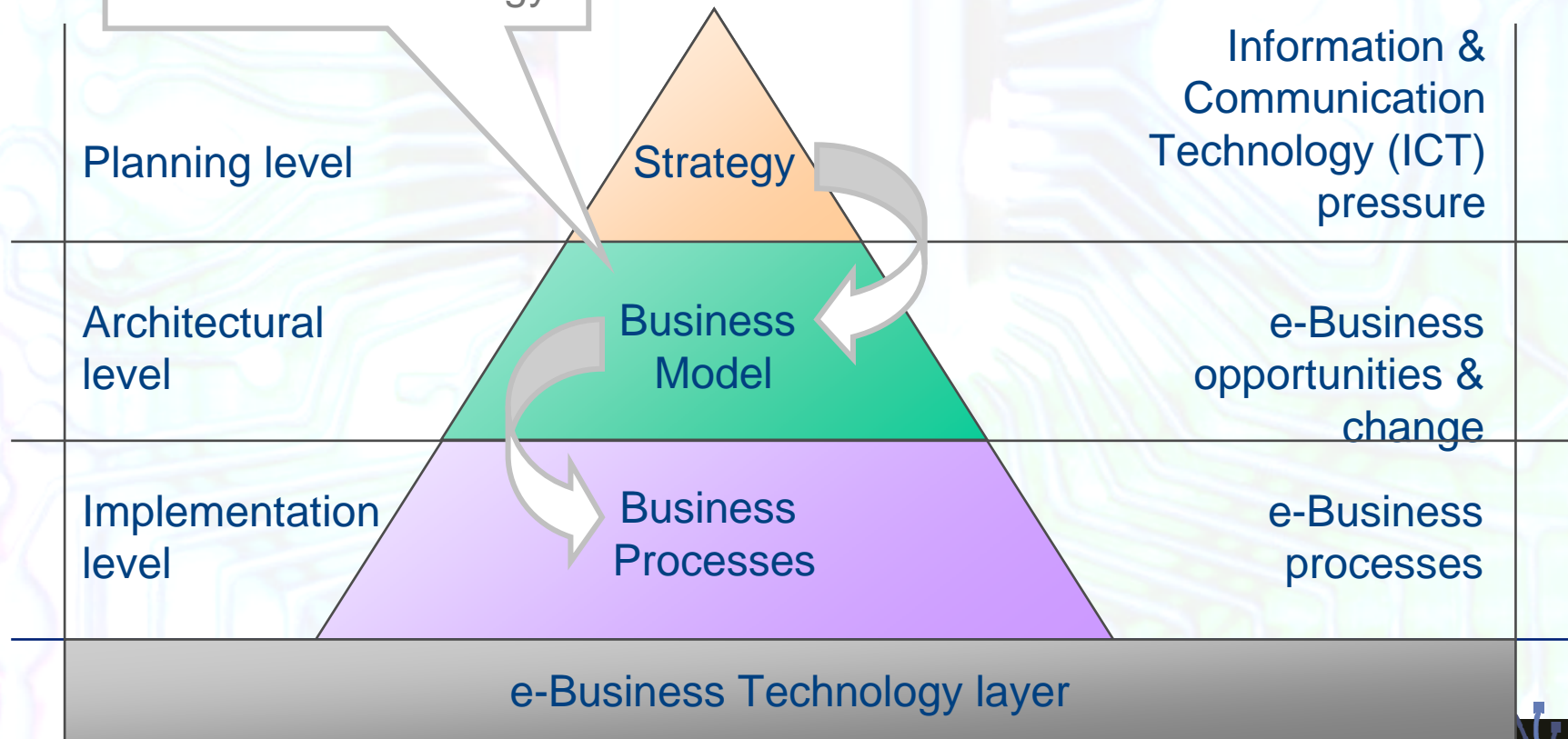
Source: Linder, 2000

Why a *business model* approach?

Conceptual architecture
of a business strategy

Planning level

Architectural
level

Implementation
level

Strategy

Business
Model

Business
Processes

Information &
Communication
Technology (ICT)
pressure

e-Business
opportunities &
change
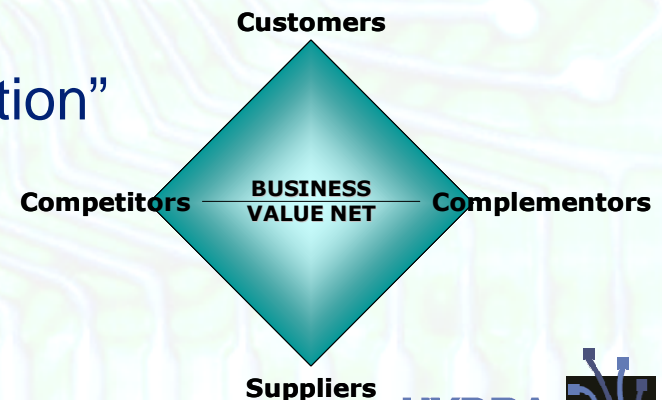
e-Business
processes

e-Business Technology layer
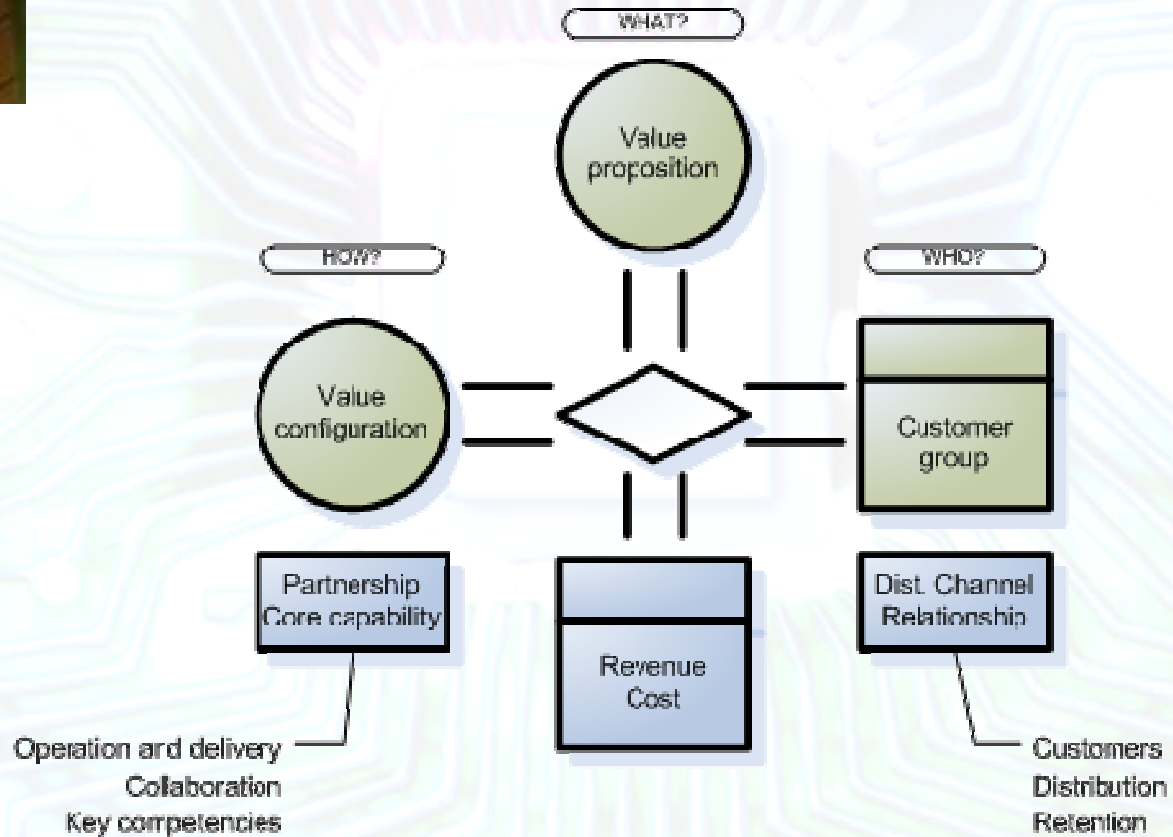
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Value constellation paradigm

- We need a new value paradigm in order to fully capture and understand the value creation process in virtual markets

- Strategy is the art of creating value. The focus of strategic analysis is not the company or even the industry but the value creating system itself!

- Competition is no longer between firms but between offerings, which are, in turn, the result of cooperation between complementors

- This notion of offering now directly addresses the issue of value co-production

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Value co-production

- An offering is the result of a complex set of value creating activities involving different actors working together to produce it for and with the customer.

- The goal of a business is not to make something for customers, but to encourage them to take advantage of a multitude of offerings and hereby create value for themselves

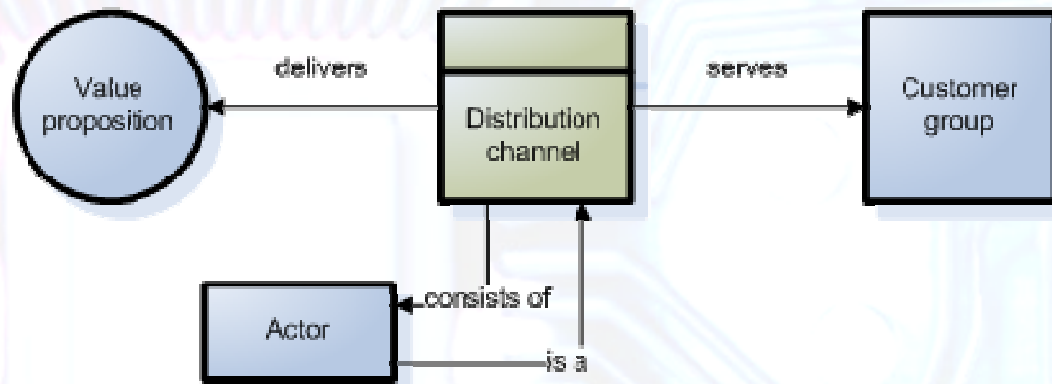- The concept of "value constellation" replaces the value chain idea

Customers

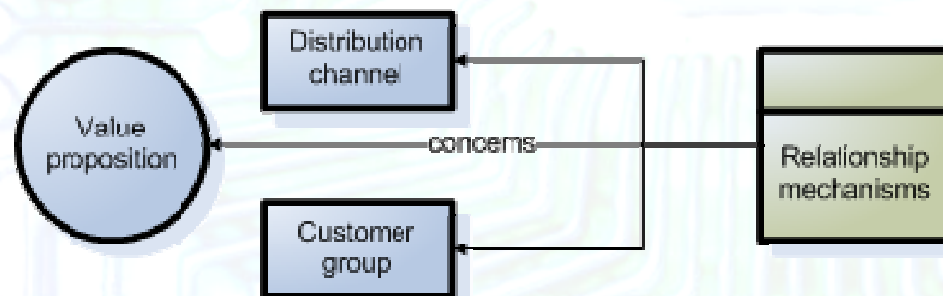**Competitors** — **BUSINESS VALUE NET** — **Complementors**

Suppliers

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A Value based Business Model

Source: Yves Pigneur, 2006

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Value proposition

Modelling distribution channels

Modelling relationships

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Value configurations

Modelling value configurations
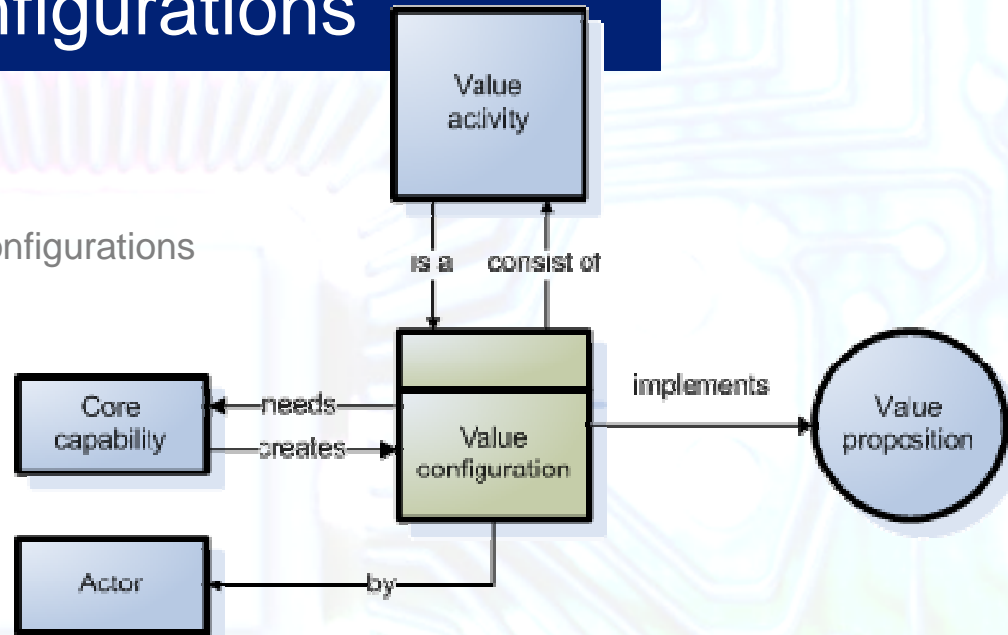
Modelling partnerships

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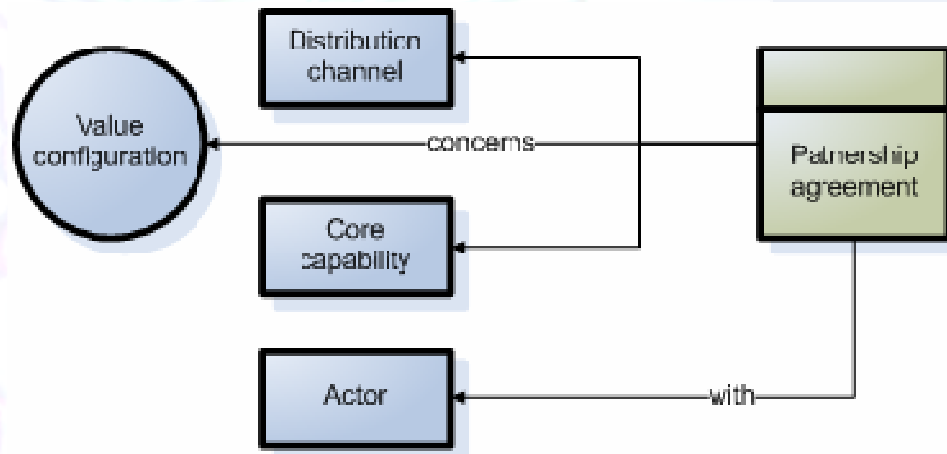
Modelling ontology
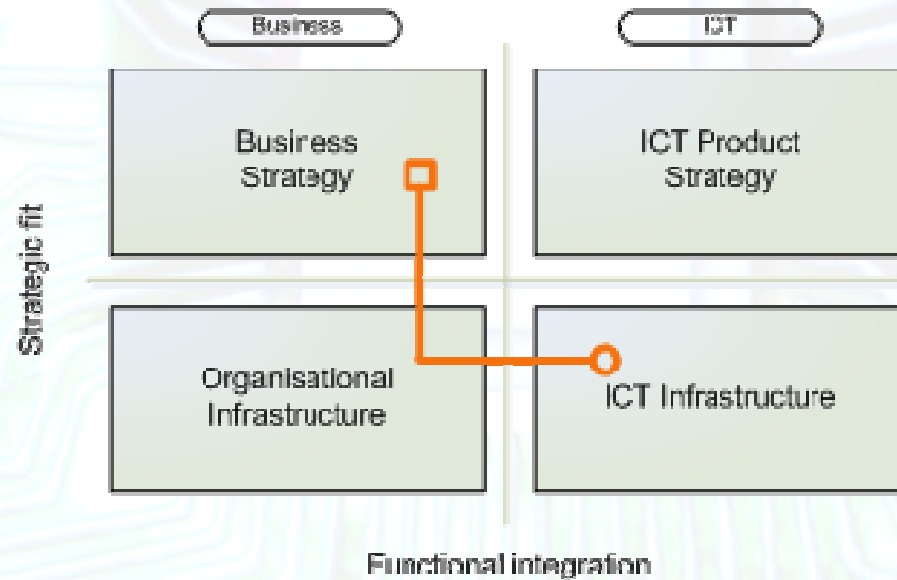
Process models are designed to give optimum process implementation, but are not so effective in radically new approaches to the way the company is doing business

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Modelling ontology

Value modelling looks at where value is created and for whom. Value modelling is very suitable for engineering radical strategic changes including new product strategies and organisational infrastructures

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Value modelling

A central part of the valuation phase of any requirements engineering
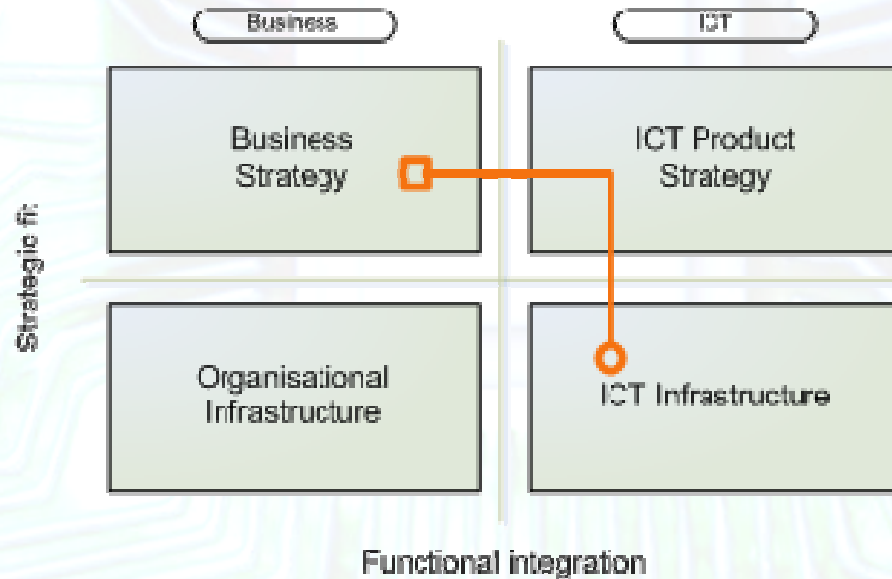process is to provide answers to the following questions:

- Is the offering feasible in terms of value proposition to the customer?
- Is the offering overall profitable?
- Is the global profit fairly distributed on all the involved actors?
- Is the intended offering feasible in terms of usability?
- Is the offering easily understood and acceptable to all stakeholders?

In order to provide the answers to these questions,
a conceptual modelling tool should be at hand

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The e³value modelling methodology

Developed by Dr. Jaap Gordijn and his group at
the Vrije Universiteit Amsterdam

http://www.e3value.nl/

- Features:
  - A lightweight approach to carry out the value analysis in a limited timeframe (iterations of the creativity process)
  - An economic value aware approach to capture and evaluate a value proposition (where is the money?)
  - A multi-viewpoint approach to deal with a wide range of stakeholders (who else needs to be in the game?)
  - A graphical conceptual modelling approach to create a common understanding and rapid evaluation (easy to grasp)

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The e³value ontology

- **Actors** *(e.g. a manufacturer)*

  - an economically independent entity – acting for profit!

- **Value Objects** *(e.g. Remote Asset Management, Meter Readings, Money)*

  - a service, a product or just information, which is of economic value for at least one of the actors

- **Value Port** *(e.g. an internet connection)*

  - an actor uses a value port to provide or request value objects

- **Value Exchange** *(e.g. exchanging remote access for a connection fee)*

  - an exchange of value objects between two value ports

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e³value tool basics

Legend	Actor	Value interface	Value port	Value Exchange	Start stimulus	Connect. element	End stimulus
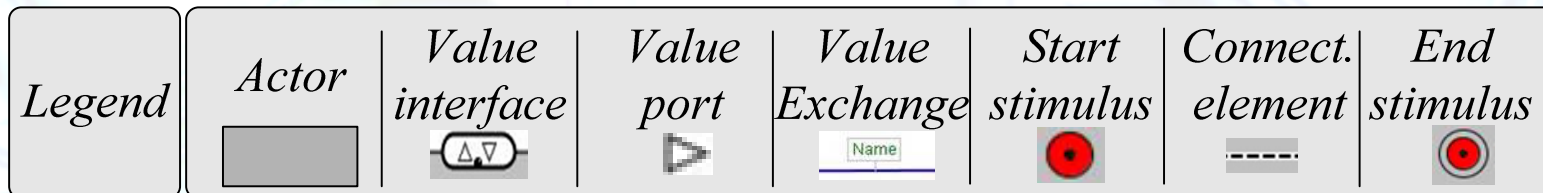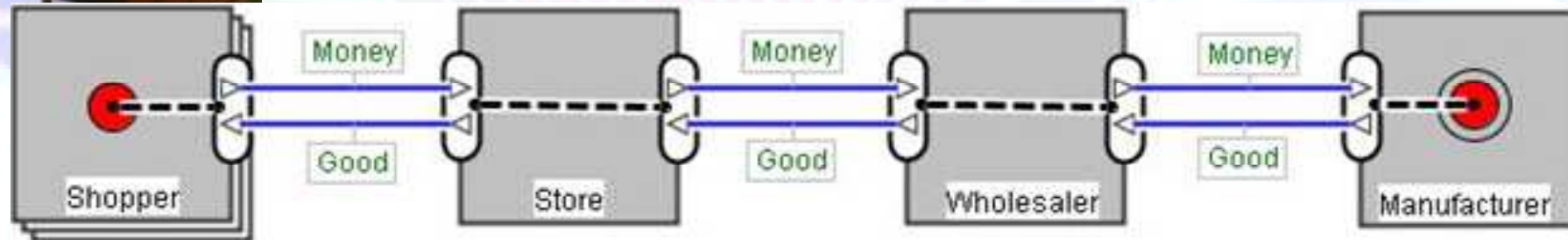
	A	B	C	D	E	F
1	Value Interface	Value Port	Value Exchange	Occurrences	Valuation	Economic Value
2	Buy store	total for Buy store		10000		-900000
3		Good	(all connected)	10000	0	0
4		Payment	Money	10000	90	-900000
5	Sell store	total for Sell store		10000		1000000
6		Payment	Money	10000	100	1000000
7		Good	(all connected)	10000	0	0
8						
9	total for actor			20000	0	100000
10						

value_interface / value_exchange / **Store** / Wholesaler

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e³value methodology and tool
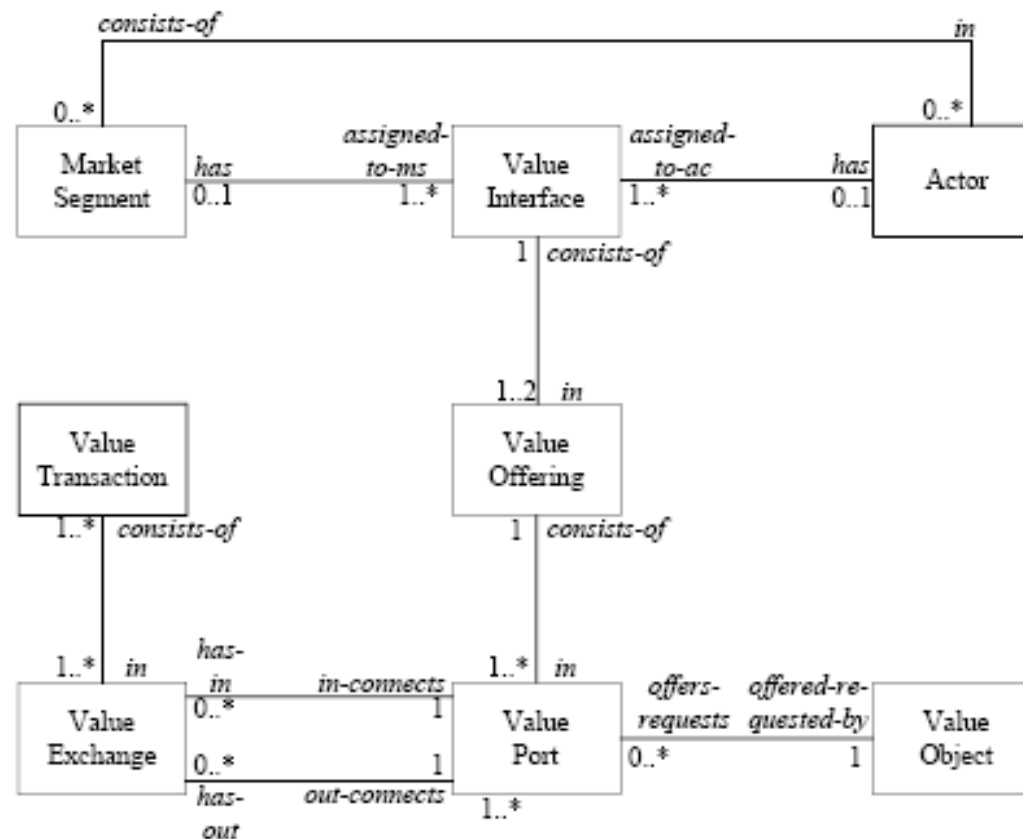
The e³value ontology expressed in a UML class diagram (Jaap Gordijn, 2002)

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Existing business ecosystems in Building Automation

Existing product value chains

Existing service value chains

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The Digital Ecosystem

- Pervasive digital environment
- Populated by digital components
- Evolves and adapts to local conditions

The Digital Ecosystem is not a piece of software

It is an ICT infrastructure that transport services and knowledge and so empowers the whole business network

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The Internet revolution is far from over

- Number of users
- Number of devices
- Number of applications
- Amount of content
- Speed/bandwidth

We are entering a new phase of Internet applications

The Internet of Things!

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Any device can communicate

All devices can communicate with and understand one

According to IBM:

- There were more than one trillion devices in 200

- The number of communicating data devices will grow from 2.4 billion to 23 billion in 2008 and <u>one trillion</u> by 2012

RFID

0
2003 2004 2005 2006 2007 2008

Toys/Appliances
Machine/Auto
Entertainment
VoIP
Mobile Devices
Computers

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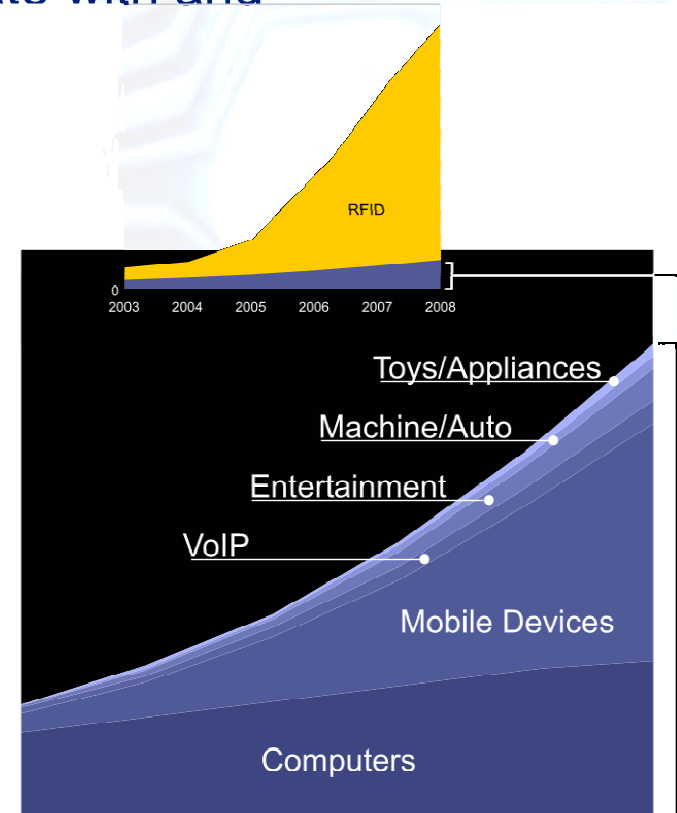
ICT - business opportunities
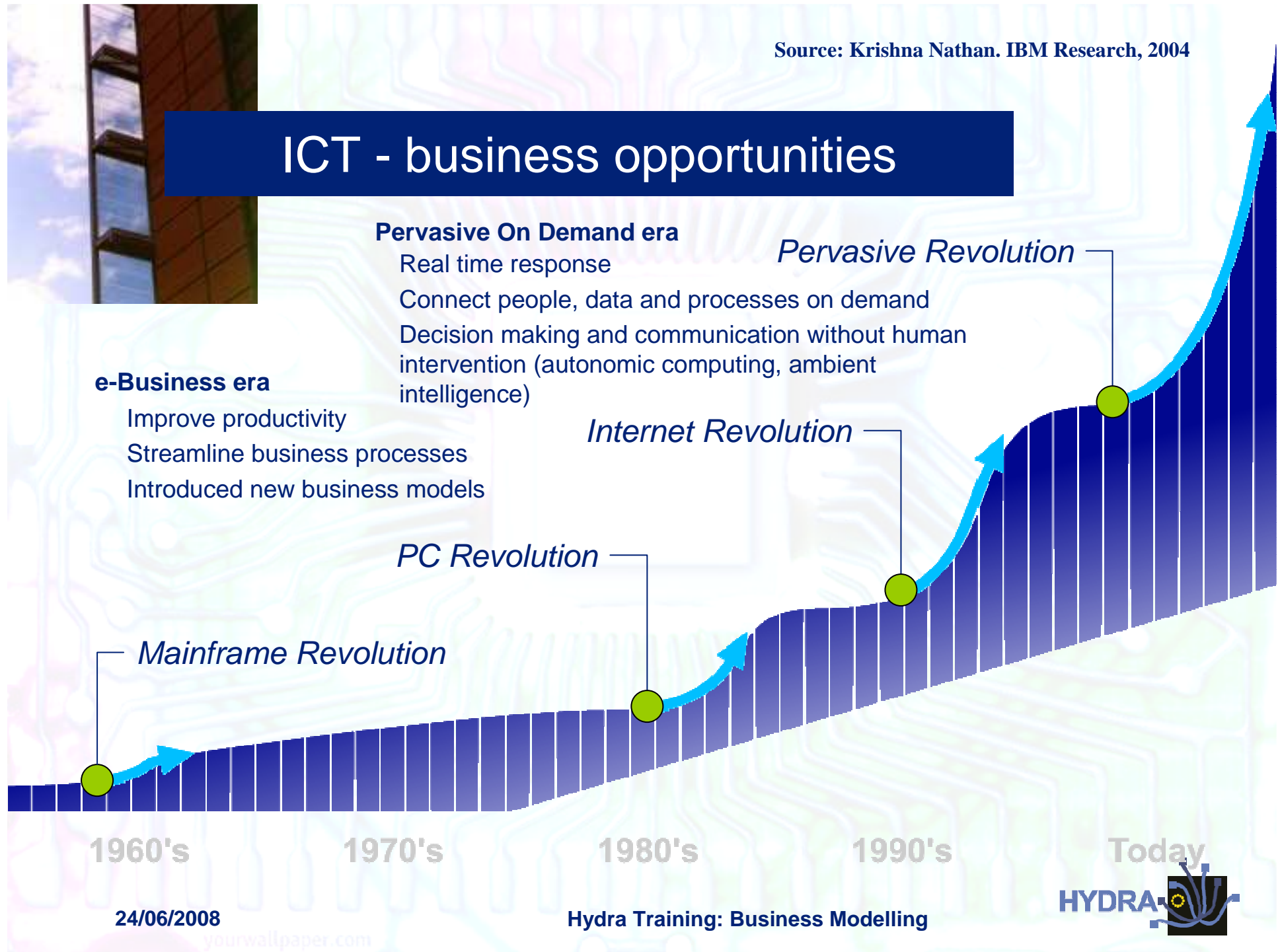
Pervasive On Demand era
Real time response
Connect people, data and processes on demand
Decision making and communication without human intervention (autonomic computing, ambient intelligence)

e-Business era
Improve productivity
Streamline business processes
Introduced new business models

Pervasive Revolution

Internet Revolution

PC Revolution

Mainframe Revolution

1960's   1970's   1980's   1990's   Today

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The Hydra context

The "Internet of things" - limitations in pervasive computing:

- Limited computing power
- Rudimentary or non-existing user interface
- Lack of communication priority mechanisms
- Lack of dynamic rules-based decision support
- Lack of sustainable business models

... but there one trillion
products already on the market

From products to services

Risk/value

Total Management

Operational Management

Facility Management

System Integration

Contract Maintenance

Remote Monitoring

Compliance Monitoring

Product

Logistics

Installation

Commissioning

Service

Product offerings

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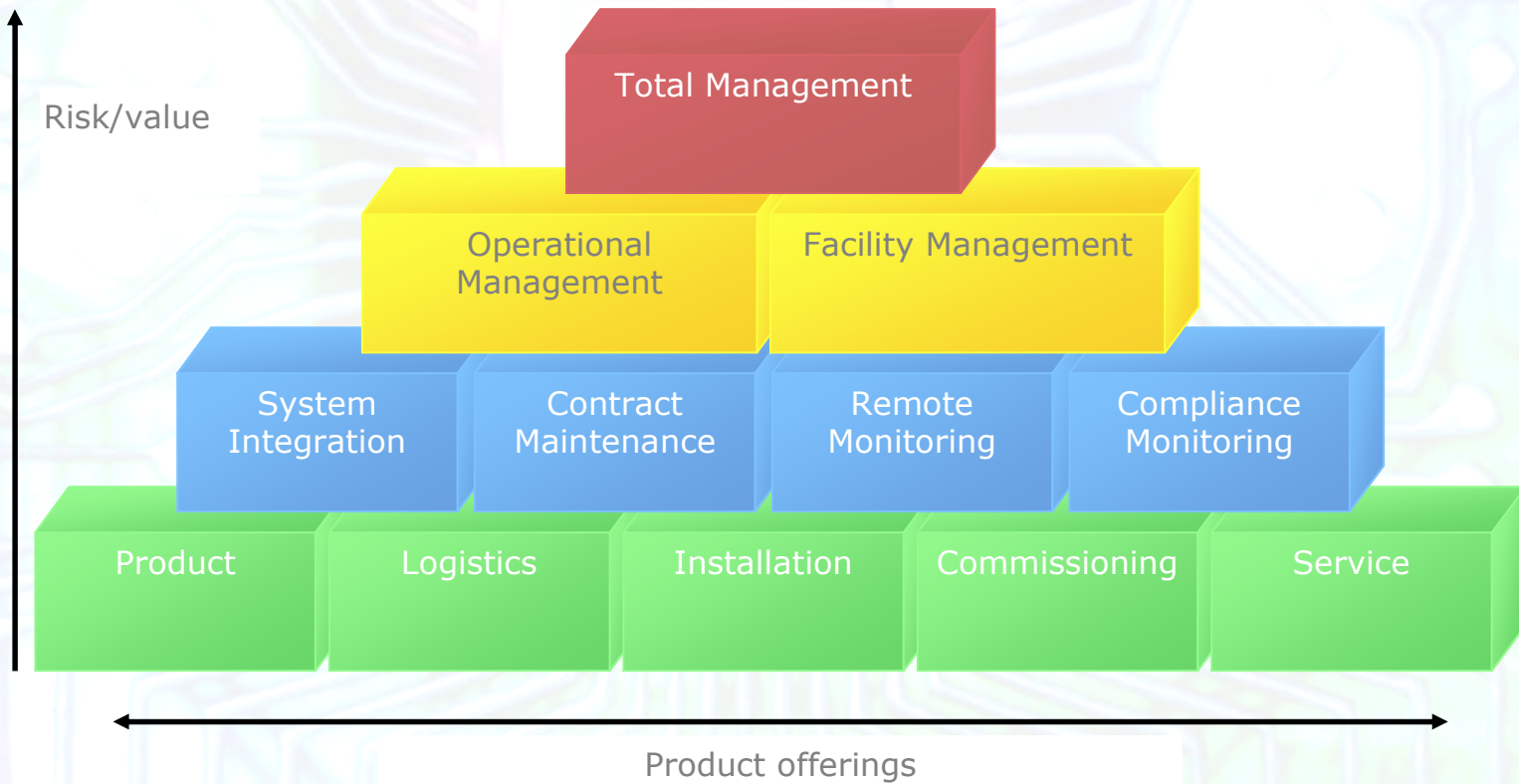
Hitting the "sound barrier"

**... we need Connectivity and Multimodality
in domains with different technology clockspeeds..**

Lifetime normally more
than a decade

Rapid changing
device technology

Case: Ajax Manufacturing

- Ajax Manufacturing Ltd. is a manufacturer of components for building automation such as coolers, compressors, valves, etc.

- Customers are building construction firms, design firms and engineering firms.

- Solid market position with very high market penetration in many countries.

- Aiming at being a world-class provider of after-sales service by securing world-wide availability of service.

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Ajax business process
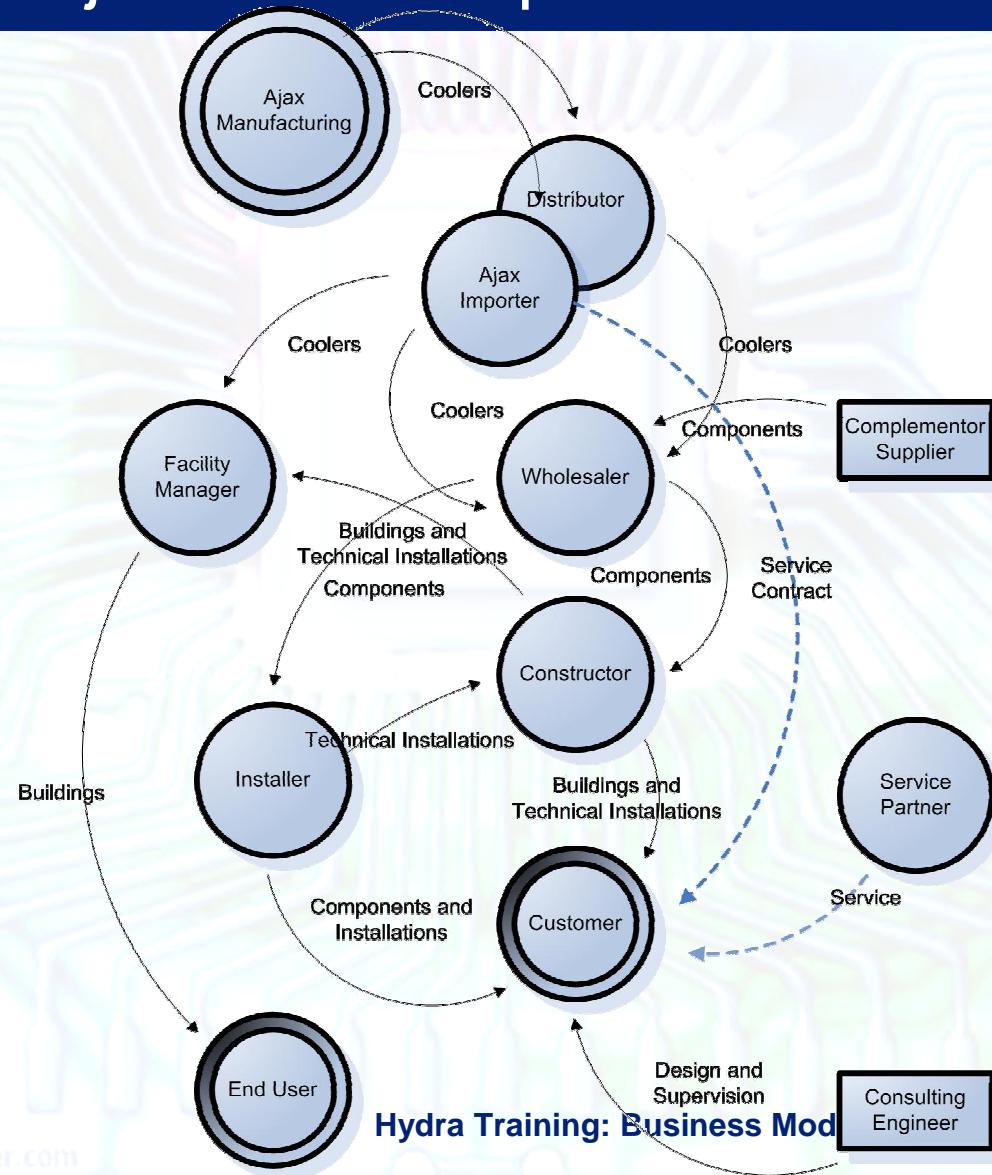
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Case: From products to services

Risk/value

Total Management

Operational Management | Facility Management

System Integration | Contract Maintenance | Remote Monitoring | Compliance Monitoring

Product | Logistics | Installation | Commissioning | Service

Product offerings

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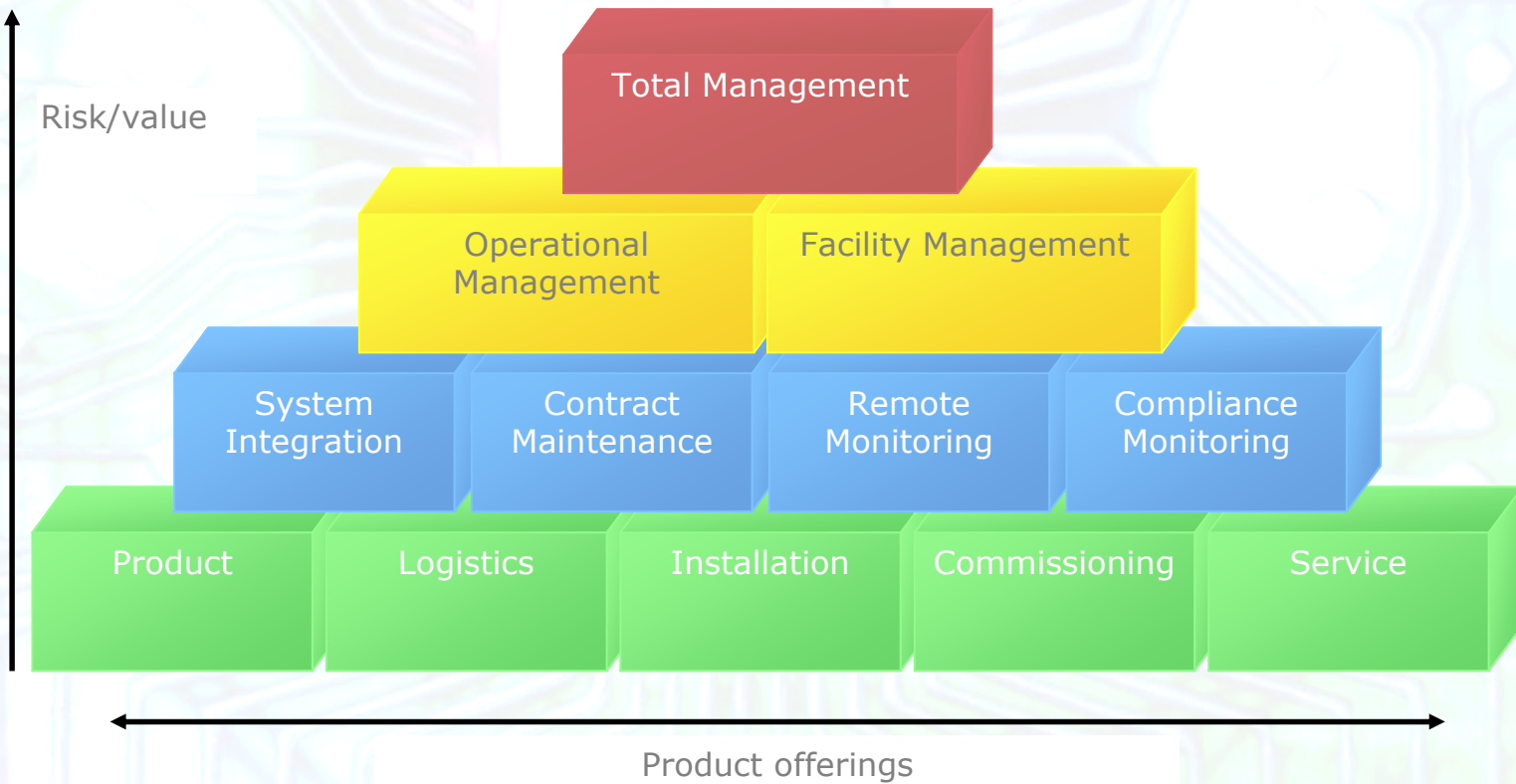
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Business opportunities in Building Automation

Main aspects of the Hydra middleware and how it
can provide new business opportunities

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Hydra outcomes

- A middleware based on a Service-oriented Architecture to which the underlying communication layer is transparent

- Development tools (SDK and DDK) for cost-effective development of Ambient Intelligence applications and enabling of devices for interoperability

- Business modelling framework for creating sustainable business cases based on Hydra enabled devices and applications

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Research areas

- Embedded AmI architecture

- Wireless networks & devices

- SoA and MDA middleware

- Trust, privacy and security

User requirements
Security analysis

Embedded AmI architecture | Wireless networks & devices | SoA and MDA middleware | Trust, privacy and security

--> From Research to Development -->

1 2 3 4

System integration
User pilots
Validation

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Middleware basics

- Middleware is a software layer that connects software components or applications.

- The middleware contains a set of enabling services that allow multiple processes running on one or more machines to interact across a network.

- Middleware provides for interoperability to support complex, distributed applications.

- Middleware supports application development and delivery and is especially useful to applications based on XML, SOAP, web services, and service-oriented architecture.

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Middleware for Embedded Systems


```
                    Application
        ┌──────────────────────────────────────┐ ┐
        │      Domain-Specific Middleware       │ │
  M     ├──────────────────────────────────────┤ │
  i     │      Common Middleware Services       │ │ Hydra
  d     ├──────────────────────────────────────┤ │
  d     │       Distribution Middleware         │ │
  l     ├──────────────────────────────────────┤ ┘
  e     │   Host Infrastructure Middleware      │
  w     └──────────────────────────────────────┘
  a
  r            Transport
  e
               Network

               Data Link

               Physical
```
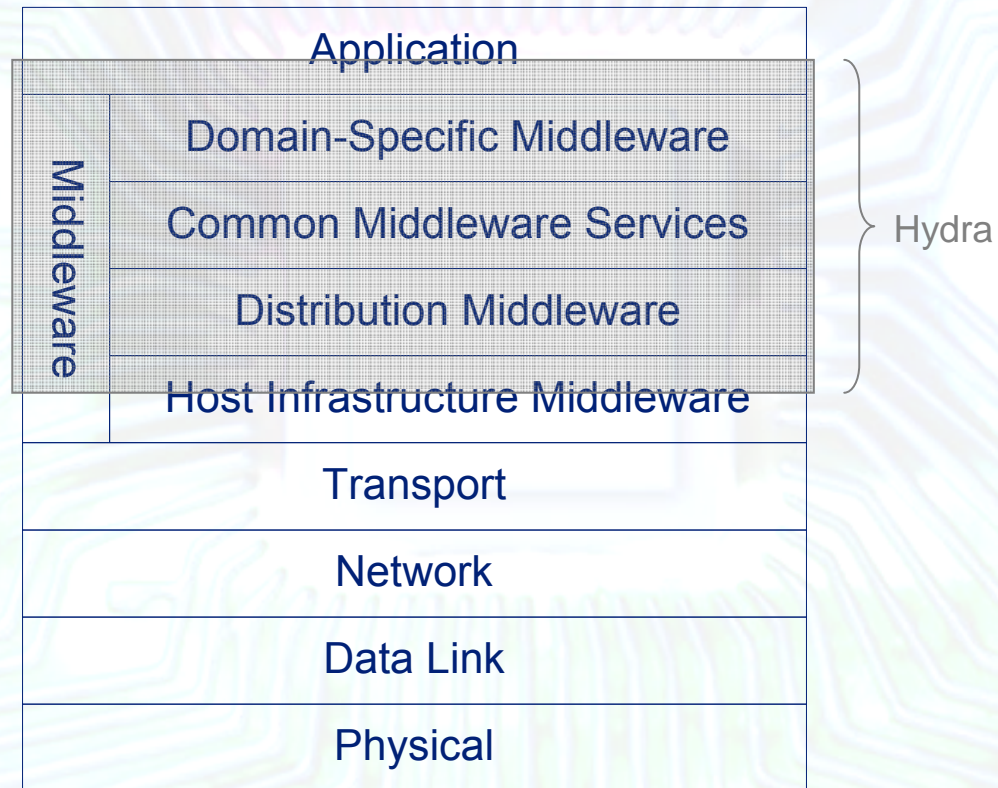
[Schmidt, 2002]

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Hydra Architecture Layers

Application   Workflow   User Interface   Configuration   Custom Logic   ...

Hydra Middleware

Application Elements

Security Layer — Security Service

Semantic Layer
- Service Manager
- Context Manager
- Policy Manager

Service Layer
- Security Manager
- Ontology Manager
- Diagnostics Manager
- Event Manager
- Orchestration Manager
- Device Manager
- Storage Manager

Network Layer
- SOAP Tunnel
- Network Manager

Device Elements

Security Layer — Security Service

Semantic Layer
- Context Manager
- Policy Manager

Service Layer
- Service Manager
- Device Manager
- Resource Manager
- QoS Manager
- Storage Manager
- Lock Manager

Network Layer
- SOAP Tunnel
- Network Manager

Operating System   TinyOS   Windows CE   Windows   Series 60   ...

Physical Layer   Zigbee   Bluetooth   WLAN   ...

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Embedded Semantic Web Services - Limbo

Device description: software and hardware

Device statemachine

Service interface → Provide WSDL file

Provide OWL description

Binding to, e.g., SOAP

Binding to device OWL description

[Resources available and open device]

[Resources constrained or closed device]

Create embedded service stubs and skeletons

Create proxy service stubs and skeletons
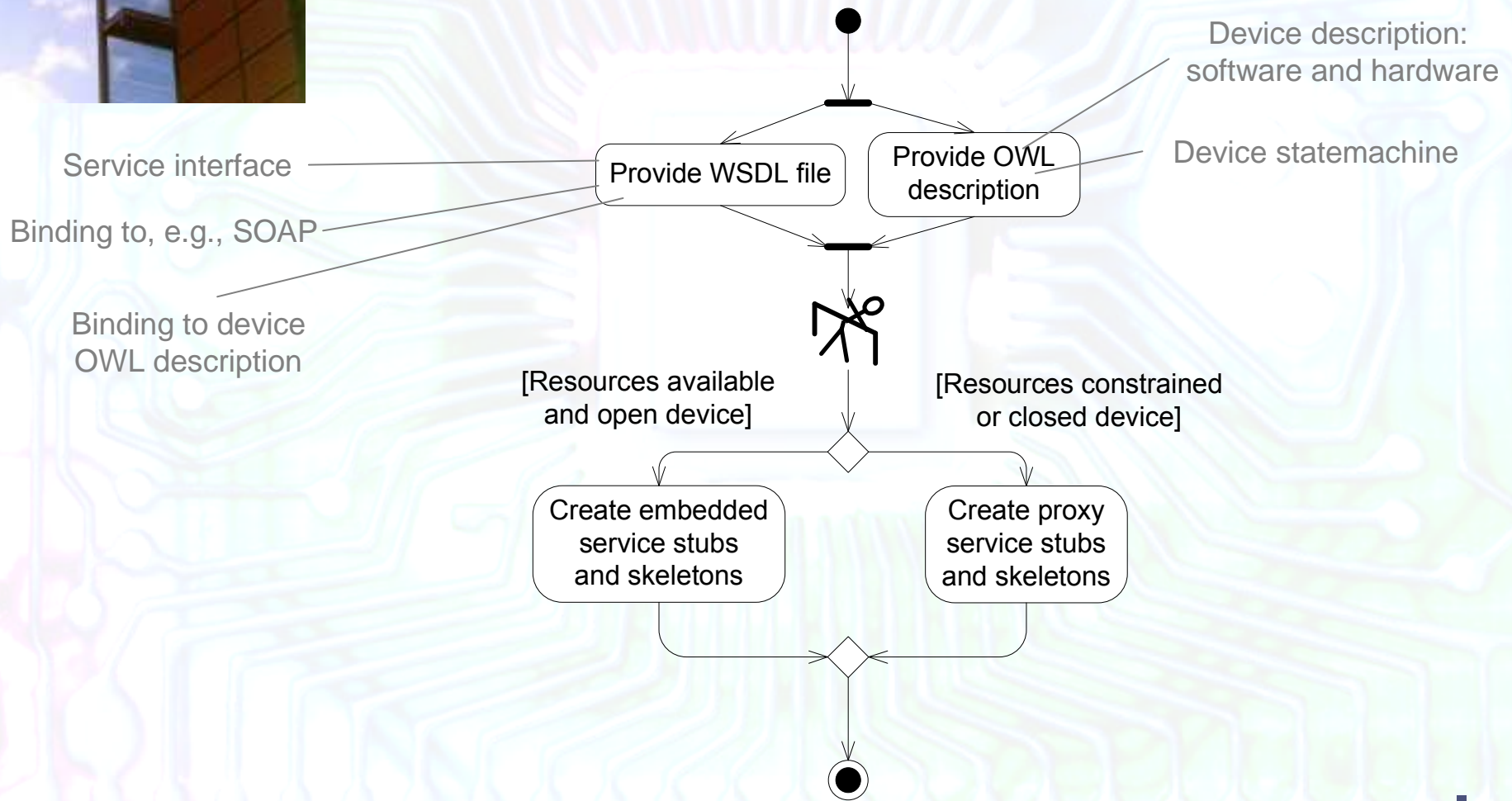
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Integration of devices using Limbo
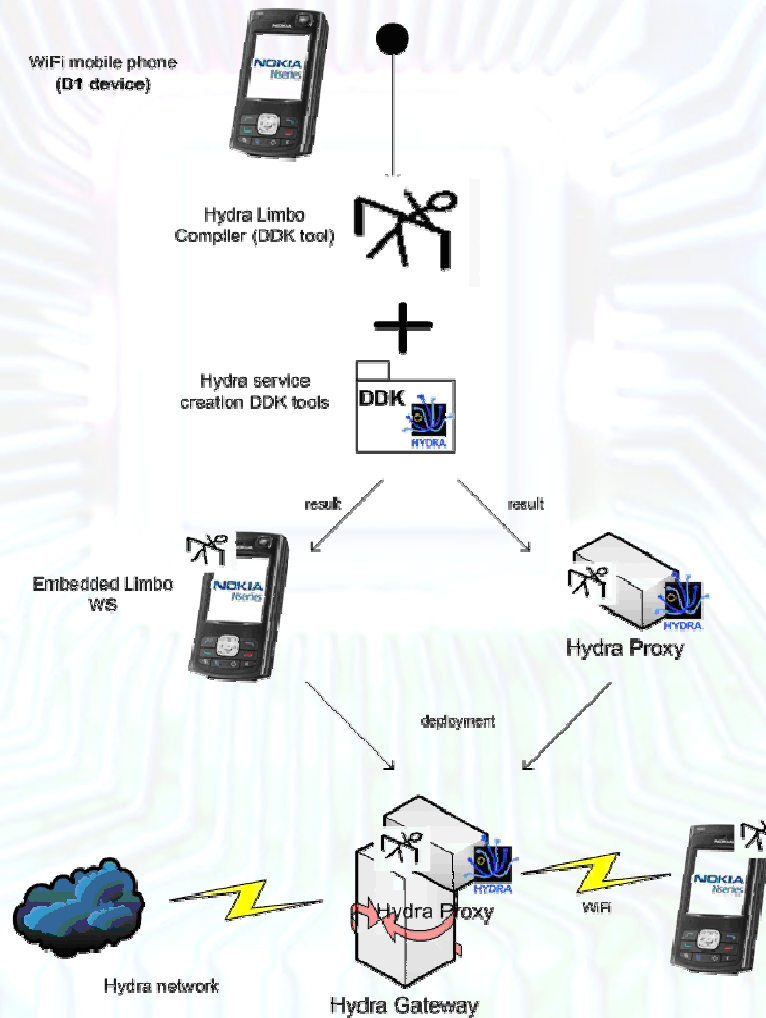
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Device Taxonomy

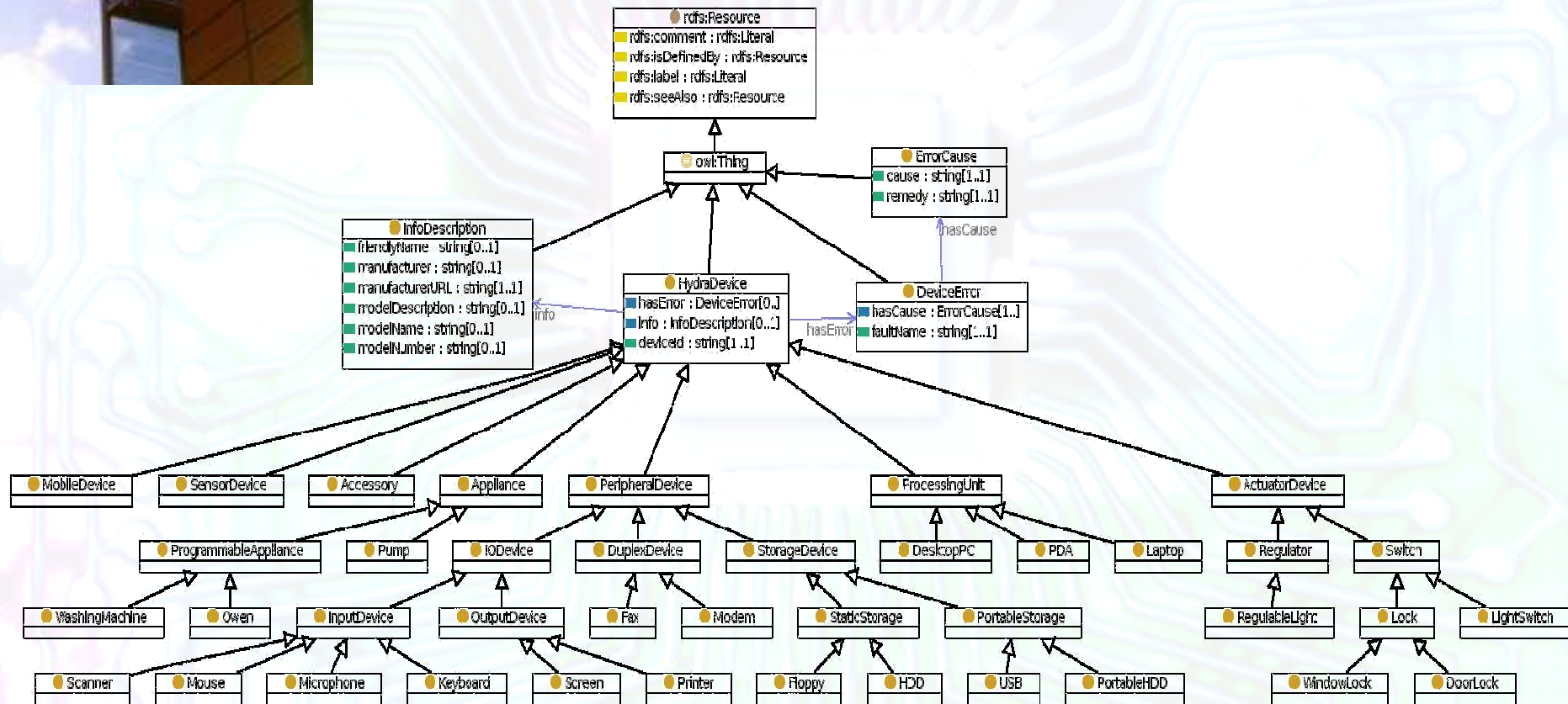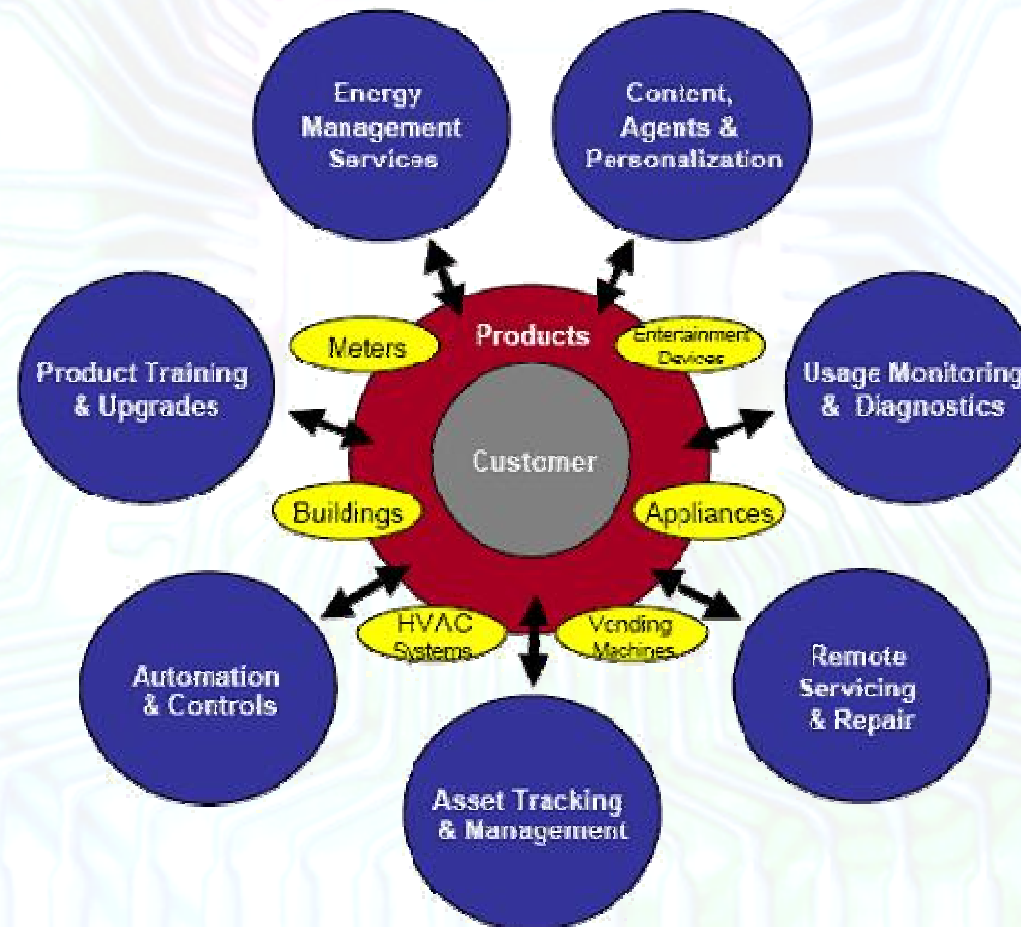**Hydra Training: Business Modelling**

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Towards Security, Privacy and Trust

- Context Security
  - Context information to enhance security mechanisms
  - Revealing only restricted data with changing identifiers
- Semantic Security Resolution
  - Bringing security to a semantic layer
  - Necessary to enable interoperability
  - High flexibility required
- Virtualisation
  - Separation between physical and logical representation of users, devices and services

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New value added industrial services

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Content, agents and personalisation

- By regaining interaction and control with customers, Ajax can manage and cater to the cultural, language, or usage differences in the global marketplace. They can thus ensure that their customers receive the same degree of service in the proper (self-chosen) cultural and linguistic context. They can additionally ensure that information on product upgrades, recalls, and maintenance is timely and properly delivered anywhere, anytime, as the customer may wish it.

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Usage monitoring and diagnostics

- New scenarios appear for Engineering Maintenance in relation with an improvement of the planning and of the provision of maintenance service. The opportunity of collecting and elaborating data from devices and applications would allow providing precise and updated information on performance measurements (e.g. availability, reliability, etc.), SLA compliance, product lifecycle, etc.

- Remote diagnostic technologies available with Hydra enabled devices allow Ajax to implement programmes for predictive maintenance which guarantee accurate monitoring of devices and installations, increase in productivity, and maximize the level of devices utilisation.

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Three opportunities for Ajax

1. Collecting and elaborating data from devices would provide plant operators with precise and updated information on performance measurements, SLA compliance, etc.

2. Product companies' employees will be able to remotely support and diagnose installations and repairs instead of using expensive field assets.

3. Remote metering has become an absolute necessity in the deregulated energy market, where costumers are constantly moving and require frequent, trusted meter readings for billing purposes.

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Remote servicing and repair

- Ajax can dramatically reduce intervention costs and customers' complaints by a continuous and remote monitoring of the installations. This can give birth to condition-based maintenance, an alternative to the classical, time driven approach.

- Instead of using expensive field assets (people, trucks, equipment) to fix a machine or device, Ajax employees will be able to remotely diagnose and order parts for repair, and in some cases, provide fixes without having to make a visit to a customer site. Also, they will be better able to apply employees with particular skills, languages, or schedules in a more effective manner for customers.

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Asset Tracking & Management

- The information associated with a product and its context can be as valuable as the product itself: e.g., its location, part number, where it was purchased, when it was installed, by whom, critical specifications, diagnostics, availability of spares, replacement alternatives, repair instructions, etc.

- Firms offering Asset Management services can offer serious business propositions with very high added value. Not so professional or inexperienced players can still get involved by teaming up with smaller professional players and offer bundled services.

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Automation and controls

- Building owners, supervisors and tenants need to be kept constantly aware of conditions within their physical space. They need to manage HVAC, security, lighting, fire, water, and other building systems in a coordinated fashion.

- These areas of responsibility are being met today through sophisticated building monitoring and control systems that let building operators know when and how resources are being spent. However, the challenge with existing systems is that they are not able to co-operate in an orchestrated way. Many users find that these systems do not give sufficient value for money, but by Hydra enabling devices, all control systems could be made interoperable and remotely accessible.

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Product training and upgrades

- The cost of installation and commission increases sharply with the increased complexity of the products, the globalisation of markets and the need for training of highly skilled personnel. Assisted installation and commissioning are important cost saving propositions for product companies.

- Using Hydra middleware, the technical experts from the company's headquarter can follow the installation process on display screens and participate in the virtual workgroup with auditory and visual advice and guidance. They can go through comprehensive tests and installation procedures with the technicians at the installation.

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Energy management and services

- As the world is experiencing a peak in energy prices and a continuing rise in the need for energy, the trend to enable the true "smart building" is becoming more and more obvious. Using Hydra enabled devices in combination with advanced facility management systems, data can be collected from a diverse set of building sources (e.g., HVAC, lighting system, elevators) and used for optimizing energy management and building automation requests. The facility management system aggregates and unifies the disparate information sources for trending, benchmarking, analysis, and decision-making.

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Business scenarios

Possible scenario, which could be a likely
implementation of the Hydra middleware

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Business scenarios for Ajax

The choice of service offerings - and the corresponding business cases - will be based on the following strategic business priorities:

1. Offering new service products to existing customers (remote access)

2. Focusing on creating economic benefits for service customers (predictive maintenance)

3. Enhancing customer retention through higher integration with service customers (service contracts)

4. Cost reduction in installation and training

5. Identify new business potential (remote metering) for new customers (utility company)

Agenda for day 2: Creation

- Actors and stakeholders
  - Identification of actors and stakeholders
- Working session I
  - Working session for analysing and conceptualising value objects, value ports and value exchanges
- Business modelling
  - Summary of work done so far – presentation in e3value
- Working session II
- Business modelling II
- Development of the business case

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Iterative business modelling

Moderated workshop under the management of an experienced moderator will analyse the business scenario and develop sustainable business cases:

1. Market segments and actors
2. Identification of value activities and value objects
3. Presentation in e3value
4. Decomposition and iteration - go back to 1

5. Development of business cases

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Iterative business modelling

Summary of work done so far – presentation in e3value

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Actors and stakeholders

- *Industrial Customer*
  - *Service contract customer*
- *Service Partner*
  - Local performer
- *Ajax Manufacturing*
  - Main actor
- *External Service Provider*
  - Facility Manager, service company
- *Utility Company*
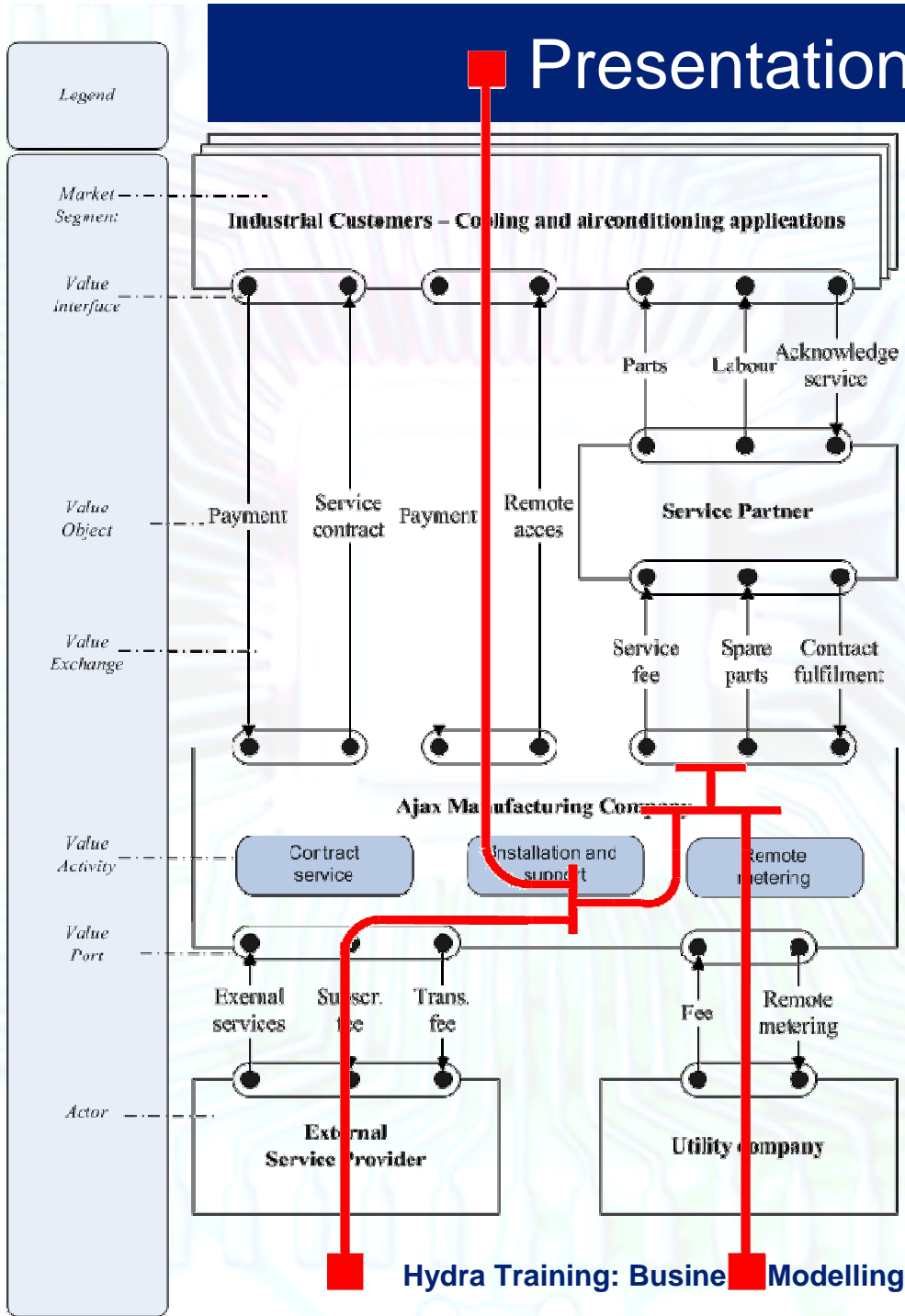 - New business opportunity!

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Value activities and objects

1. Remote access
2. Predictive maintenance
3. Service contract execution
4. Supported installation and training
5. Remote metering

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Presentation in e3value

Legend

Market Segment

Value Interface

Value Object

Value Exchange

Value Activity

Value Port

Actor

Industrial Customers – Cooling and airconditioning applications

Parts   Labour   Acknowledge service

Service Partner

Service fee   Spare parts   Contract fulfilment

Payment   Service contract   Payment   Remote acces

Ajax Manufacturing Company

Contract service   Installation and support   Remote metering

External services   Subscr. fee   Trans. fee   Fee   Remote metering

External Service Provider   **Utility company**

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Development of business cases

Conclusions

- **Globalisation and disruptive technologies requires creativity and innovation – in product development and in business processes**

- **Virtual markets (services, information, knowledge, life-style support, security) need a new paradigm for understanding and predicting business performance**

- **We need to look at value creation rather than business processes!**

- **The goal of a business is not to make something for customers, but to encourage them to take advantage of a multitude of offerings and hereby create value for themselves!**

- **Competition is no longer between firms but between offerings, which are, in turn, the result of cooperation between complementors**

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10 steps to sustainable business case

1. **Define the scenario and the scenario path(s)**
2. **Identify the actors involved in the business system**
3. **Describe the value objects, value interfaces and value exchanges that occur in the scenario**
4. **Create a value model and map out scenario paths**
5. **Select a viewpoint (global or detailed actor)**
6. **Calculate actor profitability sheets**
7. **Decompose objects and constellations to new propositions**
8. **Re-iterate value propositions until satisfactory value/profitability has been achieved for all actors**
9. **Develop a business process model on the value model**
10. **Derive and populate the business case with real elements**
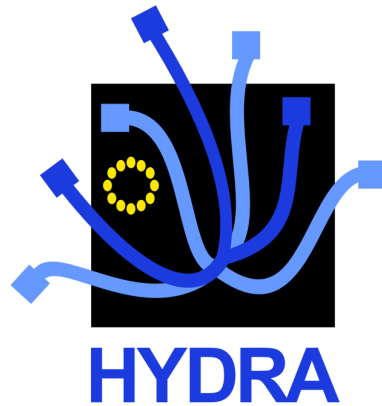
Conclusion on training

We hope you enjoyed this training session.

Please fill in the questionnaire & attendance list.

Any questions?

Additional Courses & Training material is available.

For further queries regarding the project please contact the project co-ordinator.

Thank You

HYDRA

Please come and visit us…

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JT1   You should replace this with your own organisation
            Jesper Thestrup; 20-06-2008