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HYDRA

Networked Embedded System middleware for
Heterogeneous physical devices in a distributed architecture

D12.7 Business modelling workshop teaching materials II

Integrated Project
SO 2.5.3 Embedded systems

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1. Introduction

This deliverable was intended as an update, if applicable, on the earlier deliverable D12.3 External Business Modelling Teaching Material. However, as the original has proven very successful in various training sessions, there is no new material on business modelling needed. Hence, the main content of the deliverable has not been updated. However, since experience has shown us that the concept of value nets have been difficult to understand for some trainees, two appendixes have been added with the intent of providing some more detailed (background) information on some of the more challenging and innovative concepts in this area. In particular, the differences between the value model approach and process model approach and the concept of value nets (not previously explored in D12.3) which feed into the concept of value constellations.

The appendixes are first of all intended to provide the trainer or moderator with some additional information but may also be used directly in a workshop or training session.

Readers familiar with the training content of D12.3 can skip directly to the appendix B and C.

1.1 Purpose and context of this deliverable

The training dimension of the Hydra project is essential to guarantee the project long-term impact and hence, several training activities have been planned. Some training activities are directed towards consortium members and offer inside training in use of technology and software tools. However, most activates are directed towards external target groups involved in embedded software architectures. The Hydra team will thus organise three seminars to train software architects, business development managers, etc. in relevant companies to learn how to think in terms of device networks and middleware.

The present training programme aims at providing the external stakeholders with a theoretical and practical foundation for performing business modelling in their own domain. Focus of the business modelling will be complex, multi-stakeholder oriented products and eBusiness services based on Hydra middleware components. The main focus of the training content will be in modelling business performance in end-user applications.

The training material will also be used for internal training courses for project team members in order to understand the dynamics and limitations of the ecosystem, in which the results of the Hydra project is going to be used. In designing and organising the external courses we will use the experience gained in the project internal training courses.

Hydra is committed to the production of professional course material in the form of interactive websites and other printed and multimedia material. This material will be derived from the project internal technical training courses. Furthermore, a comprehensive eLearning package will be developed based on interactive webcasting. Here too, use will be made of the material developed for and in the internal training courses and material developed in other projects.

1.2 Scope of this deliverable

This document is the "Business Modelling Workshop Teaching Materials II" which forms the deliverable D12.7 as part of the WP12. The document describes the process and the content of the training courses as well as the structure of the Hydra multimedia eLearning platform.

As noted above, this deliverable is an update of the existing deliverable D12.3 External Business Modelling Teaching Material, but since there is no update of the material (i.e. on the business modelling methodology itself) we have instead provided some more detailed information on the differences between the process model approach and the value model approach in Appendix B, as well as on the concept of value nets in Appendix C which may help to further the understanding of value constellations (explained in Chapter 5).

Chapter 2 provides a very brief overview of the Hydra middleware and why the business modelling framework is an important (and integral) part of the Hydra project outcome in order to provide

business managers with a tool to asses the novel services that can be developed using the Hydra middleware.

Chapter 3 focuses on the constructionist training methodology adopted by Hydra based on case-based learning and individualised and interactive learning using a webcast multimedia platform.

The practical implementation and content of the training session is further described in chapter 3, including a description of the webcasting platform to be used.

Finally, a case of training content is provided in chapter 5. The case is taken from the Building Automation domain, but similar cases will be developed later in the project for Healthcare and Agriculture.

2. Introduction to the training courses

2.1 Introduction to Hydra

Hydra is a middleware for building secure Networked Embedded Systems where diverse heterogeneous devices co-operate to achieve a given goal. It aims to hide the complexity of the underlying infrastructure while providing open interfaces to third parties for application development.

The Hydra middleware is based on a Service-oriented Architecture (SOA), to which the underlying communication layer is transparent. The middleware will include support for distributed as well as centralised architectures, security and trust, reflective properties and model-driven development of applications. One of the main advantages of Hydra middleware is that it will be deployable on both new and existing networks of distributed wireless and wired devices, which operate with limited resources in terms of computing power, energy and memory usage. It will allow for secure, trustworthy, and fault tolerant applications through the use of novel distributed security and social trust components. The embedded and mobile Service-oriented Architecture will provide inter-operable access to data, information and knowledge across heterogeneous platforms, including web services, and support true ambient intelligence for ubiquitous networked devices.

The physical outcomes of the Hydra project will be the Hydra SDK (Software Development Kit) which will be used by developers to develop innovative Model-Driven applications with embedded ambient intelligence using the Hydra middleware. Furthermore a Device Development Kit (DDK) will be provided that enables device manufacturers to produce Hydra-enabled devices. Finally, an Integrated Development Environment (IDE) will be provided.

2.2 Aims and objectives of the training

Since producers of devices are increasingly facing the need for networking in order to provide higher value-added solutions for their customers, the Hydra middleware facilitates application development based on value-oriented business cases, which allows the producers, in particular Small and Medium-sized Enterprises (SME), to rapidly develop solutions that are not only technically but also commercially viable.

Technical specialist, such as software and application developers, find it easy to envision scores of new functionalities and entirely new applications which can be developed with new software tools. However, the step from having a vision and innovative ideas to having a new product or service on the market is very wide and involves massive investments in product development, production planning, marketing and promotional material, training and education of sales forces; maybe even a new business ecosystem. Such step is not authorised by business manager unless the new product or service idea is a wrapped in a compelling business case. However, business managers often find it difficult to grasp the opportunities and threats of completely new technologies and completely new interaction procedures in hitherto unknown applications. Likewise, technology developers find it difficult to present their technological innovations in terms of economically viable services and ecosystems understandable to business managers.

To alleviate this situation 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.

As part of the project, the Hydra team has developed a business modelling framework for analysing the business sustainability of Hydra enabled devices and applications. New research has provided for the definition and measure of value creation in dynamic constellations based on Hydra middleware. This has in turn led to innovative business structures involving content providers, service providers, device manufacturers, and system integrators in collaborative efforts.

This training course aims to introduce this novel concept of business models and modelling tools to interested stakeholders in the business community. At the end of the course the learner will be able to know how to create and analyse the different types of business models, their objectives, how to apply them and what tools to use.

The training courses will be webcasts and made into an eLearning platform, contextualised with slides and downloadable training material. An interactive feedback and polling system will secure the active participation of the trainees.

The training courses will be conducted in three important business domains: Building automation, Healthcare and Agriculture, which will form the core of a case-based Hydra eLearning platform.

The training will help the trainees to:

- Describe what business relevant services and applications the Hydra middleware can provide – in terms of the overall framework as well as the individual functionalities - 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 value objects (new value offerings) and actors and analyse the value creation process arising from Hydra enabled applications and devices.
- Make informed judgements of the business potential of specific Hydra enabled devices and perform profit assessment for each actor.
- Create business proposals based on models of value creation and value exchange in Hydra enabled eBusiness services.

The training is thus directed towards the following target groups:

- Individuals interested to have a general overview of the business potential in Hydra middleware
- Business Development managers interested to have a first overview of the application of Hydra business modelling approach to their specific domain and the impact of Hydra technology in their products and services.
- Device Manufacturers interested to know more about Hydra regarding how Hydra will support their own business and create new business opportunities.

3. Training methodology

The Hydra business modelling training workshops will be oriented towards the business community, in particular Technology and Business Development managers interested to learn about the application of Hydra business modelling approach to their specific domain and the impact of Hydra middleware in their products and services. Another target group is Device Manufacturers, who wants to know about how Hydra can support their own business or create new business opportunities.

Since the business community is diverse and with very different background, the training content must be individualised to each situation based on relevant and adaptable case stories. Enabling the business community to use a mass-individualised learning tool means that learning will be efficient, user driven and adaptable to the individual organisation's or company's business profile.

The Hydra training approach will furthermore be geared to individualised learning processes that are independent of formal learning environments. Hydra training will facilitate the preservation of knowledge gained from the trainees' own business experience and make this knowledge interpretable and available in the new Hydra enabled contexts. We thereby aim to open doors to business exploitation of new and existing applications and devices that can extend the present business ecosystems of the involved organisations and companies.

Hence, the Hydra business modelling training methodology is based on technology enhanced case-based learning.

3.1 Technology enhanced learning

Today, many medium-sized and large business organisations place great emphasis on offering their employees competence development in the form of eLearning. The business organisations use their employee competence development polices strategically in order to both attract and retail high performers and reduce staff turnover. Among the reasons for offering staff extensive eLearning options, the organizations state that parameters like the following are of importance to them: knowledge-sharing and learning, networking, personal skills in combination with other training activities, new and dynamic initiatives in employee competence development, cohesion between different training programmes, leader involvement and career development.

When moving from paper based learning to using multimedia material, the learner is provided with a more direct link to the raw-data of the case, giving the opportunity to get a more refined and complex picture of practice. Also, technology enhanced role-playing and simulations will be used in conjunction with small case descriptions, where trainees act-out the roles in the case. This means a shift in the learning paradigm towards more action based objectives.

In order to promote eLearning opportunities, the Hydra training material is available online as a multimedia experience anywhere – anytime, based on streamed video in an interactive and shareable experience environment where Question and Answers will be supported and training documents will be available for download.

3.2 Case-based learning

Case-based learning is a clear answer to today's learning facilitation requirements: it is situational, problem-oriented, collaborative, analysis based and relevant for the learners. Case-based teaching has a constructivist and experiential approach to learning. The main advantages according to literature are that trainees: 1) Acquire knowledge when they analyse the case. 2) Actively discuss it with peers. 3) Increase understanding of ill-structured and complex situations. 4) Bring practice into the classroom relating the case to own work-experience.

The plan is to implement a Hydra multimedia training platform, which not only allows for individualised learning processes, but which builds on open and flexible tools, that can be utilised according to the situation in hand. The objective is to ensure a broad variety of case-tools that allow for a variety of case pedagogic to be carried out. The technology builds on well proven technologies in webcast streaming combined with didactic Question and Answer techniques.

The Hydra training platform supports development and facilitation of case content to be used in learning processes and allow individual learners to work with the case content in order to produce re-usable knowledge assets – either as new cases for other employees or educational planners to review, or to be used in general knowledge sharing concerning business modelling and value analysis within the organisation.

3.3 The Hydra multimedia eLearning platform

The core principle in the Hydra training is the establishment of a multimedia platform that allows for individualisation of learning processes, for information sharing and the capture of knowledge.

The multimedia platform will webcast live and archived training sessions on Hydra business modelling in different domains. Initially, three training sessions are planned, but as the training progresses into other domains, the webcast repository will act as a case repository for business cases of Hydra middleware deployment in a wide range of different business domains.

The training will be contextualised with timed slides presented during the workshop, and relevant teaching and reading material, which the trainee can download as the workshop progresses. Indexing of the workshop will allow the trainee to go back to a previous session to pick-up learning aspects or knowledge and thus radically enhancing the outcome of the training session.

Moreover, trainees may gather in groups to watch the webcasts together and form discussion groups on relevant topics covered by the training session. The platform allows the trainees to stop the webcasting to discuss certain aspects of the case, before resuming the transmission. Business development and technical development groups can thus collaborative work in the case environment and develop their own business models and cases in an interactive way.

Finally, interactive tools are provided for immediate feedback in terms of polls and surveys which can be contextualised. The Hydra multimedia eLearning platform thus not only facilitates information and knowledge about business analysis and development; but it also enables the learner to comment on the knowledge presented. This annotation and analysis opens doors to adapting the knowledge analysed and to using it in new contexts.

The multimedia platform enhances situational learning and learning that may be adapted to culture, situation and learner abilities. The platform facilitates learning at different levels – depending on learner abilities and backgrounds, learner needs in terms of analysis and annotation of knowledge – and it is directly related to the trainees' need for methodologies and tools for performing business modelling and business case development.

The Hydra multimedia eLearning platform will eventually develop into a case platform that integrates pedagogical and organisational approaches by drawing on the case format as its pedagogical tool and knowledge of business cultures and organisational development at the content level.

4. Content of training courses

4.1 Case based training sessions

Hydra has developed three training courses in which researchers, technology developers and business managers meet to exchange information and jointly analyse and develop realistic business models and business cases. These training sessions will initially be held in the three Hydra application domains: Building Automation, Healthcare and Agriculture.

The overall aim of the training sessions is to identify existing product and service business models deployed (either by purpose or inferred) in the organisation or in the industry at large and to analyse how new, sustainable business models can be developed based in the incorporation of the Hydra middleware.

The training sessions will focus on identifying actors and stakeholders, there value activities and how they demand, supply and exchange these value objects with each others. From this basis, various business cases can be developed using the Hydra business model framework and the e3value tool.

The training sessions take the form of moderated workshops under the strict management of an experienced moderator. It is preferable that the moderator is highly knowledgeable about the Hydra platform. If this is not the case, a Hydra expert should be present to provide the overview and to assist in the identification process.

The training sessions should be planned as at least 1½ days in order to allow for exhaustive discussions of the various aspects of the business models. It is important that the participants are completely excluded from interference and that they all participate from beginning to end. The latter is particularly important in cases, where the training sessions are being recorded as case material.

Further training sessions are foreseen to handle process modelling for incorporating new business activities in the organisation and price modelling, for bringing about the optimal price structure for new services. These subjects are, however, outside the scope of the present work.

4.1.1 Session execution

The training results are most effectively achieved by organising a moderated training workshop. The trainees would ideally be composed by a suitable mix from relevant target groups in the specific domain or organisation, i.e. software and senior technology developers and software architects, service managers, business development managers, financial strategists, senior managers, etc. The exact composition of the team of course depends on the organisation or domain in which the workshop is aiming.

The session starts with a presentation of the present ecosystem prevailing in the industry. It is then followed (or integrated with) a short, but insightful presentation of the main aspects of the Hydra middleware and how it can provide new business opportunities to the organisation, company or industry.

After the introduction, the participants start to discuss overall business ideas and possible new business proposition (if any) arising from the new functionalities. This section is intended as an unstructured brainstorming before a moderated approach is started. It should be limited in time and scope, so that it does not create apprehensions and false assumptions.

From this point on, the moderator carries the participants through the actual value based modelling work. From experience, it is discouraged to provide a formal presentation of the e3value method, since it can be rather theoretical for many participants. Rather, the moderator should highlight the main elements of value creation and value exchange.

First, the participants discuss and decide on a possible scenario which could be a likely implementation of the Hydra middleware, a Hydra provided application or a Hydra enabled device. The moderator leads the discussion towards early identification of all actors and stakeholders in the scenario.

When the scenario and actors have been identified and defined, the participants continue by discussing the various value objects that can be derived from the use of the Hydra middleware. It is important that all possible objects are identified at this stage, regardless of their likelihood to become viable business proposition. The value objects are also described in terms of how they can be delivered and by who (value ports).

At this stage, the moderator may break the participants into several groups. The next step is to identify the value activities for each actor leading to the existence of the identified value objects and to analyse the value creation for each actor. The aim is to define value exchanges that are overall profitable for all actors. This process requires decomposing of value activities and possible introduction of new value objects and even actors, and can in some cases be performed much better in smaller work groups.

When all value objects and value exchanges have been identified, a value model is built using the e3value tool and the results are analysed with respect to profitability. The e3value tool can be used by the moderator to enter work group results and provide rapid feedback regarding profitability.

At the end of the training sessions, the participants are requested to summarise the results of the modelling work into a concrete business case, which identifies products, markets, customers, distribution channels, etc.

A typical programme for the entire training session can be found in Appendix A.

4.1.2 Physical environment and requirements checklist

The following requirements apply to training sessions conducted in a physical environment.

The sessions should be held in a room with sufficient space for the participants to interact. If deemed desirable, further spaces for break-out groups can be required.

4.1.2.1 Modelling and presentation tools

There are no requirements for a special technology platform for the training sessions other than a normal PC with presentation software and a Java environment for running the e3value modelling software. The e3value tools is free to use and can be downloaded from www.e3value.com. There is also a Visio stencil for creating a graphical presentation of the business model.

Appropriate tools and forms for the business modelling group work should be provided. These tools consist of:

- A presentation PC with screen projector and PowerPoint presentation tools
- The e3value software installed on the presentation PC
- Optional internet connection
- Whiteboard with pens
- Optional adhesive cardboard idons (such as those used in Delphi sessions) to represent actors, markets, value activities, value objects, etc.

During the session, the moderator will use the presentation PC for introductions and presentations. The participants may use the e3value tool on the PC for simulations and to facilitate discussions. However, it is recommended to perform most of the discussions around the whiteboard.

4.1.2.2 Attendance tools

The names, functions, organisational affiliation, as well as contact details of each participant should be prepared for the contextualisation in the eLearning platform and made available for the other participants. Also, large name signs with affiliation should be provided.

A short bio of each participant must be furnished prior to the meeting for the contextualisation in the eLearning platform.

4.1.2.3 Questionnaire

A short Questionnaire to collect feedback from the user of the course will be developed. The intention of this questionnaire is to measure if the participants training objectives have been met. At the start of the training session, each participant is requested to fill in personal objectives in the questionnaire, which will be evaluated at the end of the session.

The questionnaire will further provide feedback in form of problems that have been identified in the execution of the training session and to collect suggestion and comments for future improvements and enhancements.

4.2 Multimedia eLearning sessions

Three Hydra case based training sessions will also be provided as an eLearning platform using contextualised webcasting techniques.

Using the eLearning platform, researchers, technology developers and business managers can set up their own business modelling sessions in organisations or firms, utilise the training content provided by Hydra and perform their own specific business modelling activities with the aim to analyse and develop realistic business models and business cases in their business.

The overall aim of the eLearning training sessions are to help the trainees identify existing product and service business models deployed (either by purpose or inferred) in the trainees organisation or in the industry at large and to analyse how new, sustainable business models can be developed based in the incorporation of the Hydra middleware.

The eLearning training sessions will focus on identifying actors and stakeholders, their value activities and how they demand, supply and exchange these value objects with each others. From this basis, various business cases can be developed using the Hydra business model framework and the e3value tool.

The eLearning training sessions take the form of training webcasts from physical session's presentations of the Hydra middleware and the value modelling methodologies

The training sessions can be carried out over several days and work sessions but should span sufficient time to allow for exhaustive discussions of the various aspects of the business models. It is important that the participants are completely excluded from interference and that they all participate from beginning to end.

4.2.1 Webcasting

The Hydra multimedia training platform will be based by an existing recording studio equipment and webcasting platform provided by the partner IN-JET. As part of its other service ICT offerings, IN-JET provides webcasting services for local government in Denmark. IN-JET thus possesses both recording and production equipment, which will be used for the multimedia production in Hydra. Hosting will be provided at a cost.

The webcasting equipment and software will be provided by IN-JET, but has originally been developed by the UK based firm public-i Group Ltd. for use as eDemocracy tools in local government.

The public-i system wraps functionality and context around the streaming media technology in a dedicated player, i.e. a web browser that contains multimedia content. By wrapping contextual information both textual and graphical - around the encoded live video stream, we are able to offer a far richer learning experience. The architecture is open, making use of web services and XML to facilitate data exchange. This means that it is simple to plug in 3rd party content and functionality as part of the eLearning platform. An example of the dedicated player is shown in Figure 1.

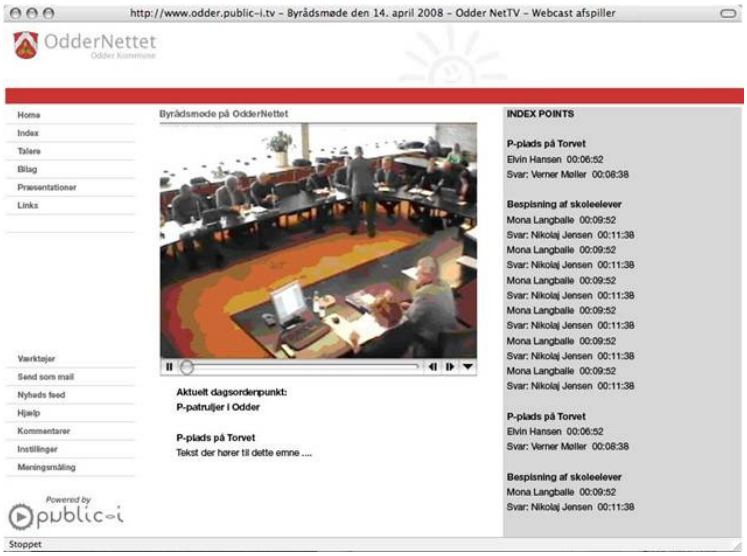

Figure 1 Example of contextualised webcast for eLearning

The system is based on a client / server architecture. The client encoder PC (provided by IN-JET) is used to capture and encode the training sessions. The encoded content is streamed alongside live contextual information such as slides, names and bios of the participants. Client encoder settings are synchronized with the central server database which stores all webcast and system data.

Unlike the majority of live webcasts that involve the use of camera crews to capture an event's content, the public-i system simplifies this process by the use of cameras remotely-controlled from the encoder PCs.

4.2.2 Multimedia eLearning environment and checklist

The following requirements apply to training sessions conducted in and on-line eLearning environment.

In order to provide a rich learning experience, it is important that a learning plan is created and the contextual information is provided before the training session starts.

The aim of the on-line training activities is to provide the three training sessions as the foundation for a case repository for business modelling and development of business cases using the Hydra middleware. Trainees are able to perform their own internal business modelling sessions using the techniques provided by Hydra eLearning platform.

4.2.2.1 Contextual information required

The contextual information required for a rich learning experience comprises:

- Indexation (timing) of the agenda items from the training session allow the learner to jump back and forth in the training. This is done semi-automatically by the operator during the recording.
- Slides used during the presentations shall be indexed and provided as contextual information, shown alongside the video/audio presentation and available for download.
- Additional material, text documents, graphics, etc. should be indexed to the agenda and downloadable

- Discussion between participants to be recorded and indexed with speaker names and profiles.
- Possible inclusion of the presentations of results from e3value to be integrated into the video presentation.

The contextual information will be created and uploaded to the public-i CMS system after the completion of the training sessions in the respective business domains.

4.2.2.2 Hardware requirements at trainee's side

The public-i system can utilise either of the two streaming media formats that dominate the market, i.e. Real Media and Window Media. For simplicity, the Hydra project has selected the Windows Media platform. However, this can be easily extended to Real Media in the future.

To participate in the eLearning programme, the learner needs an ordinary PC with Windows Media, a Java environment for running the e3value modelling software and Internet access (ADSL is recommended but ISDN and even dial-up modems are also suitable). The e3value tools is free to use and can be downloaded from www.e3value.com.

4.2.2.3 Modelling and presentation tools

To fully explore the potential of the eLearning platform, trainees should conduct their own on-site workshops, either concurrent with the webcast or immediately after a learning session. The webcast media allows the trainees to stop the learning program and carry out their own domain specific business modelling work before resuming the learning program.

Appropriate tools and forms for the business modelling group work should be provided. These tools consist of:

- A presentation PC with screen projector and PowerPoint presentation tools
- The e3value software installed on the presentation PC
- Internet connection to see the eLearning webcast
- Whiteboard with pens
- Optional adhesive cardboard idons (such as those used in Delphi session) to represent actors, markets, value activities, value objects, etc.

During the session, the moderator will use the presentation PC for introductions and presentations. The participants may use the e3value tool on the PC for simulations and to facilitate discussions. However, it is recommended to perform most of the discussions around the whiteboard.

4.2.2.4 Questionnaire and feedback

A short questionnaire to collect feedback from the user of the eLearning platform is provided with the webcast. The intention of this questionnaire is to measure whether the group's training objectives have been met. At the start of the training session, the group of trainees as a whole is requested to fill in group's objectives in the questionnaire, which will be evaluated at the end of the session.

The questionnaire will further provide feedback in form of problems that have been identified in the execution of the training session and to collect suggestions and comments for future improvements and enhancements.

A series of polls (simple trivia's) will be displayed during the training session to check, if the groups is progressing well.

5. Training case used in the workshop – Building Automation

The workshop material consist mainly of the moderator presentations and selected handout materials provided from *D10.5 Business modelling concepts* for the theoretical introduction to business modelling concepts and tools.

As the planned prototypes progresses and the scope of the applications that can be provided in each domain becomes more and more clear, the results of the work performed to develop business models and cases in these domains will be available for the training workshops. The results will be documented in the three deliverables *D10.6 Business models in Building Automation* (M32), *D10.7 Business models in Healthcare* (M26) and *D10.8 Business models in Agriculture* (M40).

The discussion between workshop participants and the interaction with the moderator are important elements of the eLearning platform for people that have not taken part in the workshop. This material will primarily be documented and made available in the form of webcasts. Learners will be able to customise the experience by selecting the precise aspects of the session which they find the most useful.

In this chapter we will highlight the main messages and content for each agenda item of the workshop. For a detailed description the reader is referred either to the PowerPoint presentations provided or to the original deliverable as referenced.

In order to provide case-based learning, we use a case to demonstrate the various aspects and content of the training sessions. It is up to the moderator to decide if an external case should also be used in the training session. This can be necessary if the participants come from many different organisations. If they all belong to the same organisation, company or even industry a more dedicated case can be developed.

For the present description we use a case from the area of Industrial Services, which is closely related to Building Automation. This case refers to a manufacturer of Building Automation components, which is contemplating Hydra enabling its products in order to be able to offer more value added services to the customers. Similar cases will be developed for the Healthcare and the Agriculture domains.

5.1 Brief introduction to business modelling

The full description of the theoretical aspects of business modelling is found in chapters 4 and 5 of the deliverable *D10.5 Business modelling concepts*. The following are the main points to be presented by the moderator.

In the last couple of decades, product companies have added numerous new business models to their business systems, such as supply chain management, service management and service level management, etc. These business models often introduce additional economic benefits into the value creation calculations, such as customer loyalty and customer retention, and lead to yet new models such as customer asset management and customer asset management of services, etc.

Common for most of these business models is the increased complexity compared to traditional business models and hence, the risk of loosing the necessary metrics for value computation, validation and evolution. Further, the business models tend to be relatively static (in time). With the introduction of new eBusiness concepts, completely new business models are needed to identify and explain dynamic value creation and to model the flow of products, services, information and resulting value between dynamically emerging constellations of stakeholders across the business system.

The basic questions to be answered in the business model are the fundamental questions of any business: What do we offer to the customer, who are they and how do we operate to deliver the product or service so that we can create a profitable and sustainable business? (Osterwalder et. al. (2005)) In other words, we need to identify and analyse the value proposition in the intended Hydra based e-service, to which customer group the service is targeted and how we organise ourselves to

deliver the service in the most efficient way. As we shall argue later, the order of which these three steps are performed have a great impact on the choice of modelling approach to be taken.

When the three questions have been answered, we can easily analyse the revenue streams and cost models and derive the financial return and thus evaluate the sustainability of the proposed business.

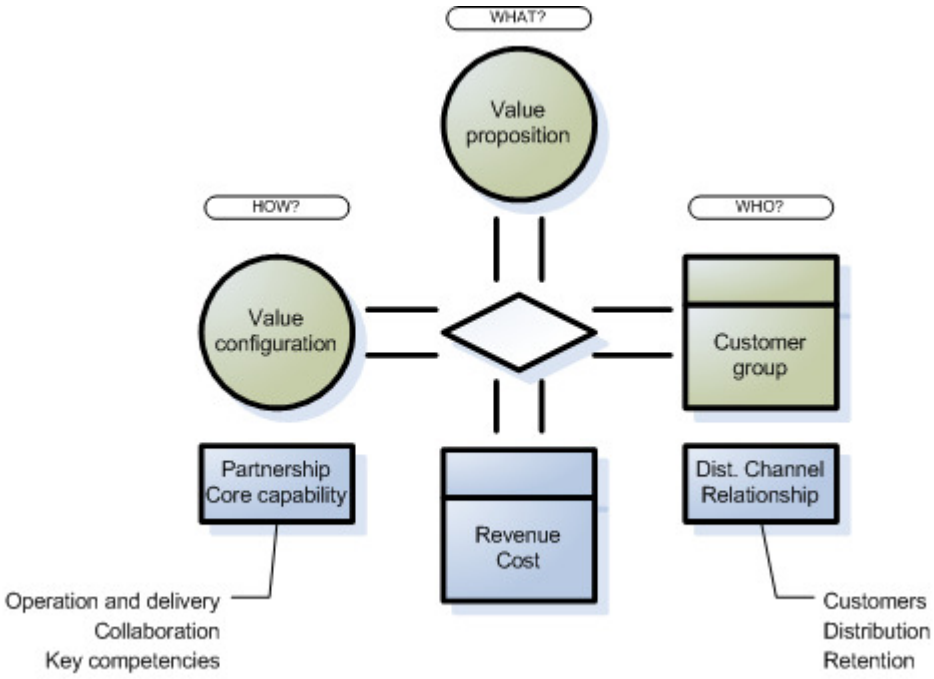

Figure 2 Fundamental elements of a business model

5.1.1 Business model architecture

The overall raison d'etre and description of a firm's or organisation way of doing business is described in its business strategy. The business strategy describes the firm's vision, objectives and goals and the methods and tools it will deploy in order to achieve these goals.

Ideally, the strategy does not describe in detail by which means (products and services) and for whom (customers and target groups) it will achieve its objectives. This information is added at the planning level. A firm separation of strategic and operational goals is the key to successful management of enterprises.

However, the changing business environment and global trends call for regular reality checks and revisions of the strategy. Especially the emerging technological trends in ICT calls for strategy revisions in many product oriented firms. Figure 3 shows how business models can assist the firm in effective implementation of revised or new strategies with focus on e-Business, by providing a conceptual architecture of the new strategy for subsequent implementation in the firm's business processes.

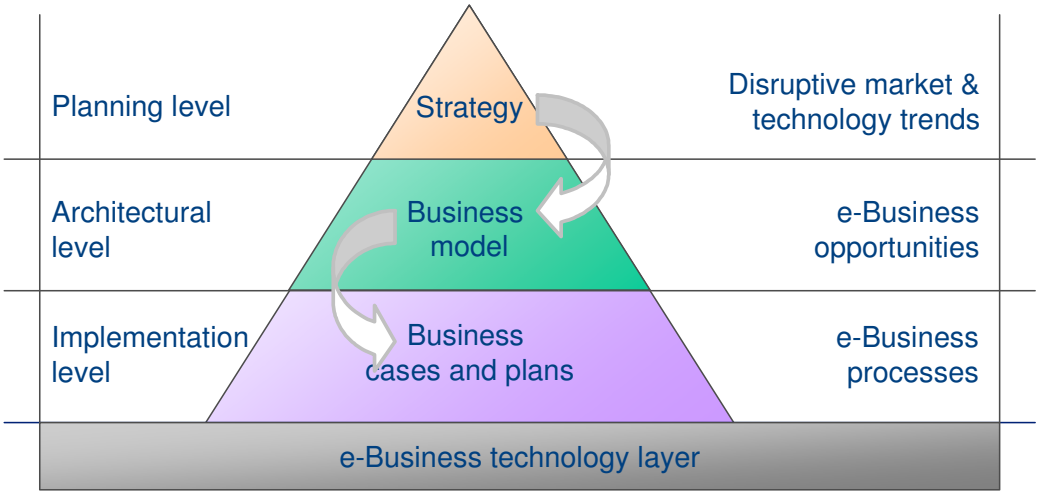

Figure 3 Business model as conceptual architecture

At the strategic planning level, the firm or organisation evaluates overall business opportunities and emerging trends in markets and technologies. With special focus on the emerging trends in disruptive ICT technologies for intercommunication and interoperability, the firm may to wish adjust its strategy accordingly.

However, before the strategy can be effectively implemented in the firm's business processes, opportunities and strength need to be analysed at the architectural level. Value proposition, customer target groups, weaknesses in core elements, such as resources, distribution channels, etc., must be identified and new ways of business interaction must be created and evaluated. This is the role of the business model. The business model allows for visualisation and evaluation of the e-Business opportunity, easy communication among stakeholders and rapid iterations and evaluation of different scenarios. Suitable modelling tools are essential for the successful and effective development of complex business models.

After the modelling has revealed the optimum business architecture for new e-Business products and services, the implementation phase can commence. First, the business model must be instantiated with the most promising combination of value proposition, customer groups, partner networks, etc. Founded in the firm's or organisation's overall strategy and adding the relevant industrial settings, other financial and market conditions, one arrives at a concrete business case for the new e-Business product or service, which can form the basis for a management decision to go ahead. The business case is easily implemented in the business process via a suitable business plan.

5.1.2 Business modelling approaches

The business model can take two very different model approaches: The value model and the process model (for further information on the difference between the two approaches please refer to Appendix B).

As the name indicates, value modelling focuses on value creation; how value is created, by whom and for whom. It is thus foremost a strategic tool with the aim of identifying new business opportunities and how the firm can position itself strategically to derive maximum benefits from new and emerging opportunities which may or may not require substantial redefinition of the enterprise infrastructure.

Process modelling is in many ways different from value modelling. Process modelling refers to business procedures of the same nature that are classified together into a model. One possible use of a process model is to prescribe how things must/should/could be done in contrast to the process itself which is really what happens. The process models are thus best suited to provide architectural overview in the implementation of business strategies in established infrastructures.

In this workshop we will confine ourselves to working with value modelling as the point of entry to developing business cases for such innovative business services as those developed on the Hydra platform.

Services based on functions provided by Hydra middleware can be seen as advanced eBusiness services delivering value to customers and other actors through electronic interchange. eBusiness is, in its simplest form, the conduct of business on an Internet based infrastructure. It is a more generic term than e-commerce because it refers not only to transactions of buying and selling but also servicing customers through electronic services and collaboration among business partners and mobile workers.

The purpose of the value model is to describe who exchanges objects of value with whom, while a process model describes the way a value model is put into operation: the activities needed, as well as their sequence, to create, distribute, and consume value. The concepts in a value model are thus centered around the notion of value, while in process modelling concepts focus on operational aspects of a process.

It follows from the basic human character that a sustainable business can only be built, if its transactions are creating true, lasting values. If there is no added value for the stakeholders, the business will eventually disappear.

The value modelling will be based on the e^3value methodology with a limited set of actor views.

5.1.3 Value constellations

According to Normann & Ramirez (1993), strategy is the art of creating value. In a competitive environment, strategy is no longer a matter of positioning a fixed set of activities along a value chain. Their focus of strategic analysis is not the company or even the industry but the value creating system itself, within which different economic actors – supplier, business partners, allies, and customers – work together to co-produce value. The key strategic task is the reconfiguration of roles and relationships among the constellation of actors in order to mobilise the creation of value in new forms and by new players (for more detailed information please refer to Appendix C).

As value is created within these complex constellations, competition is no longer between firms but between offerings, which are, in turn, the result of cooperation between complementors. The notion of offering now addresses this issue of value co-production. 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 new logic of value thus presents companies with three strategically important implications:

1. The goal of a business is not to make or to do something for customers, but to encourage customers to take advantage of a multitude of offerings and hereby create value for themselves
2. *Companies* do not compete with each other any more. *Offerings* compete for time and attention of customers. The notion of the company and/or supplier becomes secondary.
3. A company's principal strategic task is the reconfiguration of its relationships and business systems to align it with the new customer focus.

The concept "value constellation" replaces the value chain idea. One key word in value constellation is value co-production. Within this framework, it is not companies that compete with each other, but different offerings in terms of combinations of products and services. Value occurs not in a sequenced way but in complex constellations of different actors.

5.1.4 Value models

The purpose of the value model is to describe who exchanges objects of value with whom, while a process model describes the way a value model is put into operation: the activities needed, as well as their sequence, to create, distribute, and consume value. The concepts in a value model are thus centred around the notion of value, while in process modelling concepts focus on operational aspects of a process.

A value model captures decisions regarding who is offering and exchanging what with whom and expects what in return whereas a process model focuses on decisions with respect to how processes should be carried out, and by whom.

A value model captures other stakeholder decisions than a process model does. A value model shows the essentials (the strategic intent) of the way of doing business in terms of actors creating and exchanging objects of value with each other, while a process model shows decisions regarding the way a business is put into operation.

A value model predicts to which extent actors are profitable, and whether actors are willing to exchange objects of value with each other. A process models states which activities should performed, in which order, and which objects (in which order) flow between activities.

Finally, value modelling uses decomposition of value activities as a way to discover new profitable activities, where decomposition of activities in process modelling serves the goal of clarity, or studying various resource allocations (e.g. operational actors) to activities.

The e3value method was developed by the group of Jaap Gordijn at Vrije Universiteit Amsterdam (Gordijn, J. (2002)). The full description of the e^{3}value modelling tool is found in chapter 8 of the deliverable *D10.5 Business modelling concepts*. The following are the main points to be presented by the moderator.

The e3value ontology specifies generic terms and definitions for important concepts. It provides a vocabulary for the language used to handle information and operational data in Hydra scenarios. We use the ontology to describe concepts and relations between the many instances of data and relationships in a Hydra enabled framework, which makes up our value models.

5.2 The e^{3}value methodology

The e^{3}value methodology was chosen in Hydra as the method and tool to created value models. It is organized in three sub viewpoints each discussing related requirement types.

The global actor viewpoint

This viewpoint shows the *actors* involved and the *objects of economic value* created, exchanged, and consumed by these actors. It also shows the objects of value, which actors expect in return for an object of value delivered, or the mechanism of *economic reciprocit*y. Further it shows objects, which are offered or requested *in bundles* and *phenomena* that cause *exchanges* of objects between actors.

The detailed actor viewpoint(s):

This viewpoint shows the *partnerships* between actors when actors request or offer objects of value jointly, *constellations* of actors, which need not to be seen on the global actor viewpoint, e.g. to avoid unnecessary complexity plus *requirement expressions* as on the global actor viewpoint, but then only for actors expressed on the detailed viewpoint.

The value activity viewpoint(s):

This viewpoint shows the value-*creating or adding activities* and their assignment to actors. The main purpose of the global actor viewpoint is to explain the overall value model to all stakeholders involved. It hides complexity, which can be shown on detailed actor viewpoints.

The reason to include a detailed actor viewpoint is twofold: (1) representation of constellations: a decomposition of a part of the global actor viewpoint to reduce complexity, and, (2) representation of partnerships: actors who decide to offer and/or request products or services as one virtual actor to/from other actors. Finally, the value activity viewpoint is included to show what actors do to create profit or to increase value for themselves.

For more information on the method and its use, please see *D10.5 Business modelling concepts*.

5.3 Existing product and service value chains

Industrial services have traditionally been considered as "necessary add-ons" to the physical product: they have been centred on custom-design only in an initial phase and around the simple provision of spare parts in a second phase. This has changed a lot in the last decades: as Monitor (2004) underlines, there is a dramatic shift from "engineering and manufacturing companies" to "performance providers". Services have become powerful instruments to retain customers and to generate new revenues for component manufacturers.

Internet-enabling of industrial products are bringing huge business opportunities. Everything from a pump, a building, an industrial machine, and an office's thermostat will have the potential to be networked thus creating a huge network of interconnected devices. Product companies can use their devices to enter into a customer service relationship that increases both revenue and customer management. In many ways, the product companies can use the networking technology to reduce the burden of Asset Management and reduce the total cost of ownership for the end-user. But it may not be the end-users that initially have the most to gain from the networking. It can well be the businesses that support them. Product companies can use device networking technologies to reduce costs, reduce installation time, improve effectiveness, neutralise learning differences, bridge knowledge gaps, gain more customers, and pursue new opportunity areas.

Most product companies will thus soon realise that device networking isn't only possible, it's essential for their future business. Moreover, in a market where customers continuously ask for more complex and integrated services, it clearly results that these new applications and intelligent solutions can help to reduce the risk that product companies take by assuming a greater and greater management responsibility (from simple installation to global service).

In relation to the Hydra enabling of products, the manufacturer has decided to analysis the Industrial Service market, where the main actors to be considered are component manufacturers, building designers and planners, system integrators, facility managers and end-users/customers.

From a business perspective, the main difference between Industrial Services and Facility Management has really been the "management" element and the greater responsibility that goes with it. In this respect management shall be understood to include technical, work process and human resource issues and also legal, ethical, health and safety and social issues. The large number of value offerings that businesses and Service Providers may consider can thus be grouped in a structure as shown in the following figure:

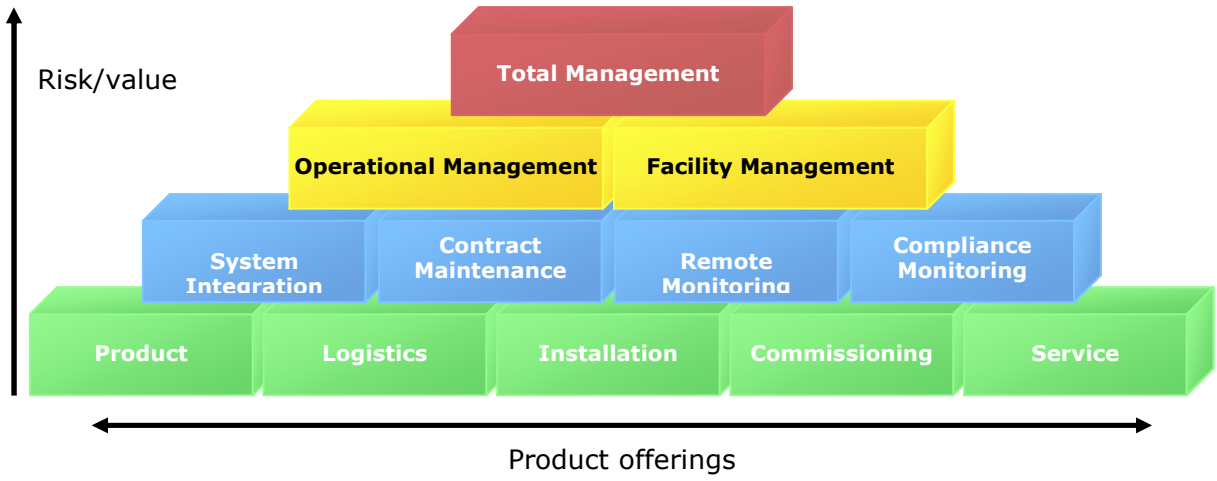

Figure 4 Risk and added value in product offerings

Traditionally, more involvement in management issues means greater value creation, but also greater risk. Firms need to balance the risks and the business opportunities stemming from the value creation process of assuming increasingly greater management responsibility (read: product liability).

Product companies traditionally initially expand their business horizontally at the lowest level. They provide logistics support for their customers, perform installation and commissioning of their products and offer various degrees of basic services. All of these offerings are closely related to the firm's own products and will not greatly increase business risks; neither will it add significant value to the business processes over and above keeping the customers happy and maintaining a competitive position in the market. Except for maybe the products themselves, companies may choose to provide any offering in co-operation or alliance with business partners.

When firms seek to go further in creating value offerings for their customers, it inevitably involves some degree of management and thus greatly increases responsibility and risk. "Operational Management", "Facility Management" and "Total Management" involves companies taking over large portions or even all of the management responsibilities previously vested with the owner and operator of manufacturing operations or process facilities.

Ajax Manufacturing Ltd. is a manufacturer of components for building automation such as coolers, compressors, valves, etc. Their traditional customers are building construction firms, design firms and engineering firms. Ajax enjoys a solid market position with very high market penetration in many countries. Ajax is also aiming at being a world-class provider of after-sales service by securing world-wide availability of service, organising training for customers, offering a wide range of flexible and targeted service and spare parts, giving prompt and timely assistance, being cost-effective, and operating a competent and motivated service team all over the world.

The Ajax company is represented in all parts of the world by own sales and service companies and Service Partners. In addition, the products are merchandised by distributors in a large number of countries.

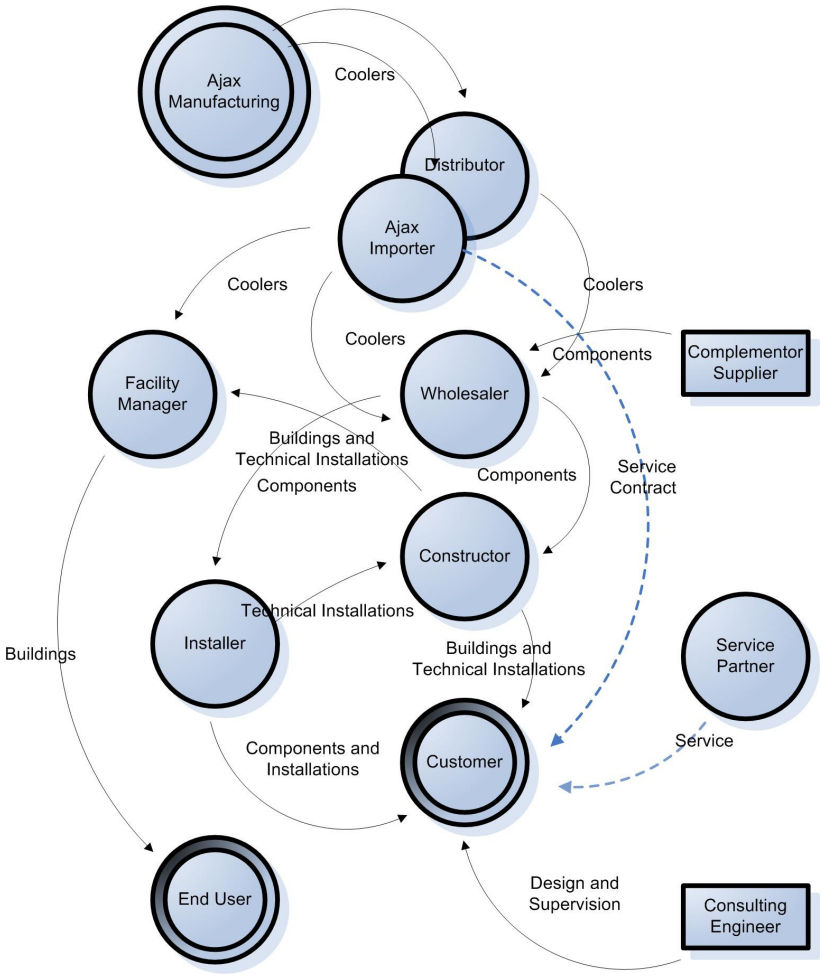

Figure 5 Case study: Ajax sales network

5.4 Main aspects of the Hydra middleware

Hydra is a middleware for building Networked Embedded Systems where heterogeneous devices co-operate to achieve a given goal. The Hydra middleware is based on a Service-oriented Architecture (SoA), to which the underlying communication layer is transparent. The middleware includes support for distributed as well as centralised architectures, security and trust, reflective properties and model-driven development of applications.

Middleware denotes 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 in support of the move to coherent distributed architectures, which are used 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.

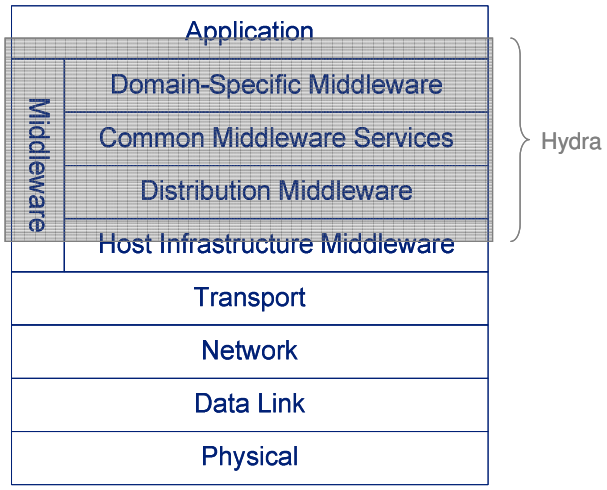

Figure 6 Middleware for Embedded Systems

The Hydra SDK (Software Development Kit) which will be used by developers to develop innovative Model-Driven applications with embedded ambient intelligence using the Hydra middleware. Furthermore a Device Development Kit (DDK) will be provided that enables device manufacturers to produce Hydra-enabled devices.

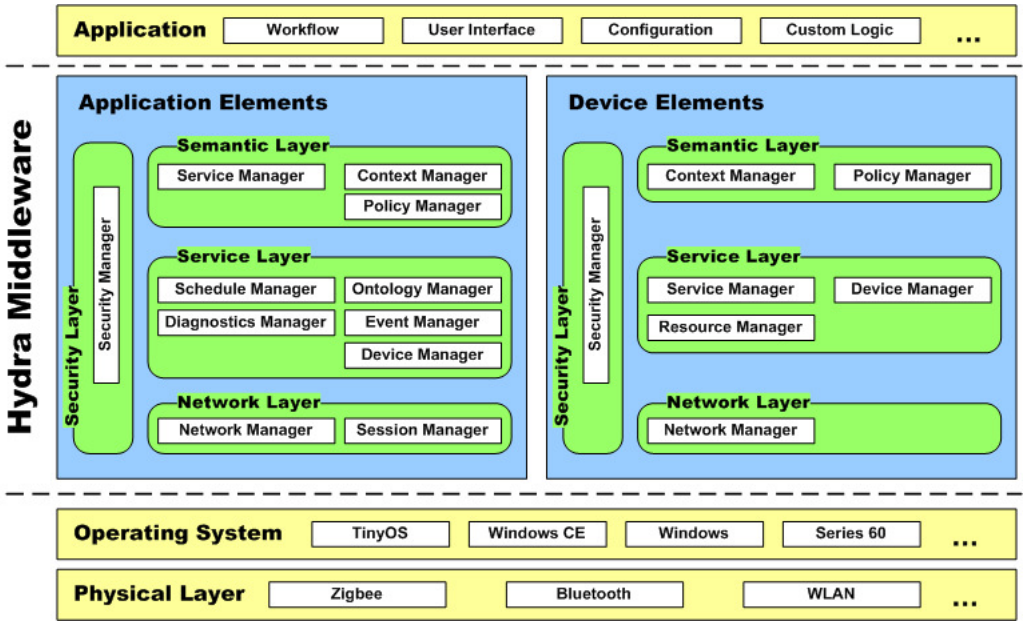

Figure 7: Hydra Architecture

The top level architecture view of Hydra is provided in Figure 7. It shows the different managers in the application view (Application Elements) and the device view (Device Elements).

The functions for each manager in both application and device elements are explained in various deliverables such as *D3.9 Updated System Architecture Report* and *D12.2 External developer's workshops teaching material*.

5.5 Business opportunities in Building Automation

One of the main advantages of Hydra middleware is that it will be deployable on both new and existing networks of distributed wireless and wired devices. The embedded and mobile Service-oriented Architecture will provide interoperable access to data, information and knowledge across heterogeneous platforms, including web services.

Let us now consider the case of Ajax again. By having remote access to their products, Ajax can begin to change the nature of their business. They will increasingly engage as information brokers and service providers. And they can start to offer a range of new services such as assisted installation and commissioning, remote diagnostics, repair and maintenance, energy management, asset optimisation, and information management.

Finally, Hydra enabled devices can also provide them with better information, such as usage tracking, for use in their future product designs.

Some of these potential services are categorised in the figure below:

Figure 8 New services from networked devices (Habor Research, (2001))

5.5.1 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.

5.5.2 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 (service Level Agreement) 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.

5.5.3 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.

5.5.4 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.

5.5.5 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 (Heating, Ventilation, Air Conditioning), security, lighting, fire, water, and other building systems in a coordinated fashion. Security systems and indoor air quality monitoring, temperature control, and energy management, will all contribute to a tenant's ability to create a certain kind of workspace and culture.

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. This means better product specifications, which can attract higher prices, and new, paid services.

5.5.6 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.

5.5.7 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.

5.6 Possible scenario – likely implementation of the Hydra middleware

Based on the above process description of the Ajax business model and the new business opportunities arising from Hydra enabled coolers, we will now choose and develop a scenario for a future business proposition. The aim of the business modelling work will then be to determine the details of the value proposition and develop a sustainable business case.

From a technical point of view, several e-services are easily envisioned based on the introduction of the Hydra middleware in Ajax' Industrial Services segment. Ajax already has a portfolio of strong service offerings that can be extended with new product specific offerings such as remote asset management, remote monitoring, and remote servicing. However, Ajax can also move to new types of services, which extends their business offerings either horizontally (extended products) or vertically (extended management). The choice is up to Ajax management, and the business models should provide alternative business cases and the financial implications.

The choice of service offerings - and the corresponding business model - will be based on the following strategic business priorities put forward by Ajax:

1. Offering new service products to existing customers
2. Clearly focusing on creating economic benefits for service customers
3. Enhancing customer retention through higher integration with service customers

Several additional services have already been indicated in the scenario "Beehive", which is described in *D2.1 Scenarios for usage of HYDRA in 3 different domains*. We will use this scenario to provide the foundation for the development of the business models.

The training participants, under the guidance and supervision of the moderator, will now develop and describe the scenario. The hypothetical case scenario that could be developed is presented in the following.

5.6.1 A new business model for the Building Automation sector

The business model has been developed based on the industrial market segment comprising customers, owners and users of Ajax components for cooling and HVAC applications. In this hypothetical market, the number of new installations and replacements annually is 6.000, of which 1,200 customers have opted for a service agreement with annual service calls and free spare parts.

5.6.2 Market segments and actors

The service contract is entered into by the *Industrial Customer*, but the service is performed by a *Service Partner* in the local area. *Ajax Manufacturing* is the main actor in providing high quality service to the customers, which is part of the company's overall strategy. In addition to providing the basic service and maintenance, Ajax Manufacturing has introduced network communication components allowing users as well as Service Partners and Ajax' own staff to remotely access the installations. Ajax is basing the remote services on the Hydra platform and has outsourced the operation to a facility manager called *External Service Provider*. As a by-product of the communication network, Ajax Manufacturing is now able to enter into new partnerships with e.g. utility companies, offering them remote access to energy consumption at the customer's installation. The *Utility Company* is therefore our final actor in the model.

In this way, the Ajax Manufacturing undertakes three value activities supporting the business model: Contract service, installation and service support, and remote metering.

5.6.3 Identification of value activities and value objects

The first extension to present Ajax service business case involves the introduction of a new remote monitoring service: the "Remote Access" value object. Customers, Facility Managers, and building owners with service contracts will be able to access the installation remotely and perform asset monitoring and control. They will be able to monitor early indications of breakdowns and thus reduce risk of down-time. They can also perform compliance monitoring and store the information for documentation to public authorities. The value object is closely related to the service contract itself and enhances customer loyalty and retention.

During an initial value model analysis it becomes clear that this value proposition is not sufficiently profitable to be sustainable. Consequently, we use decomposition of value activities as a way to discover new profitable activities, for instance to identify alternative assignments of such activities to actors. Actors with many value interfaces are good places to start looking for decomposing potential.

By using decomposition, we arrive at two new value activities. One value activity is concerned with the offering of service contracts. Another value activity is concerned with internal support for the field service technicians. Due to increased complexity of the installations, there is a strong need for service staff training. Not only the cost of education, but also the costs of supporting the service technicians during installation and commissioning and during actual service work are high. Having established remote accessibility to all installations, "Remote Access" can now be used for improving the value activity of "Installation and service support" leading to a substantial saving on service support costs.

Since the "Remote Access" value object is already being requested by all of the present actors in the scenario, we finally look at the possibility of introducing new actors with a similar value proposition. The "Remote Access" object can be used for high accuracy temporal data about energy supply and consumption. The Ajax installation becomes a component in the "Smart Grid" information network for energy distribution. Information becomes a commodity and Ajax now has a value object, which is of interest to a completely new actor in the scenario: The utility company.

Thus having identified a range of actors and described how they value various products and services offered by Ajax and its business partners, it is now the time to find out how these value objects can be turned into profitable business propositions for Ajax. In other word, which applications can Ajax develop and offer at what prices and in combination with which business partners. Due to the complexity of the business system, we will now develop a model, which allows us to quickly calculate the economical consequences of various business decisions.

By performing several iterations on the model, we should be able to determine the ecosystem that allows Ajax to present several sustainable business cases to management to justify the investment in the Hydra middleware development platform.

5.6.4 Presentation in e3value

Having developed the business scenario described above, the e3value tool provides the flexibility and easy to perform several iterations and present the results, both in terms of economic value and in terms of visualisation of the business ecosystem.

The value objects are well described and the interaction among actors is defined. Finally, the model has been used to calculate the profitability of all actors. In the case of Ajax, the resulting business case would look like this:

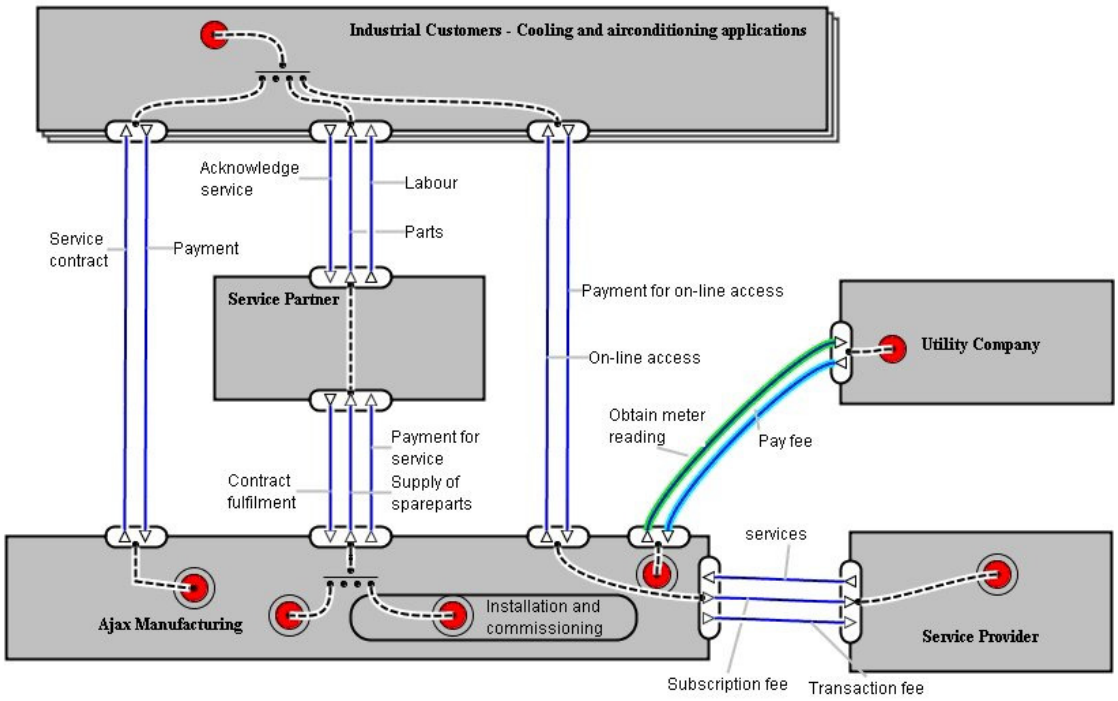

Figure 9 Ajax extended business case

The business case is based on an identification of value objects, value offerings and value exchanges.

The first value object consists of "Remote Access" to relevant data in the product. This value offering is requested by the Industrial Customer, Facility Manager or building owner, because it provides up-to-date information about the status of the installed assets, early warning of malfunctions and specific information on consumptions and other operational parameters. They will also be able to perform compliance monitoring and store the information as documentation.

The same value object is requested internally in the Ajax support organisation. It allows key technical support personnel to remotely diagnose and support field service workers directly from headquarters, without having to make visits to customers' sites.

Finally, the remote accessibility provides remote or automatic meter reading capabilities, a new commodity (or value object) which is being requested by various utility companies. Offering this information against a fee provides new influx of money into the business system.

An underlying service platform providing other Facility Management services is provided by an external Service Provider, who receives compensation in the form of subscription and transaction fees.

Most value objects are being exchanged via the Ajax actor. We have chosen this approach because it conforms to the fact that the investment in Hydra development tools is being undertaken by Ajax and the added revenues should flow into Ajax to provide the necessary cash-flow for payback.

However, it also implies that Ajax can block other service providers to get in direct contact with their customers. By being engaged in all parts of the exchange of value objects, Ajax retains total customer control and supports customer satisfaction, brand recognition and a high level of customer retention.

5.7 Development and write-up of business cases

After having performed several iterations with the e3value tool, the Ajax business case is now finished and can be written according to the standards used in the firm or organisation.

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7. Appendix A: Suggested programme for training workshop

Time	Subject	Topics to be covered	Time (mins)	Lead participant
DAY 1:	**ANALYSIS*: Existing and new business models, new opportunities based on Hydra***			
13:00	**Welcome**	Welcome & workshop objectives		Moderator
		Introduction to the workshop methodology		
13:15	**Business modelling**	Brief introduction to business modelling, dynamic value constellations etc.		Moderator
14:15	***Coffee Break***	Coffee and perhaps some biscuits		
14:15	**Existing business ecosystem**	Existing product value chains		All
		Existing service value chains		All
14:30	**Business opportunities**	Main aspects of the Hydra middleware and how it can provide new business opportunities		Moderator
		Discussion, ideas and analysis		All
15:30	**Business scenarios**	Possible scenario, which could be a likely implementation of the Hydra middleware		All
16:30	**Close of day 1**			
DAY 2:	**CREATION:** ***Actors and value objects, concepts, development of business case***			
09:00	**Welcome**	Welcome & workshop objectives		Moderator
09:15	**Actors and stakeholders**	Identification of actors and stakeholders		All
09:45	**Working session I**	Individual working session for analysing and conceptualising value objects, value ports and value exchanges		All (in groups)
10:45	**Business modelling I**	Summary of work done so far – presentation in e3value		Moderator
11:00	**Working session II**	Individual working session for analysing and conceptualising value objects, value ports and value exchanges		All (in groups)
12:30	***Lunch***			
13:30	**Business modelling II**	Summary of work done so far – presentation in e3value		Moderator
14:30	***Coffee Break***	Coffee and perhaps some biscuits		
14:45	**Business case**	Development of the business case		All
15:30	**Synthesis**	Formalisation of eBusiness model and case		Moderator
16:30	**Close of day 2**			

8. Appendix B: Value model approach vs. process model approach

The following example will visualise the different model approaches – the value model and the process model – and highlight the benefits of each method.

Assume the case of a company wishing to define a new product strategy based on emerging ICT technology (such as Hydra middleware). The new product strategy will require a radical improvement of the communication ability of its products and addition of entire new concepts of e-Business services to be added to the existing portfolio of physical products. The company has two strategic dimensions to address: The overall strategic fit, i.e. how does the new e-Business products and services fit the present strategy and how does it functionally integrate into the present infrastructure. This is exemplified in the two cases below.

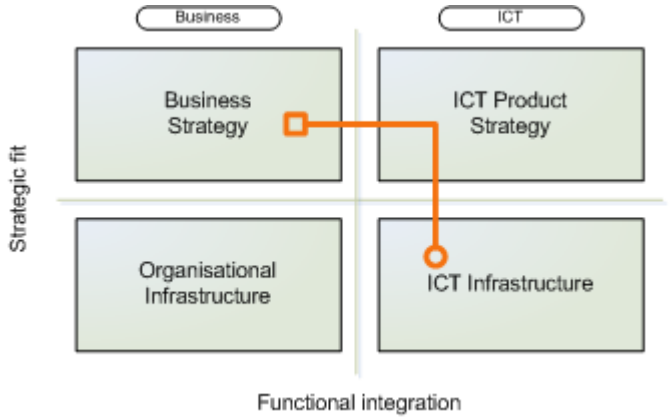

Figure 100 Value model approach

Using the value model view, the organisation will first define the new product strategy based on the emerging market trends and the company's overall strategy. The value modelling will identify the value proposition (e-Business service) and how it is delivered to the customer. It may also reveal the need for bundling of services and cooperation between service providers in the distribution channel. From these architectural requirements, the company can define the necessary ICT Infrastructure and derive needs for organisational and other infrastructure changes needed to support the new product strategy.

Value modelling is thus very suitable for engineering radical strategic changes including new product strategies and organisational infrastructures. However, it does not provide much help in defining the most optimal business process implementation.

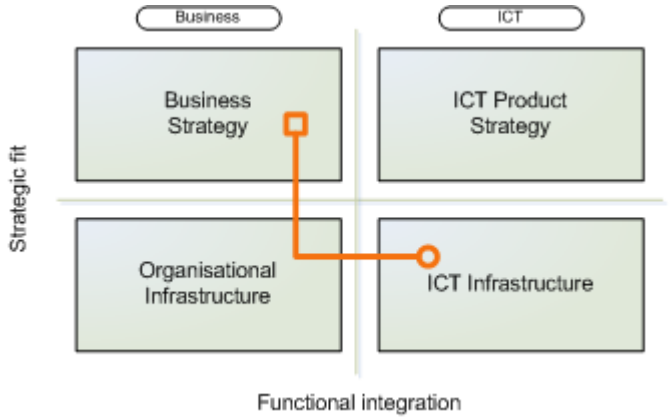

Figure 11 Process model approach

Using the process model view, the organisation will first look at the overall business strategy and the existing organisational infrastructure. From these starting points, the process model can be used to describe how the new ICT infrastructure shall be established to support the new strategic objectives in light of the boundary conditions provided by the new product strategy.

The process model is thus very suited to derive new product strategies given a certain overall business strategy and a well functioning organisational infrastructure. 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.

In either case the value model and the process model reveals only superficial information about the profitability (quantification of revenues and costs) of the proposed e-Business. In most cases the financial information can be very useful for evaluating and prioritising various instantiations of the model, but a serious analysis of revenue streams and pricing models and associated costs needs special modelling work. For this purpose, a series of revenue and pricing model methodologies exists.

The overall concepts and interrelationship of the various models is visualised in Figure 11.

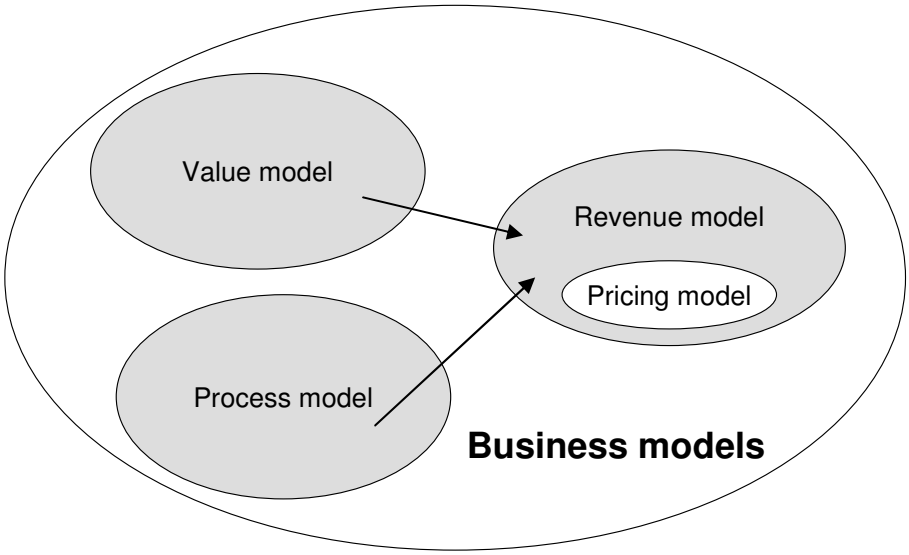

Figure 11: Relationship between business model, revenue model and pricing model

9. Appendix C: Value nets

The highly dynamic world of Internet services and e-Business, which began to flourish in the beginning to mid 1990s, needed a new value paradigm in order to fully capture and understand the value creation process in virtual markets.

Normann and Ramirez (1993) developed a value creating system concept by observing that new technologies are opening up new ways of creating value. They argue that value creation is the process of *co-producing* offerings (products and services) in a mutually beneficial seller/buyer relationship. This relationship may include other actors. In the value constellation relationship, the parties behave in a symbiotic manner leading to activities that generate positive values for them.

The actors came together to interact in a process of co-producing value and the concept of value nets was introduced by Brandenburg and Nalebuff (1996) where they asserted that business is simultaneously both competition and cooperation.

Business strategy frameworks must increasingly look to the role of *complements* in their product offerings. A player is a *complementor* if customers value hers/his product more when they have the other player's product than when they have the product alone. A player is a *competitor* if customers value hers/his product less, when they have the other player's product than when they have the product alone.

In value nets, customers and suppliers play symmetric roles. Mistreating the supplier when serving the customer can destroy value instead of creating it, i.e. suppliers are needed for serving customers. Competitors and complementors play mirror-image roles. A single company can be a competitor in certain instances and complementor in other (e.g. emerging vs. mature markets).

Whereas competitors divide markets, complementors help to create or grow markets (in emerging markets most participants are complementors). With the emergence of Ambient Intelligence networks and global connectivity, a new paradigm has evolved where information, connectivity and time define new business opportunities. Information is richer in quality and quantity, promoting collaboration among actors.

The end results are highly competitive environments where rivals can emerge overnight from unexpected places, such as traditionally non-competing industries.

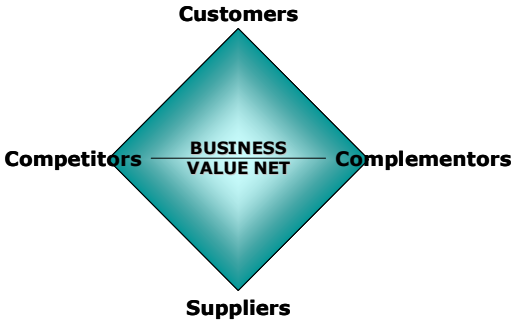

Figure 123 Business value net

The existence of Hydra middleware will enhance business dynamics and make the collaborative value inherent in co-operation more necessary than ever.