ManuBuild
Open Building Manufacturing

European Integrated Project on Industrialised Construction

Dr Samir Boudjabeur
Corus RD&T
ManuBuild - Vision

The vision of ManuBuild is **open building manufacturing**, a new paradigm for building production and procurement by *combining* highly efficient **manufacturing techniques** in factories and on construction sites *and an open system* for products and components offering diversity of supply and building component configuration opportunities in the open market.
ManuBuild - Objectives

“To develop a ManuBuild System that will be used to produce uplifting, sustainable and cost-effective customer-oriented building through radical integration and industrialisation of the design, production and delivery processes as well as greater integration and involvement of the customer; helping them to determine the shape of function of their development.”

- Construction costs reduced by 50%
- Construction time reduced by 70%
- Work related accidents reduced by 90%
- Affordable customised and flexible buildings
- Architecturally rich & sustainable communities
- Diversity of plug and fix components
The ManuBuild Open Building Manufacturing System is an integrated system that holistically incorporates Building Concepts, Business Processes, Production Technologies and ICT Support as well as Training and thus enables future construction to act as a flexible, agile, value-driven and knowledge based industry and most of all to be highly customer-centric, efficient and competitive.
ManuBuild - Open System

- Building construction as a knowledge-based industry
- Open system: products + process + production + ICT
- Effective production and open system combined!

Advanced house manufacturing
Ship building
Prefabrication in construction
Open building
On site production & assembly
On site craft work

Car industry

Closed system
Open system
Transition and targets
from Current State to Future State – via ManuBuild System towards Vision
Work Programme Structure

WP11. Management

WP1. Stakeholder requirements

WP2. Building concepts
WP3. Value driven business processes
WP4. Ambient manufacturing methods
WP5. ICT support

WP6. Integration

WP7. Exploitation

WP8. Demonstration
WP9. Dissemination
WP10. Training

Industrial & societal needs; State-of-the-art; Technological opportunities

Exploitation by partners; Transformation of the industry and breakthrough
ManuBuild - Approach

- Building Concepts
- Business Processes
- Production Technologies
- ICT Support
- Demonstrations
Design Process Production ICT

Develop and introduce concepts, rules and new products for building design for manufacture employing a system engineering approach,

- Customer choice and design flexibility through lifecycle
- Design for living
- Design for manufacture
- Openness to multiple sourcing of components
- Principles and rules of open systems
Develop and implement a new value driven business process specifically for open building manufacturing and the indicators to measure the efficiency of the process.

- New and value added process and organisations that integrate the key players
- Organisational concepts and models to support the integration of the customer
- New services covering the whole life cycle of buildings from design until demolition and recycling.

Business Processes + Organisational Models + Service Models = MBM
Integrate and develop technologies and methods new to the construction industry for flexible, value added manufacturing and assembly processes

- Off-site manufacturing and pre-assembly: highly flexible, scalable, efficient, and automated manufacturing methods and systems
- Mobile factories: concepts for portable/mobile factories that will bring efficient manufacturing and pre-assembly operations to building sites
- Logistic solutions: for efficient and lean handling and on-time delivery.
New integrated ICT infrastructure and key tools to support distributed building manufacturing with seamless information management and delivery.

- A tool that enables the ManuBuild process where the customer, developer and manufacturer are linked.
- Customer-oriented design and configuration
- Market analysis and new product development methodology
- Model-based, site logistics and assembly planning.
Work Package 5 – ICT Tool

Software tools to capture customer requirements and market demands.
ICT Vision & Strategy

Legend:
- Out of scope
- ManuBuild

Impact:
Customer centric, knowledge based collaboration

ICT support

Take-up
- Construction sector
- Software developers

Application tools
- Technology providers

ICT infrastructure
- Standardisation

Standards

Demonstrations
- Out of scope
- ManuBuild

Design (CAD)
- Out of scope
- ManuBuild

Model server
- Out of scope
- ManuBuild

Data model (IFC)
- Out of scope
- ManuBuild

Learning courses
- Out of scope
- ManuBuild

Configurators
- Out of scope
- ManuBuild

Training simulator
- Out of scope
- ManuBuild

Analysis, simulation & visualisation
- Out of scope
- ManuBuild

Production planning & control (ERP)
- Out of scope
- ManuBuild

Logistics & assembly planning
- Out of scope
- ManuBuild

Impact assessment
- Out of scope
- ManuBuild

Impact
- Customer centric, knowledge based collaboration

Impact:
Customer centric, knowledge based collaboration

Consortium © 2006
Realising the Challenge for Flexible and Open Building Manufacturing

- Novel open system and European-wide standard for buildings: modular, cheaper and faster manufacturing and assembly, future expandable and open for modification,

- New value driven business models and processes: focus on customer and community perceived whole life cycle value, and involvement of stakeholders in planning, design/configuration, customisation, delivery and service of individual buildings,

- New ambient and scalable technologies and methods for manufacturing and assembly: efficient, flexible, fast, safe, healthy and environment-friendly,

- New ICT methods and tools: full integrated support throughout the whole life-cycle for customer, community, suppliers and manufacturers.
Target system

**Building concepts**
- LC guides
  - Principles, rules & instructions
  - Architectural & spatial typology
  - Configurable building templates
- Key products
  - Smart components
  - Multifunction modules
- Connections
  - Standardised
  - Flexible

**Business processes**
- Value management
  - Performance metrics
  - LC assessment and optimisation methods & tools
  - Visualisation & decision support methods
- Process models:
  - Process modularisation
  - Whole life services
- Site production
  - On-site logistics
  - Radip assembly methods

**Production technologies**
- Fixed factories
  - High volume production of integrated modules
- Mobile factories
  - Manufacturing and assembly of pre-fabricated parts and systems

**ICT support**
- Open ICT system
  - ICT architecture
  - Standard interfaces
- Critical ICT tools
  - Market assessment
  - Intelligent product catalogues
  - Customer oriented configuration design
  - Distributed logistics & assembly planning

**Implementation support**
- Training & Education
- Standards
Demonstrations

Validate results and key scenarios using real and full-scale buildings

- Madrid
- Sweden
- UK
ManuBuild - Summary

ManuBuild is an integrated project on industrialised construction and forms part of European Framework 6 with 10 M€ EC financial support

- **Vision**
  - Transformation of building construction into a knowledge based industry.
  - Open system: Building + Process + Production + ICT

- **Focus & approach**
  - Open building system concepts
  - Value driven business processes
  - Ambient manufacturing methods
  - ICT enablers
  - Demonstration in full scale building projects in Spain, UK and Sweden

- **Duration**
  - April 2005 – March 2009

- **Consortium**
  - 24 partners from 10 European countries.

- **Web site**
ManuBuild - Keeping in touch

2nd International Conference

The Transformation of the Industry:
Open Building Manufacturing

April 2009

Community of Interest
http://www.ManuBuild.net