Selvaag BlueThink

Design Power

Automated Residential Building Design –

A Solution for Rebuilding the Gulf Coast?

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Where the Best Get Better –

FIATECH's Annual Technology Conference & Showcase

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Design Power Inc.

- FIATECH member, Primary focus: Design Automation
- Rule-Based Design Automation Platform Design^{++}
  - Reduces Design Automation effort with 70%+

  Success examples:
  - Robertson Ceco
    - Automated engineering and detailing of 7,000+ buildings/year
  - Selvaag BlueThink: presentation to follow
- PlantWise: Design^{++}-based Plant Concept Modeler

  Success Examples
  - Fluor: 0% review better than 50% review used to be, optimized layouts, reduction in project costs.
  - KBR: Conceptual models in half the time allows clients to consider more options.

Rule-Based Design Automation

- Makes knowledge active
- Equalizes on/off shore productivity, accelerates delivery, reduces errors.
- Automates in-house engineering/design process while coordinating use of “best-of-breed” solutions
- Stems knowledge migration & knowledge dissipation
- Keeps learning & knowledge creation in-house.
- Makes knowledge persistent and cumulating.
- Protects company’s intellectual assets

The Selvaag Group

Selvaagbygg

Selvaag Invest

Selvaag Forvaltning

Selvaag Eiendom

SelvaagHus

Selvaag Gruppen

Selvaag Pluss

Selvaag BlueThink

City Self-Storage

Strategic ownership

Selvaag Creo

Selvaag SpinOff

Book equity	**USD 725 million**
Revenue	**USD 160 million**
Employees	**approx. 520**

Selvaag BlueThink…

- creates **computer based tools** that will revolutionize building industry processes
- develops methods and tools which prevent errors from being repeated by collecting, archiving, activating and automating **construction knowledge**
- provides methods and computer tools which facilitate an **industrial approach** to construction

The industry challenge

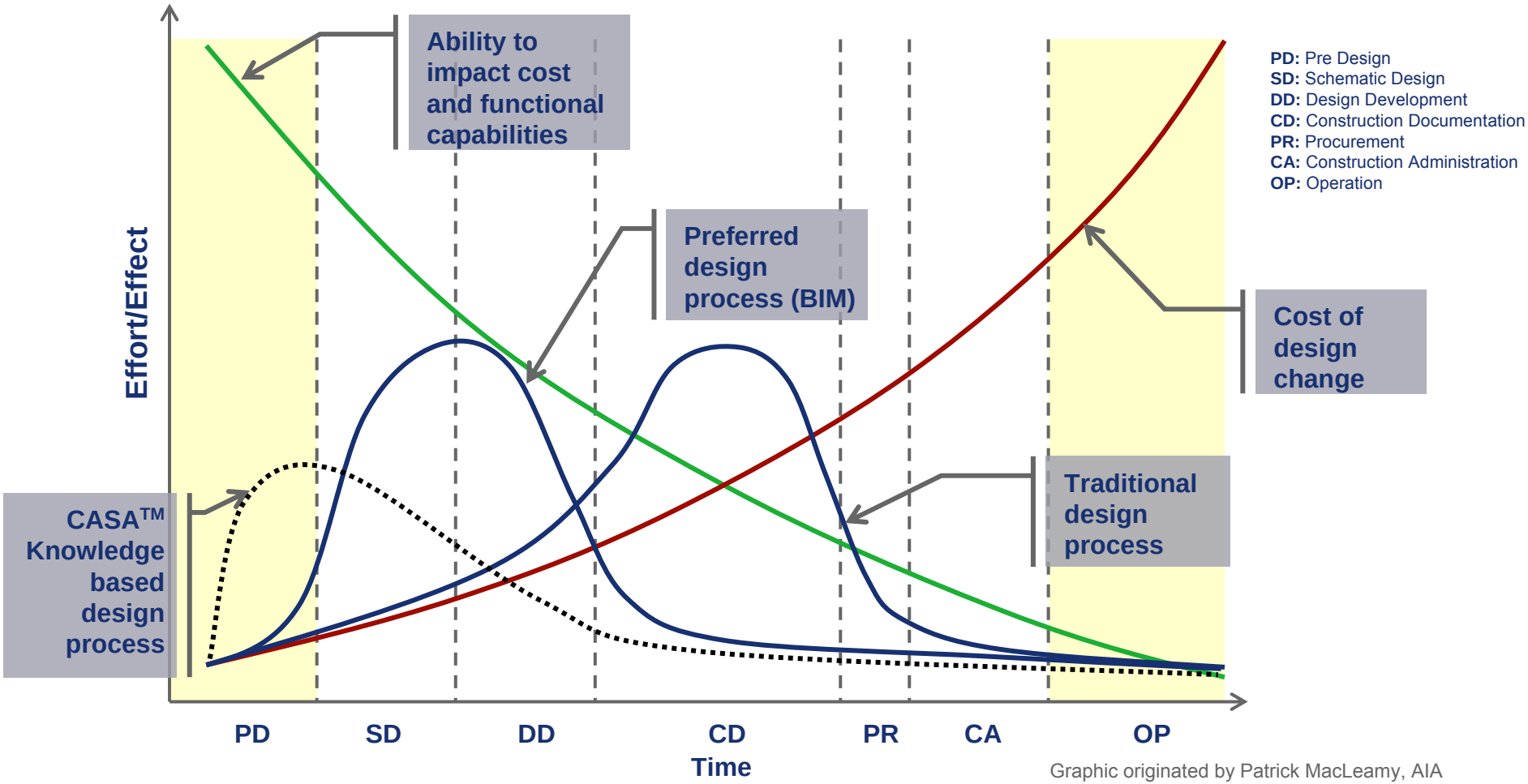
- Complex processes with many decision points
- Many parties involved (authorities, owners, builders, customers, FM)
- Compressed phases from design, engineering, contracting to construction
- High information load and transaction rate
- Paper-based information handling
- Information inconsistencies between phases and actors
- Uninformed and sub-optimal decision-making
- Expensive validation and risk avoidance processes
- Re-work, change order, and warranty costs due to wrong or inconsistent information
- Immature experience recording systems
- Project by project development migrates to erroneous solutions previously abandoned
- Unconsolidated changes in ”random” processes introduces new errors

- **THE GULF COAST REBUILD CHALLENGE**
  - **Large scale, short time, lack of resources and infrastructure**

What can we do?

- Share information rather than exchange information
- Focus on information content rather than information liability
- Share information to share risk – keep the lawyers away
- Share intents through multidisciplinary and collective decisions
- Learn from experience
- Re-use knowledge
- Consolidate information models
- Provide sustainable information management
- Enhance 3D BIM benefits for agreement and understanding
- Decide early and “keep to it”
- Automate

Improved design process



Graphic originated by Patrick MacLeamy, AIA

Decision empowerment through use of KBE* technology

* KBE – Knowledge Based Engineering

- Provides
  - Structured knowledge management
  - Re-used experience
  - Knowledge activation by rule inference
  - Handling of combinatorial complexity from functional intent, constructability, aesthetics, regulatory requirements, etc.
  - Decision support by generative (suggestive) and validating rules
  - Rapid exploration of many alternatives
  - Super-BIM capabilities
  - Design-build process change – information rich decisions made early
- Requires
  - Knowledge and experience acquisition and management tools
  - Digital information model - ontology – building information model
  - Integration of building information - IFC
  - Design-build process change – decision loyalty

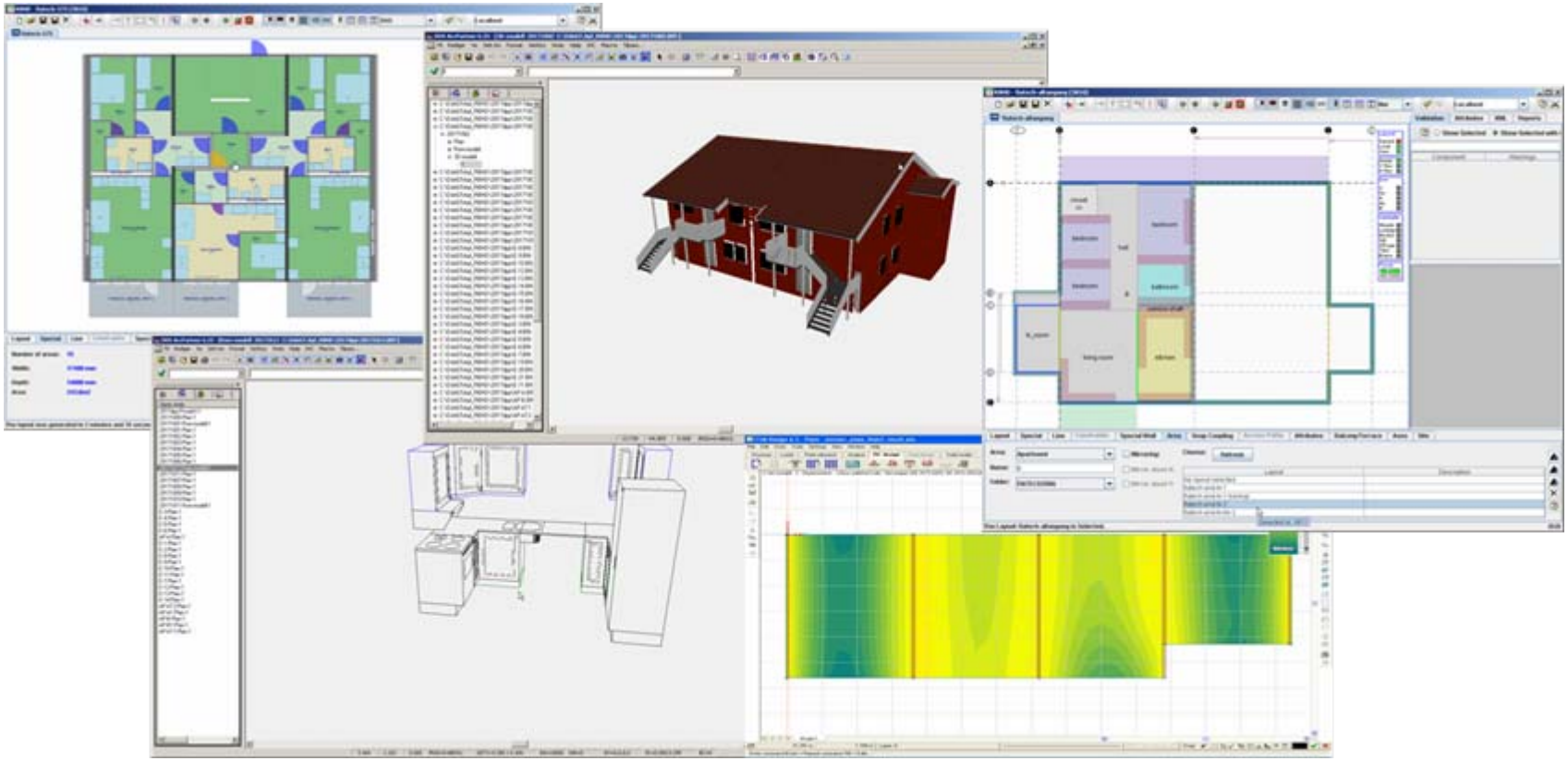
CASA™ Knowledge Suite

● Early, consistent decisions ● Active knowledge management ● Managed products and recorded experience ● Industrial, repetitive products and processes ● Digital, complete and consistent information

CASA™ Designer

- Users
  - Architect
  - Construction engineer
  - Owner
- Functionality
  - Decision support
    - Creative workbench
    - Functional intent directed design
    - Automated solution generation
    - Optional mix of rule sets
    - 3D visualization
  - Analysis and reporting
    - Holistic analysis handles combinatorial complexity
    - IFC export
    - Estimation
    - Structural
  - Quality control
    - Validations
    - Generated BIM

CASA™ Designer - Demonstration



Example use of automated building design

- Residential building products
- Institutional building configurations
- Building systems exploration
- Code and regulations validation
- Conventional design-build process improvement

Industrial residential products

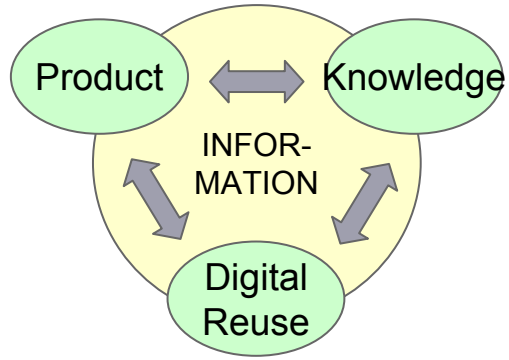
- Provides
  - Structured information management
  - Automated production of documents and drawings
  - Standardized housing products
  - Handling of required option program and mass customization
  - Product and project decision loyalty
  - Industrial approach with cost control in engineering and construction
  - Design-build process change – change orders within product definition
  - Design-build process change – pre-validated engineering information
- Requires
  - Design-build process change – Limited project variations
  - Product formulation methodology
  - Product Lifecycle Management
  - Construction technology standardization and quality control

Example Business Case – Selvaag Group

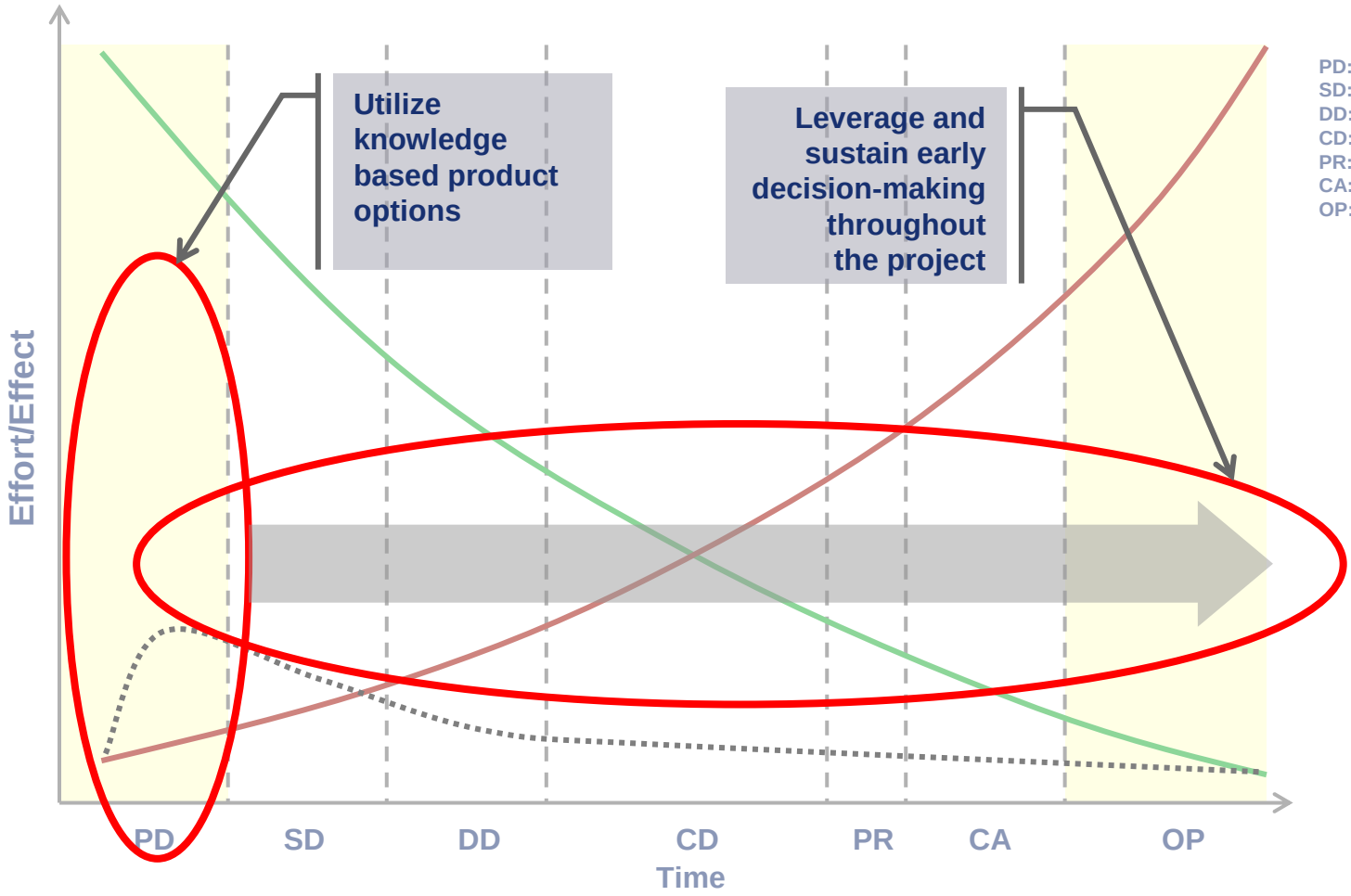
- Products
  - Modular homes
  - Multi apartment building

- Approach
  - Product development ROI through repeated use
  - Model based PLM
  - Standardized solutions
  - Information management

- Three-way synergy



Product use and decision loyalty in projects

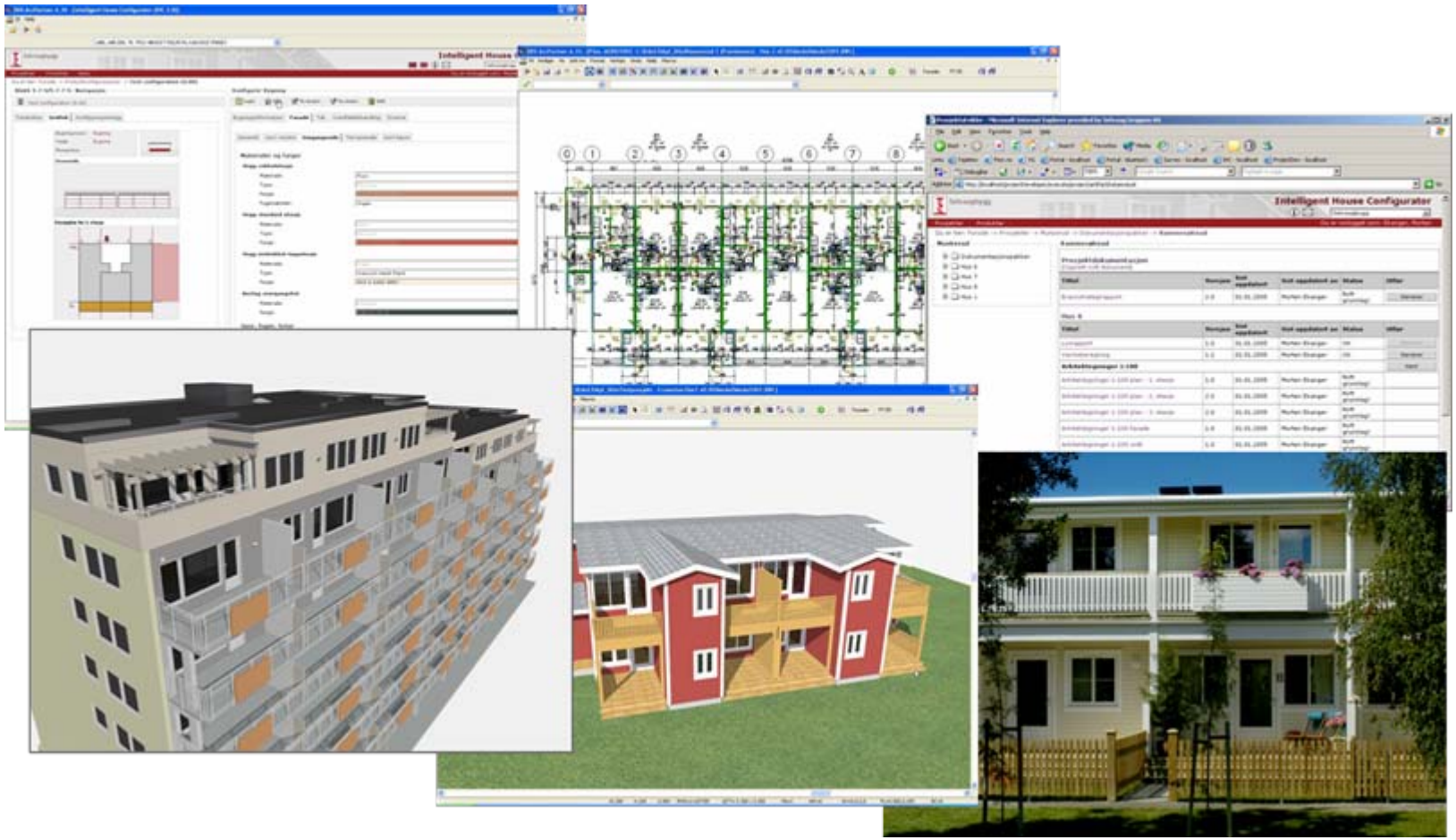


PD: Pre Design
SD: Schematic Design
DD: Design Development
CD: Construction Documentation
PR: Procurement
CA: Construction Administration
OP: Operation

CASA™ Conductor

- Users
  - Owners / Sales
  - Project developers
  - Project engineers
  - Construction
- Functionality
  - Building configuration
    - Based on products with Option programs
    - Product options – Project options – End user options
    - Industrialized mass customizations
  - Information management
    - Super BIM
    - Version – Revision - Changes
  - Automated document production
    - Predefined and engineered solutions
    - Drawings
    - Quantity takeouts
    - Details
    - Purchasing
  - 3D Visualization

CASA™ Conductor - Demonstration



Automated Building Design –
A Solution for Rebuilding the Gulf Coast

- Flexible design options including functional intents
- Rapid decision-making through easy presentation of configurable options”
- Model based analysis and documentation
- Codes and regulations awareness in design
- Handles optional production systems
- Project management based on high quality documentation in digital information flow

- Institutional buildings next ?

Selvaag BlueThink - Movie