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INTEGRATIVE PROCESS AND ECO-CHARRETTE FOR GREEN BUILDING PROJECTS

ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS

ONLINE TRAINING BY KRISHNAJI PAWAR

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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MODULE 02

Integrated Design for Sustainable Buildings

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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Integrated Design for Sustainable Buildings

Sustainability is needed to reduce buildings' environmental impact due to population and urbanization. Integrated design has evolved alongside sustainability and sustainable design. "Integrated design" is a collaborative process that considers the design, construction, operation, and occupancy of a building throughout its life cycle to create high-performance (sustainable) buildings with low incremental costs.



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LEARNING OBJECTIVES

- **Introduction to Integrated Design**
- **The Conventional Design Process vs. Integrated Design Process**
- **Benefits of the Integrated Design Process**

Introduction to Integrated Design

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- Population and urbanization drive the need for building sustainability to reduce environmental impact. Sustainability and sustainable design have changed integrated design. Integrated design is a collaborative process that considers a building's design, construction, operation, and occupancy throughout its life cycle to create high-performance (sustainable) buildings at low cost.
- This method uses a multidisciplinary and collaborative team of experts from various fields to make decisions from conception to completion based on shared visions and project goals, unlike the traditional design process.
- This course aims to understand the differences between integrated design and traditional approaches, recognize the benefits, and identify the critical success factors for using integrated design to achieve sustainable design.
- After a thorough literature review, this course will cover integrated design for sustainable buildings and interdisciplinary work in each phase.





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Introduction to Integrated Design +

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- After the industrial revolution, because of such factors as population growth, economic changes, technological developments, and environmental degradation, all areas are faced with a rapidly changing renewal over time.
- It is important to face the challenges associated with extending limited natural resources to meet the needs of a growing population with greater expectations for their quality of life.
- Challenges today include finding new and innovative ways to incorporate a broad mix of clean environments and renewable power sources for sustainability.



Introduction to Integrated Design +

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- As pressure increases to be more environmentally responsible in all fields, sustainability in building design, construction, and occupancy also has a definite impact on the environment.
- Due to this reason, "integrated design" can be used as a strategy to support sustainable approaches by combining both interdisciplinary teams and building life cycle integration.

Integrated Design

- Integrated design is often associated with iterative process, non-linear approach, flexible method, etc.
- Integrated design involves a contractual agreement between a minimum of owner, constructor, and design professional that aligns their business interests.
- This concept is a collaborative approach to building design that emphasizes holistic design and a modernist approach that considers all design requirements simultaneously rather than sequentially.
- This holistic design approach describes a deliberate, successful approach to sustainable building and community design.
- Integrated design is a discovery process that optimizes all building project elements and their interrelationships across increasingly larger fields to maximize resource efficiency and effectiveness through multidisciplinary teamwork.



Integrated Design +

Most would agree that all definitions of integrated building processes share common elements. These integrated building process components are:

- goal-driven, with sustainability as the main goal and specific goals, objectives, and targets to achieve it.
- Facilitated by someone whose main responsibility is design accountability, not building design,
- structured to avoid locking in bad performance by making non-reversible decisions with incomplete input or information.
- Clear decision-making and critical conflict resolution require a well-defined process.
- Everyone—owner, operator, and others—must be heard when designing.
- collaborative so that the architect is more than just the form-giver and leads a larger team with more active roles earlier in the process.
- Holistic or systemic thinking to create something greater than the sum of its parts and possibly more economical.
- A holistic solution allows financial trade-offs in whole-building budget setting.
- iterative to incorporate new information into previous decisions.
- As needed, non-traditional expertise on the team or brought in at non-traditional times to help.





THE CONVENTIONAL DESIGN PROCESS VS. INTEGRATED DESIGN PROCESS

Learning and improvement are key to the integrated building process. An integrated approach includes feedback mechanisms to evaluate all decisions, unlike a linear design process, which often leaves upstream decisions and assumptions unchallenged.

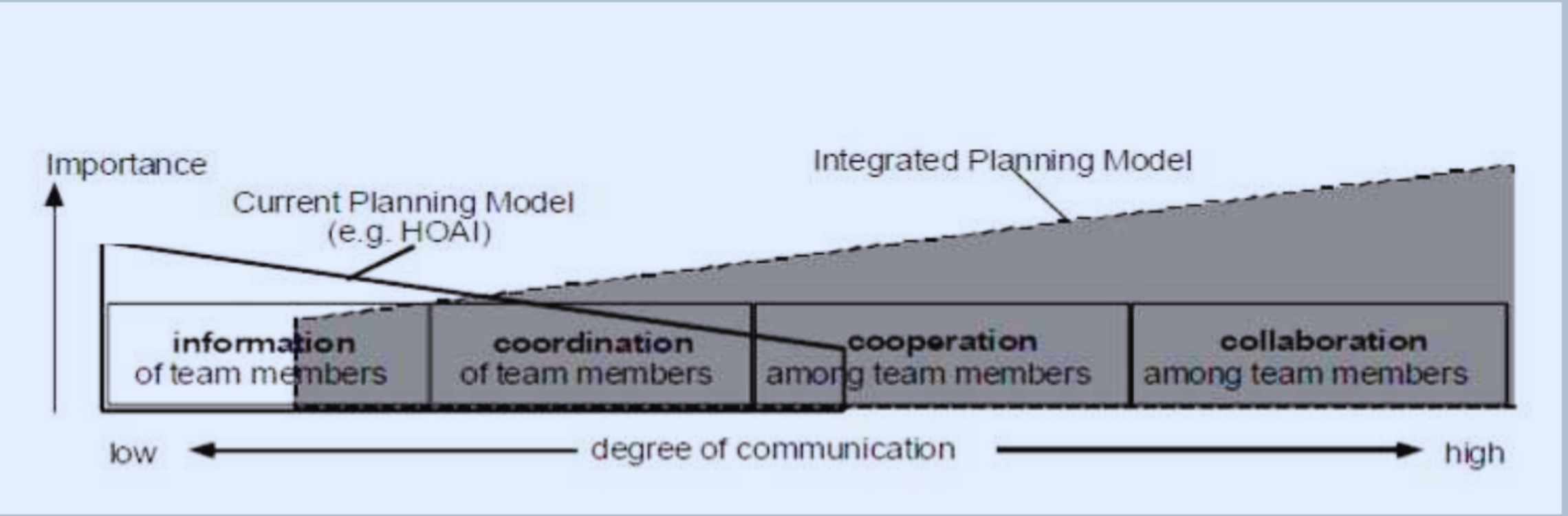
THE CONVENTIONAL DESIGN PROCESS VS. INTEGRATED DESIGN PROCESS +

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- In contrast, the integrative design process, which is different from the conventional (or linear) design process, requires multidisciplinary collaboration, including key stakeholders and design professionals, from conception to completion in order to achieve the greatest effectiveness in cost and environmental performance.
- Integrated design has evolved in conjunction with the rise of multidisciplinary design firms and sustainable design.
- In this context, an integrated building process requires multidisciplinary collaboration, including key stakeholders and design professionals, from conception to completion and generates a production process by bringing together a wide variety of teams at every stage of design from the beginning to the end.
- The team always includes an energy specialist and, in some cases, an independent design facilitator (The Integrated Design Process).
- Integrating sustainable approaches into the building design process requires a high degree of transparency on many related subjects, usually conducted by separate participants.
- The level of cooperation and communication needed to incorporate, for example, knowledge of sustainable approaches into the design process typically overwhelms common design teams.
- Implementing deterministic solution strategies cannot optimize the design process because the majority of buildings are custom-designed and built.



Level of coordination, cooperation and collaboration in conventional design process and integrated design process



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Table 1. Conventional design process and integrated design process comparison

Conventional Design Process	Integrated Building Process
Linear	Non-Linear
Team members attend only when required (Involves team members only when essential)	Team members attend during the whole process (Inclusive from the outset)
More decisions made by fewer people	Decisions influenced by broad team within an iterative process
Single team approach	Multidisciplinary team approach & problem-solving
First cost is significant, Emphasis on up-front costs	All life cycle cost and benefits are considered
Each system is analyzed one by one	The relationship among systems are taken into consideration for a full optimization
It requires less time, energy, collaboration and cooperation at early phases	The biggest investment with time and energy is made at the beginning
Collaboration is weak	Collaboration from the beginning on goals and aesthetics is strong
Systems often considered in isolation	Whole system thinking
Diminished opportunity for synergies	Seeks synergies
Incorporate green strategies as singular solution	Incorporate green strategies into all phases of the project, from programming through to construction, operation and maintenance
Closed communication process	Open communication process
Limited to constrained optimization	Allows for full optimization
Process continues through post-occupancy	Typically finished



BENEFITS OF THE INTEGRATED DESIGN PROCESS



- Integrated design also has more advantages over the conventional design process in terms of costs and efficiency.
- The integrated building process contains no elements that are radically new but integrates well-proven approaches into a systematic total process.
- The skills and experience of mechanical and electrical engineers and those of more specialized consultants that are integrated at the concept design level from the very beginning of the design process and the spirit of cooperation among key actors result in a design that is highly efficient with minimal, and sometimes zero, incremental capital costs, along with reduced long-term operating and maintenance costs (The Integrated Design Process).
- In other words, by a parallel development of multiple expressions of concepts from all key parties, comparing integrated building processes with conventional design processes, integrated building processes bring advantages such as lowering costs, maximizing quality, avoiding re-design processes and related cost increases by spending more time on reproducibility and suitability of the product according to users' requests, unlike conventional processes that spend very little time on design, etc.

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BENEFITS OF THE INTEGRATED DESIGN PROCESS



- On the other hand, the most significant acquisition of the integrated building approach is the opportunity to more clearly and comprehensively define and measure a project's scope, vision, goals, objectives, and outcomes.
- Besides considering life-cycle costs, integrated building processes foster the type of holistic and long-term thinking necessary for sustainable design.
- Additionally, in the integrated building process, teams that are working in a collaborative and concurrent way with a determination to foster open-mindedness and creativity create innovation and synthesis, which allow the team to achieve the complex requirements of a high-performance building (Roadmap for the Integrated Design Process).
- In this context, a summary of the benefits of the integrated building process is shown in Figure 3.

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* Well-defined scope, vision, goals and objectives * Effective and open communication * Well-organized * Multidisciplinary work * Collaborative work * Team Work * Concurrent * Innovation and synthesis * Systematic decision making	**Sustainabilty**  **Life -Cycle**	* Iterative process with feedback loops * Realization of more optimally integrated solutions * High Performance (Maximized benefits and quality) * Minimal Cost / Effort / Time * Environmental Performance

Figure 3. Benefits of the Integrated Building Process

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CONTACT US

+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR Layout ,Bengaluru ,India



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