



# **Bridging The A/E/C FM Technology Gap**

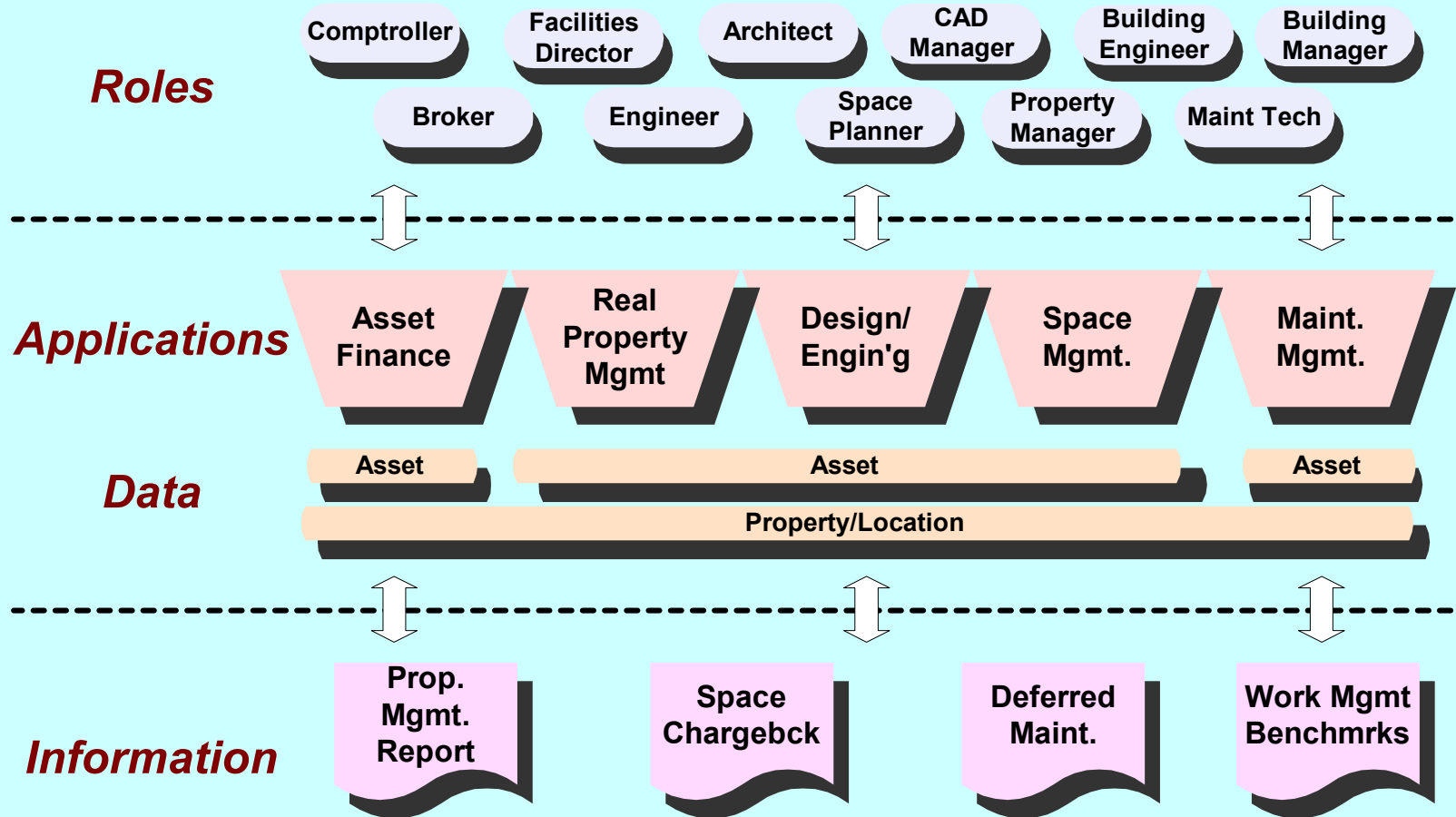
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# The Need for Integration

- Facility operations typically 8-12% of corporate budget
- ca. 30% of corporate assets are in real estate and operations
- ca. 60-80% of Facilities budget is related to work and asset management



# Agenda

- **Early lessons**
- **Issues**
  - Standards/technology
  - Graphic data
  - Assets/life cycle data
  - Collaboration
  - Legal/financial
  - Data commissioning
- **Case Studies**
  - Turner Construction
  - ROI/Tectonic/RCMS



# **The Beginnings:**

## **Case Study: U.S. Botanic Gardens Conservatory Renovation**



# Planning:

1. **What are the CAD graphic and non-graphic requirements both during design that related to facility management?**
2. **What is the availability and sources of facility information used during design, renovation, construction, maintenance and operations, asset management, security operations, and so forth?**
3. **What are the current and planned future use of the CAFM system vis-a-vis facility management, renovation and remodeling, and operations?**
4. **What are the needs and requirements of Technical Support for CAFM information during future design and construction? and,**
5. **What are the current requirements and methods of capturing facility information from design and construction processes to be migrated into CAFM?**

# Data Mapping

- Facility Drawings
- Space Inventory and Management
- Asset and Equipment Inventory
- Operations and Maintenance

– CAFM Mapping



# The Basics: Room numbers

- An asset's information can't be complete without its location
- What is the correct room number?
- When is the earliest you can get the final room numbers?
- How do you ensure the collector has the most up-to-date room information?



# Standards

- Building systems (Uniformat based)
- Inventory items (Federal Supply Classifications)
- Tag number format
- Level of detail – Assemblies, Areas
- Manufacturer or built on site
- What about new standards in the field?



# Barcode Labels

- “It’s simple, we can use barcode scanners!”
- Size
- Format
- Material and durability
- Location
- Sequential or intelligent
- No. of scanners, type, on and on



# Data Mapping

Facility Information				CAFM Mapping				
Source Type	CSI Division	Data Element Description	Notes	Drawing Inventory	Equipment Inventory	Maintain Asset	Maintain Location	O&M Material
Drawing	01300	1st Floor South Addition, Elec, HVAC, Plumb & Ducts		✓				
Material	04400	Granite - Pink					✓	
Material	15430	Backflow Preventers				✓		
O&M Manual	01650	Generator						✓
Personal Eq		Scissors Lift				✓		
Warranty	07610	Roofing - Sheet Metal						✓

# Data Commissioning Strategies



- Strategy One - data commissioning integrated with design and construction
- Strategy Two – independent data commissioning

1. Standards/technology  
4. Collaboration

2. Graphic Data  
5. Legal Financial

3. Assets/life cycle data  
6. Data Commissioning

# Issue 1: Standards/technology

- Interoperability (ENR/NIST study > poor data coordination costs \$15.8B/yr)
- NIBS – National Institute of Building Sciences - <http://www.nibs.org>
- IAI – International Alliance for Interoperability - [http://www.iai-international.org/iai\\_international/](http://www.iai-international.org/iai_international/)
- ifcXML – Standard for converting IFC releases into XML schema. (link from IAI website)
- OSCRE – Open Standards Consortium for Real Estate (industry alliance) <http://www.oscre.org>
- BLIS Building Lifecycle Interoperable Software <http://www.blis-project.org/>.

# More Standards/technology

- oBIX:  
[www.caba.org](http://www.caba.org)
- BACnet:  
[www.bacnet.org](http://www.bacnet.org)
- Modbus  
[www.modbus.org](http://www.modbus.org)

## BENEFITS OF A STANDARD PROTOCOL

- Single operator workstation for all systems
- Eliminates being “locked in” to single system
- Possibility of integrating functions across multiple platforms
- Interoperability
  - Data sharing
  - Scheduling
  - Alarm/event management

1. Standards/technology

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## Issue 2: Graphic Databases

- Culture
- As-built vs. As-designed
- Formats and stovepipes
- General and sub-contractors
- Data integrity/consistency
- 2D/3D
- Data needs of owners and contractors



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# Issue 3: Assets

- Life cycle data – capital planning
- Preventive Maintenance
- Cost
- TAM – Total Asset Mgmt.

 Enterprise  
 Business Unit  
**O** Data Owner  
**S** Data Steward  
**U** Data User

		Business Units									
		Auditor-Controller	PFRD HB&P	CEO Risk Mgmt	PFRD Fac Ops	CEO Real Estate	Probation	Social Svs Agency	Health Care Agency	Sheriff	Airport
Requirements	Asset Accounting & Control	O	U	S	U	S	S	S	S	S	
	Asset Maint, Repair & Repl.	U			O		O	O	O	O	
	Equipment Inventory (capital, important non-cap)	O		U	O	U	O	O	O	O	
	Space Management (moves, adds & changes)	U		U	U	U	O	O	O	O	
	Building Inventory (bldg, floor, room)	U	U	U	S	O	S	S	S	O	
	Land Inventory (parcel & property)	U	U	U	U	O	S	S	S	S	



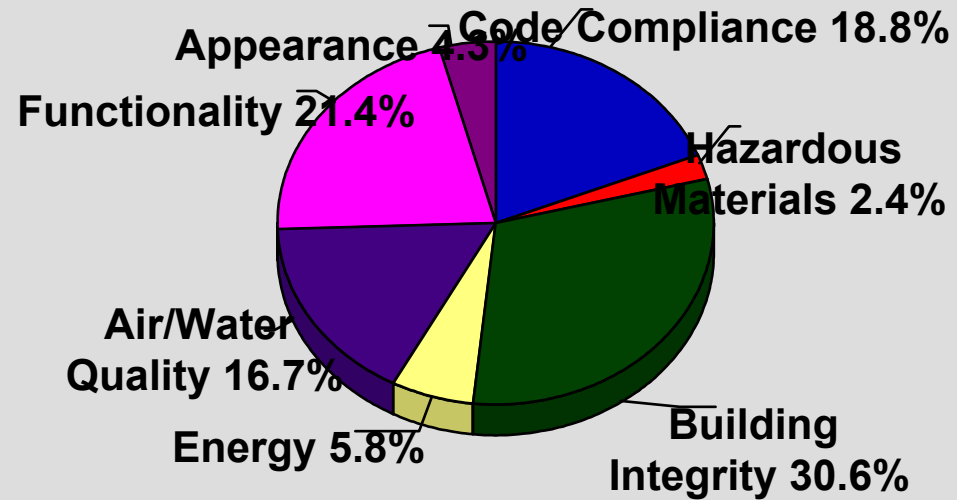
# Lifecycle Asset Management

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- Pre-development Planning
- Property/RE Portfolio Mgmt.
- Facility Condition Assessment
- CAD
- Space Management
- Routine, Demand, Preventive & Predictive Maintenance
- Procurement/Materials Handling/Disposal
- Project planning and management
- Budgeting
- Personnel/Work Mgmt.
- Executive Information, Reporting

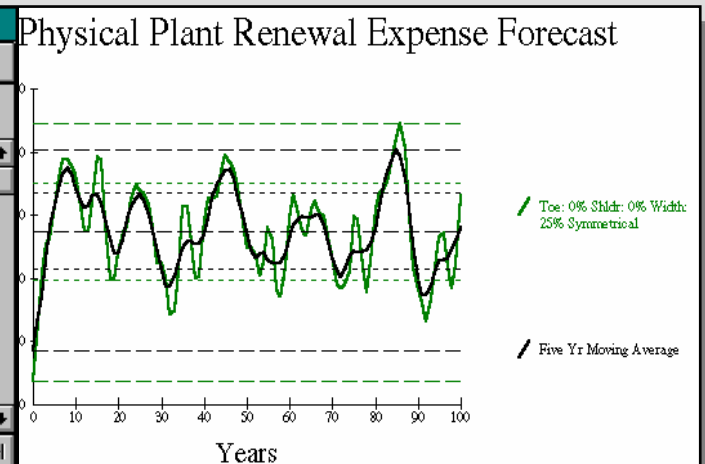
# Conditions Assessment

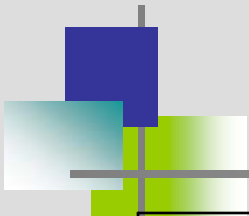
- Identify existing deficient condition
- Prioritize and categorize condition
- Develop resolution (correction)
- Estimate cost to make correction



Building Cost Prototype			
File Edit Select Equalize			
Major Bldg Components and Systems	% of Orig. Bldg. Cost	Lifetime (Years)	% Renewed
Foundation	6.35%	100	5.00%
Vertical Support	2.96%	100	5.00%
Floor Framing	6.25%	75	10.00%
Roof Framing	3.16%	75	10.00%
Roofing	4.33%	20	100.00%
Exterior Wall	4.22%	75	35.00%
Doors	1.55%	30	80.00%
Windows	1.73%	30	85.00%
Partitions/Doors	12.25%	50	70.00%
Flooring	4.75%	17	95.00%

Laboratories : \$190/gsf





<b>World</b>	<b>Asset</b>	<b>Benchmark</b>	<b>Measure</b>	<b>Trigger for spending</b>
<b>New Capital</b>	<b>New capital assets, investments</b>	<b>Business fit and risk</b>	<b>ROI, Internal rate of return, net present value, payback</b>	<b>Maximized return on capital spending</b>
<b>Renewal</b>	<b>Physical assets and their components</b>	<b>Condition</b>	<b>Facility Condition Index, Building Condition Index</b>	<b>Time &amp; condition indicating significant risk of failure</b>
<b>Program</b>	<b>Spaces, Manufacturing components</b>	<b>Program suitability</b>	<b>Program Suitability Index, Facility Suitability Index, Area suitability Index</b>	<b>Technical/functional obsolescence impacting competitive capabilities</b>
<b>Regulatory</b>	<b>Buildings and sites, their components and potential regulatory issues</b>	<b>Code and regulatory standards</b>	<b>Physical states versus regulatory standards</b>	<b>Corporate governance policy</b>

Courtesy Physical Planning Assoc.

1. Standards/technology

2. Graphic Data

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## Issue 4: Collaboration

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- Intranets
- Security
- Document management
- Work flow
- Project management
- Role of building owner

1. Standards/technology  
4. Collaboration

2. Graphic Data  
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3. Assets/life cycle data  
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## Issue 5: Legal/Financial

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- Owner/Consultant Roles
- Services Contracts
- Risks and Rewards
- Insurance
- Bonding

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## Issue 6: Data Commissioning

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- Data commissioning integrated with design and construction or independent data commissioning?
- Delivery models trending toward integration.
- Delivered products will trend toward digital.
- Process will be market-driven based on availability of standards & supporting technologies.

# Case Studies



- Turner Facilities Management Solutions (Turner FMS)

Contact: [daldrich@tcco.com](mailto:daldrich@tcco.com)



- ROI/Tectonic/RCMS

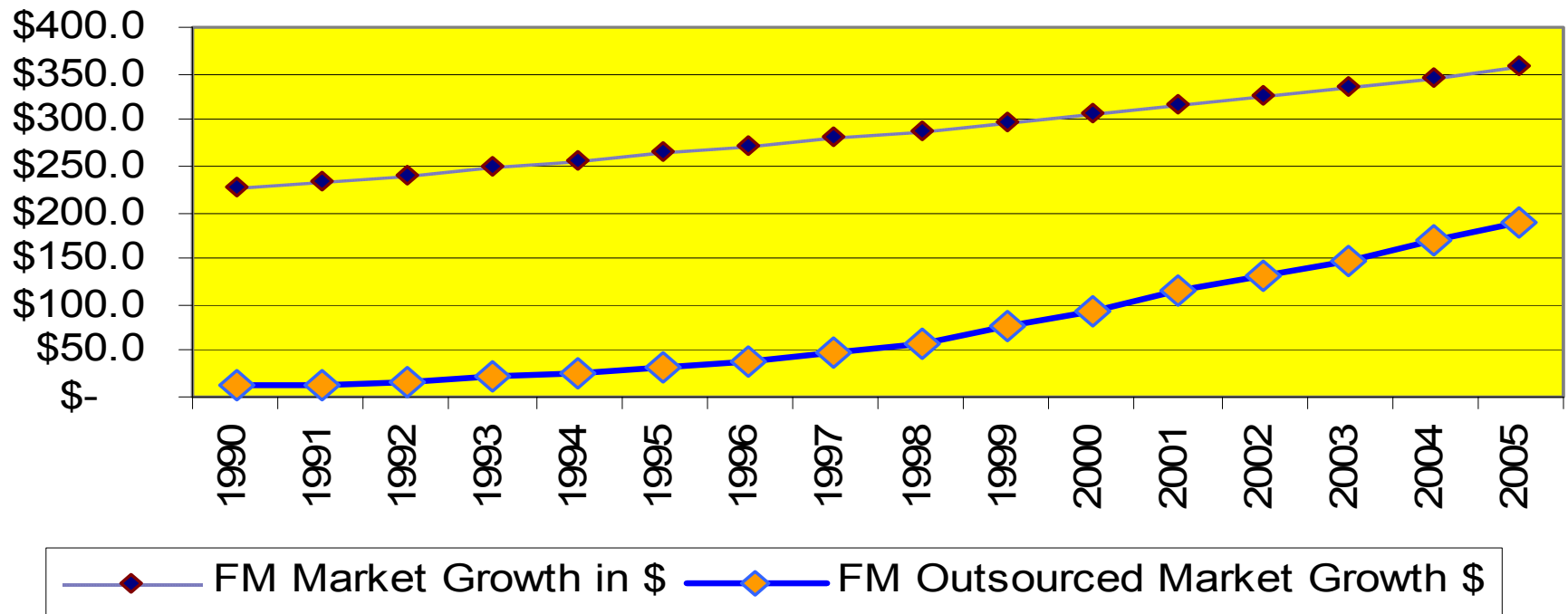
Contact: [www.yesrcms.com](http://www.yesrcms.com)



# Facilities Management Outsourced Growth

- The Percentage of the Outsourced FM market has increased at approximately 20-25% annually since 1990 and is projected to continue at this rate through 2010
- Based on Models in Europe and Australia, FM outsourcing will be the preferred method of operation beyond 2010 and will entirely dominate by 2020.

## FM Market Vs. FM Outsourced Market



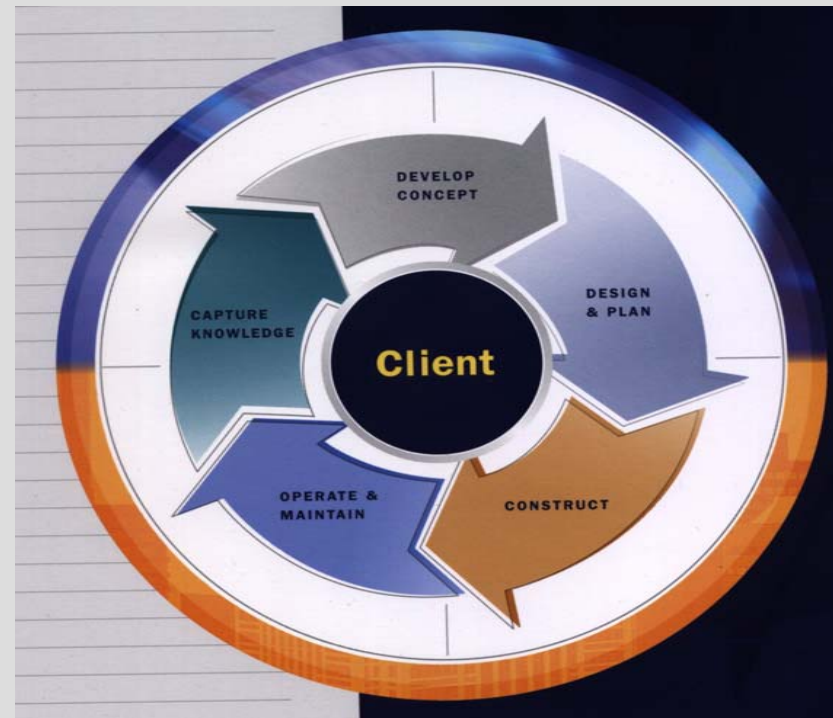
Source: IFMA, US Dept Commerce  
Confirmed by Honeywell, Siemens

# TurnerFMS

Develop Concept:

## Life Cycle Cost Analysis

- Life cycle cost modeling
- Operational cost scenarios
- Material and systems analyzed

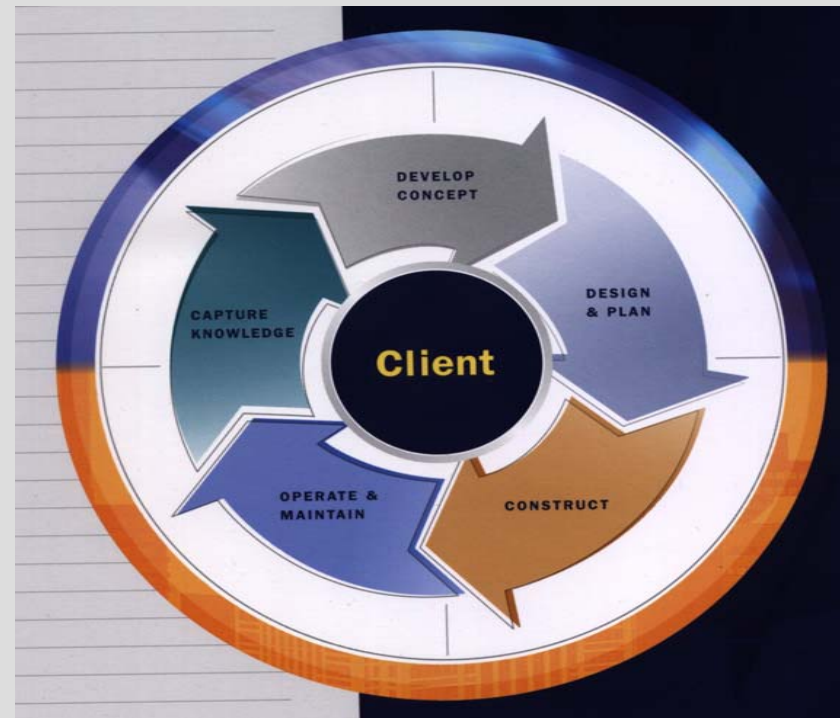


# TurnerFMS

Design and Plan:

## Contract Aggregation

- Discounted construction pricing
- Supplier and vendor warranty commitment
- “Invested” contractors and suppliers

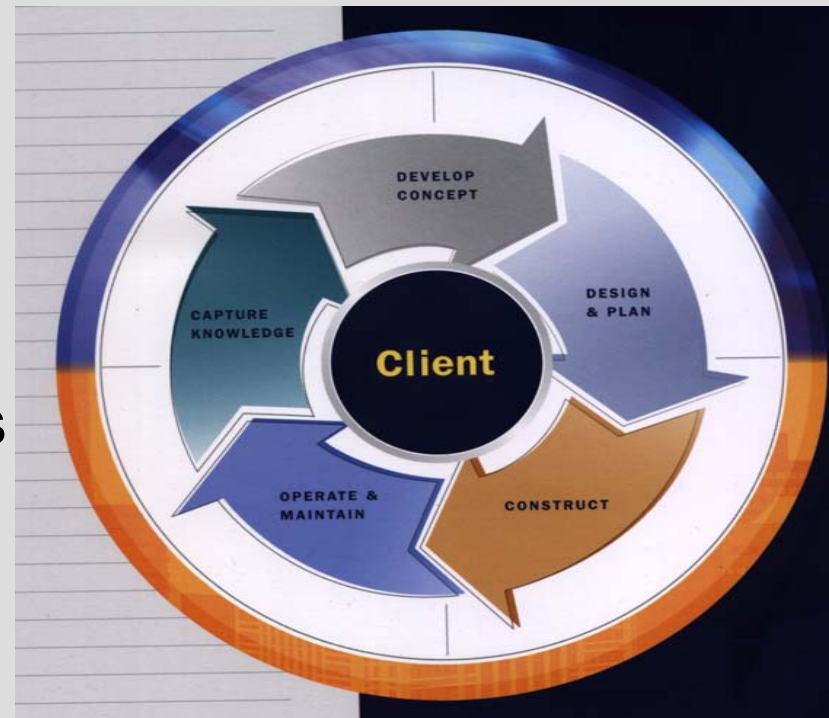


# TurnerFMS

Construct:

## Owner's Manual

- Pre-populated CMMS
- Work flow management
- SOP's, PM's and O&M protocols for turn-over
- Secure, shared knowledge base



# TurnerFMS

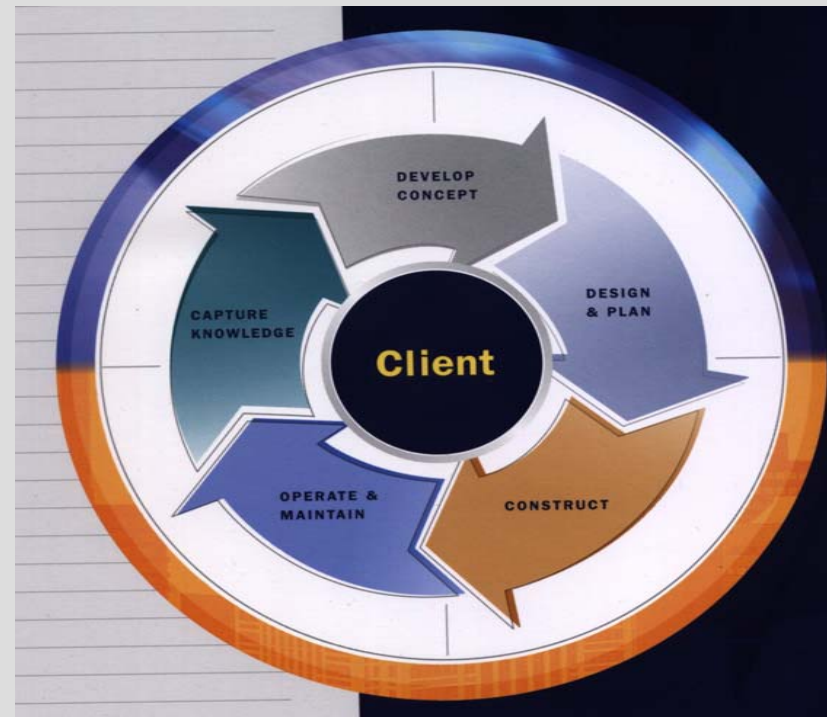
## Operate and Maintain:

### Start-Up and Move-In

- Validation and commissioning
- Move management
- Training

### Ongoing Operations and Maintenance Management

- Contract management
- Work order management
- Call center
- Space management/turnover
- Warranty management

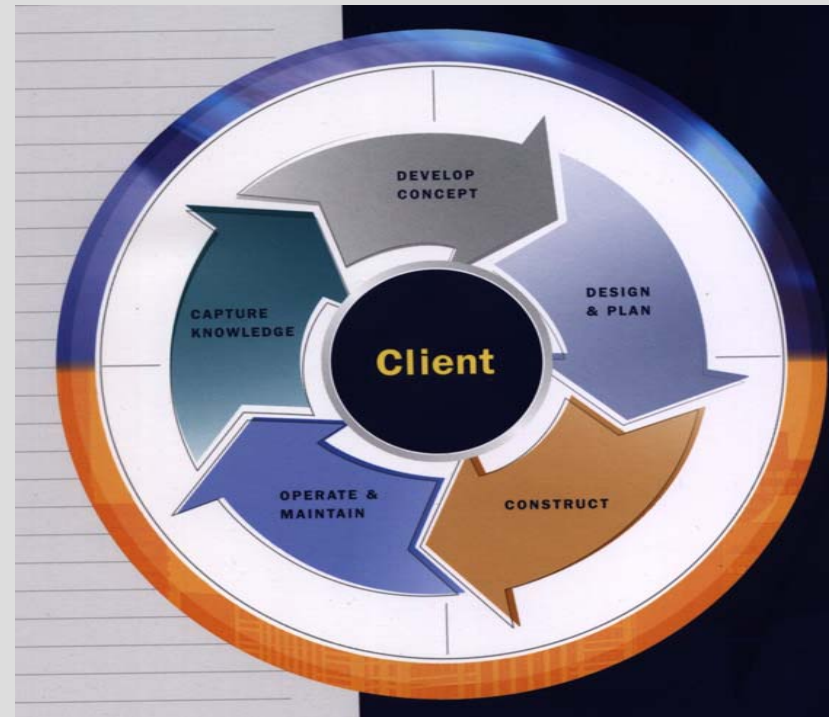


# TurnerFMS


Capture Knowledge:

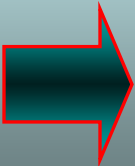
## Use of Knowledge Base

- Benchmarking
- Dashboards
- Performance Metrics
- KPI's



# ROI/Tectonic/RCMS

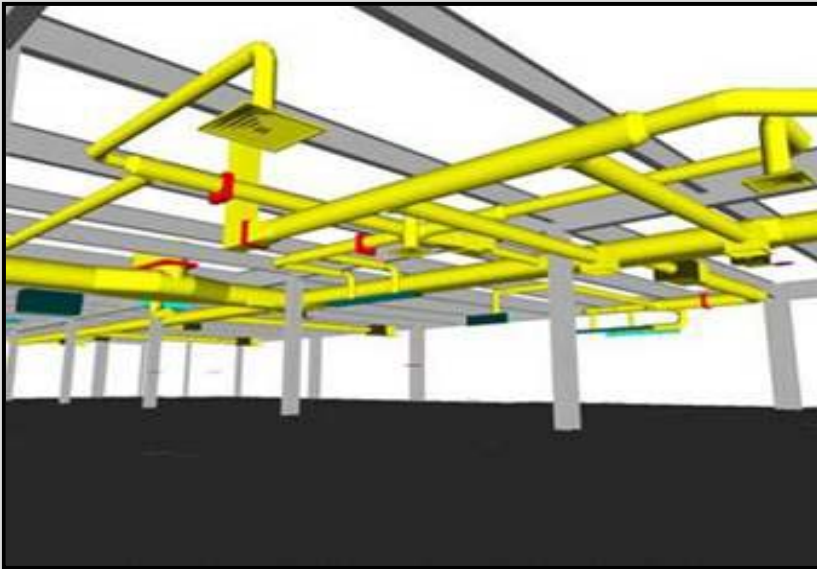


<p><b>VIRTUAL MODEL</b></p>	<p><b>SIMPLISTIC MODEL</b> Mass Models, Site Plans, Area Takeoffs, Preliminary Budgets</p>	<p><b>DETAILED &amp; COMPLEX MODEL</b> Model contains (or interfaces with) all the construction information on the project</p>	<p><b>QUANTITY TAKEOFF FROM MODEL</b> Quantities, Products, Model #, Links to Manufacturers</p>	<p><b>VIRTUAL CONSTRUCTION</b> Sequence studies, Conflict analysis, Timelines</p>	<p><b>CHANGES &amp; AS-BUILTS</b> Maintain accuracy of model throughout construction phase</p>	<p><b>LIFE-CYCLE RESOURCE</b> Maintain model, Access model for operations &amp; FM, Modify model for renovations</p>
<p><b>PHASE</b></p> 	<p><b>DESIGN</b> Project Concepts, Preliminary Building Design, Preliminary Budgets</p>	<p><b>CONTRACT DOCUMENTS</b> Drawings, Schedules, Specifications</p>	<p><b>BID / NEGOTIATION</b> Quantities, Labor &amp; Material Costs, Sub-Contractors, Suppliers, Contracts</p>	<p><b>CONSTRUCTION PLANNING</b> Timeline, Construction Phases, Process Modeling</p>	<p><b>CONSTRUCTION</b> Management of Construction Process, Purchasing, Conflict Resolution</p>	<p><b>MAINTENANCE &amp; OPERATIONS</b> Facilities Management (FM), Renovations, Maintenance, Operations</p>

- Model corrections are easy and the results are viewable instantly
- Schedules and specifications change with modifications to 3D models
- Better product selection



# ROI/Tectonic/RCMS



- Reduces risk via Interference Detection
- Integrated schedule data
- Securely communicate with your extended design team
- Provide CAD Standards across all projects

