

Using BIM for Space Chargebacks in a Healthcare Facility

Most healthcare organizations in the United States rely on Medicare and Medicaid reimbursements to provide needed care for their patients. But the recovery of facility costs for these services relies on accurate space management and reporting. This whitepaper examines how healthcare owners can use BIM to facilitate space reporting and simplify the submittal process for Medicare and Medicaid reimbursements.

Table of Contents

Introduction	2
The Healthcare Industry and CMS	2
CMS Reimbursements	3
BIM for Space Calculations	4
Benefits of Using BIM for Space Management	6
Space Reporting for CMS Reimbursements.....	6
Conclusion	7
Appendix	7
Ohio State University - Wexner Medical Center	7
Carolina HealthCare System	7
Xavier University.....	8

Introduction

Building Information Modeling (BIM) is an intelligent model-based process that helps owners and building professionals achieve business results by enabling more accurate, accessible, and actionable insight throughout a project lifecycle. The use of coordinated, accurate 3D building models during design and construction can result in substantial cost and timesavings for building owners, and the building industry is increasingly recognizing the role that BIM can play in bringing predictability into the building process. Due to the complexity and critical nature of healthcare facilities, many healthcare facility owners in particular are turning to BIM to facilitate more efficient design and construction processes and improve their building outcomes.

However, design and construction costs pale in comparison to the cost of facility management, operation, and maintenance, which may run as high as 80 to 85 percent of the total lifecycle costs of a building. Of course, these figures are broad generalizations as construction and staffing costs vary based on building type, location, business sector, and so forth. But clearly, the use of BIM to reduce post-occupancy costs represents the much larger return for building owners.

To capitalize on that value, healthcare owners are now starting to use BIM software (and repurpose building models and information created during design and construction) to help streamline building management and operations. An obvious use of the precise spatial information contained in a building model is for space management, which coincides with an important business challenge facing most healthcare organizations: chargeback reporting to the federal government to receive Medicare and Medicaid reimbursement funds.

This paper explores how owners can use Autodesk® BIM solutions to analyze space usage, create more accurate chargeback reports, and help streamline the reimbursement process.

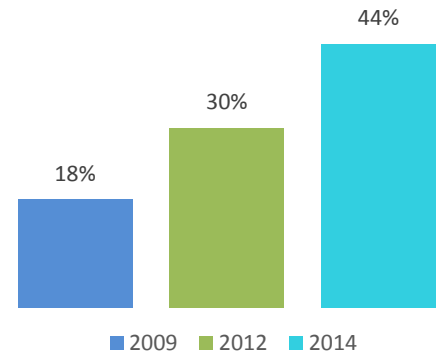


Figure 1: Percentage of North American building owners using BIM on more than 60% of their projects.

Source: McGraw Hill Construction, 2012

The Healthcare Industry and CMS

In 2011, healthcare expenditures in the United States were \$2.7 trillion¹, nearly 18 percent of the country's gross domestic product (GDP). According to the latest government statistics, healthcare is projected to grow by 33 percent and create 5.7 million new jobs by 2020². Ten of the 20 fastest growing occupations are in healthcare related fields. The U.S. healthcare industry is one of the world's largest and fastest-growing industries, driven in part by an aging population with longer life expectancies.

Healthcare providers are responding to this industry growth by expanding their facilities. In a recent survey³ at the Fall 2012 Healthcare Design Conference, 80 percent of healthcare providers reported that their design and construction activity grew in 2012 and 67 percent expect continued growth in 2013. In addition, two-thirds of the surveyed healthcare providers felt that the Affordable Care Act will result in increased capital expenditures over the next 5 years. Another large survey of U.S. healthcare providers echoed these statistics. A 2010 capital survey by VHA (a network of healthcare organizations including 1,400 hospitals and 25,500 non-acute healthcare organizations in 46 states) revealed that 67 percent of its member hospitals were undergoing renovations or additional construction.

¹ Centers for Medicare & Medicaid Services, U.S. Department of Health and Human Services, available at www.cms.gov, Research, Statistics, Data and Systems >> Statistics Trends and Reports / National Health Expenditure Data >> Historical

² Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2012-13 Edition, Projections Overview, available at www.bls.gov/oooh/about/projections-overview

³ Mortenson Construction, *Healthcare Industry and Design Trends*, January 2013, available at www.mortenson.com/ResourcePage_Whitepaper_HealthcareDesignTrends.aspx

The largest purchaser of healthcare in the United States is the United States government—specifically the federal government’s Centers for Medicare & Medicaid Services (CMS). CMS is a federal agency within the U.S. Department of Health and Human Services that provides health coverage for approximately 100 million people—almost one-third of the US population—through Medicare, Medicaid, and the Children's Health Insurance Program (CHIP)⁴.

In 2012, CMS outlays were \$732.2 billion (net of offsetting collections and receipts), accounting for 21 percent of federal spending⁵. Medicare alone processes over one billion claims a year and accounts for approximately 14 percent of the federal budget. Over 80 percent of Medicare spending is for people age 65 or older.

Given the impact of the country’s aging population on the healthcare industry and by extension healthcare facilities, one major challenge that healthcare organizations face is recouping their costs for CMS programs. Every year, healthcare organizations can recover direct costs and overhead for services provided to CMS patients. Hospitals in particular rely on CMS reimbursements (which can be as much as 60 percent of their annual revenue) for their day-to-day operations as well as future growth.

CMS reimbursement claims for facility overhead require very detailed reporting on an annual basis. The submittal process is typically led by the hospital’s finance department, but requires significant involvement of the facilities team for detailed spatial data. A hospital’s reimbursement submittal often takes months to prepare and requires accurate space allocation data—including current allocations as well as changes in space inventory and allocations since the previous report. Typically, six months after the submission, the hospital is audited by the CMS to finalize the payment. In some cases, this audit process can take several more months to defend the submittal through reviews and appeals.

Facility reimbursements are based on the percentage of floor space in a hospital that participated in the delivery of healthcare services for a CMS patient. As such, the recovery of facility costs is dependent on accurate space reporting. For healthcare facility owners, this represents a large portion of BIM’s value proposition for the facility owner.

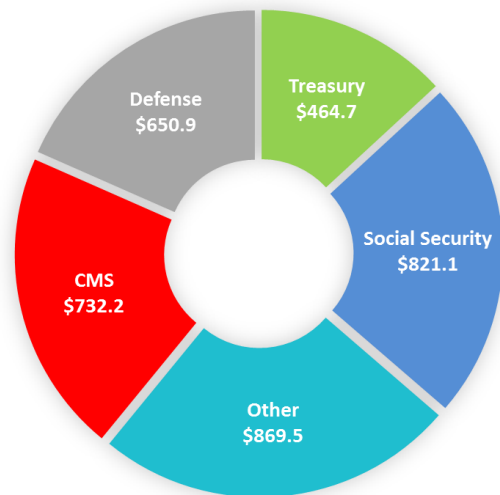
CMS Reimbursements

Every year, Medicare-certified institutional providers are required to submit a Medicare/Medicaid cost report to CMS. This cost report contains information such as facility characteristics, utilization data, costs and charges by cost center (total costs as well as for CMS services only), CMS settlement data, and financial statement data.

CMS submittals are extremely complex and a whole sub-industry of consultants, analysts, and accountants help hospitals prepare and defend their cost reports.

2012 US Federal Spending

(in billions of US dollars)



Source: CMS Financial Report, Fiscal Year 2012

Figure 2: CMS expenditures accounted for 21% of US government spending in 2012.

⁴ Centers for Medicare & Medicaid Services, U.S. Department of Health and Human Services, available at <http://www.cms.gov>
⁵ CMS Financial Report, Fiscal Year 2012, November 15, 2012, available at www.cms.gov >> Research, Statistics, Data and Systems >> Chief Financial Officer (CFO) Report

CMS cost reports require important facility data including:

- Accurate space inventory (such as room number and name, and square footage of each room).
- Accurate designation of total building space to hospital departments (e.g. Room 204 belongs to oncology, Room 205 to Cardiology, Room 206 to Medical Records, and so forth).
- Accurate tracking of space inventory or departmental allocations over time and (if applicable) throughout renovations and new construction, so owners can calculate percentage of space occupied by a specific department over the course of a year, even if the square footage of that department changed during the year.

Gathering and maintaining facility data is critical for developing CMS cost reports, and healthcare organizations can use BIM to facilitate these efforts. The use of BIM helps organizations maintain accurate documentation of existing building space and streamlines the reporting of that space.

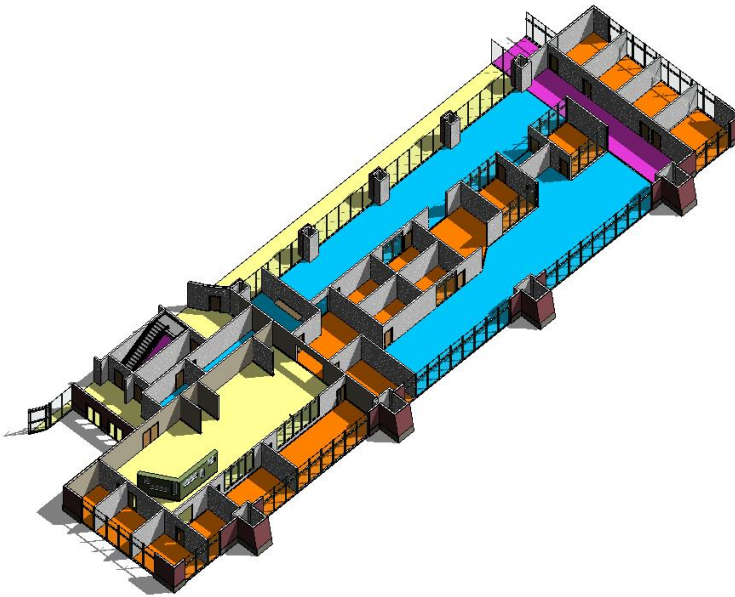


Figure 3: Healthcare organizations use BIM to streamline the tracking and reporting of facility space for CMS cost reports.

BIM for Space Calculations

Autodesk® Revit® software products—Autodesk’s BIM solution for facility design, construction, and lifecycle maintenance—help building professionals create higher-quality, more energy-efficient healthcare facilities, and help healthcare owners manage, maintain, and renovate those facilities. Revit software applications produce a computable, intelligent building model that can be understood by a computer *as a building*. A wall for example, ‘knows’ what it is and how to react to the rest of the building.

The entire building model—including all the building documents—is interconnected. 3D model views, 2D floor plans, informational area schedules, etc., are all ‘live’ views of the underlying building model. The Revit software coordinates all this building information across all representations of the facility. For example, when a wall is moved, that change automatically ripples to all affected views such as plan drawings, area schedules, color-filled departmental floor plans, and so forth. This automatic change propagation improves the accuracy of facility floor plans and area takeoffs, which in turn improves the accuracy of chargeback documentation and reporting.

Managing Healthcare Space with BIM

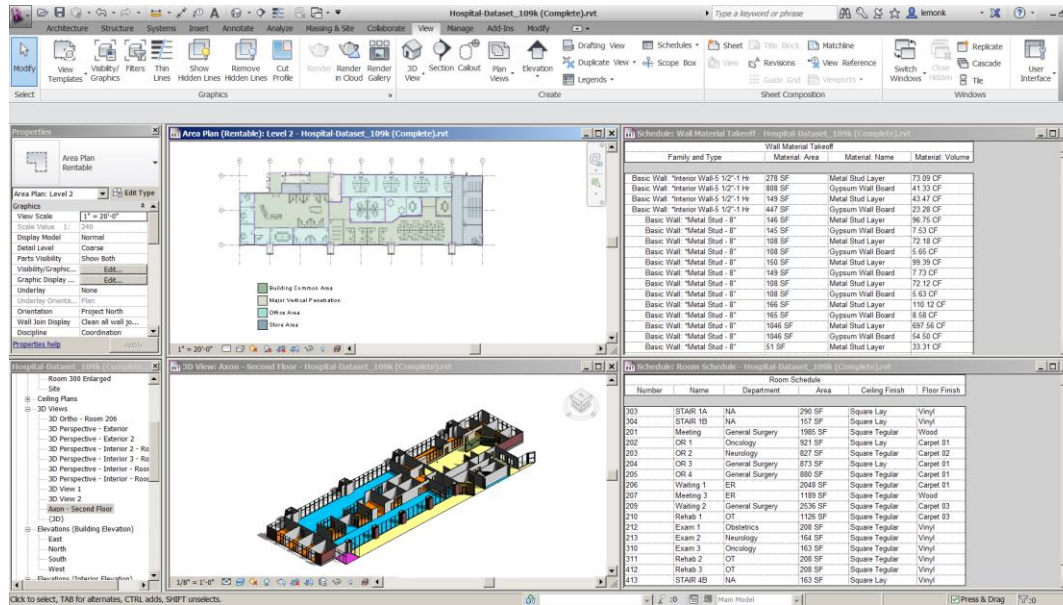


Figure 4: Revit building models feature intelligent areas that are used to define spatial relationships in the building model and help streamline the calculation and reporting of space.

Revit building models also feature intelligent areas that are used to define spatial relationships in the building model and help streamline the calculation and reporting of space. **Traditional area takeoff** methods for space management and chargeback business functions rely on the use of scales and calculators to manually measure floor plans and determine areas. **CAD applications** introduce a slightly improved method where electronic floor plans are used as backdrop references and closed polylines are manually added to the floor plans to define areas for area calculations. In contrast to these manual approaches, **Revit** software products use definable spatial relationships and intelligent area elements, plans, and schedules that automatically define, calculate, and report areas.

To define areas in a Revit model initially, the user selects model elements (such as walls) that bound an area and the software automatically generates area boundary lines. These area boundaries stay connected with underlying model elements. For example, if a wall moves, the area boundary moves as well and the area of that space automatically updates.

Area boundaries (and therefore area measurements) are based on industry standards for area measurements such as ANSI/BOMA. Areas are automatically calculated based on the area type (chosen when the area is created and can be updated at any time). For example, gross building area is calculated by using the exterior of the walls, whereas office area is calculated using wall interiors. Area boundaries automatically adhere to window height rules as well, so when a window height is greater than 50 percent of wall height, the area boundary lines go to face of glass versus the wall interior. And if the window is modified to be less than 50 percent, the boundary line reverts to the wall interior and the area automatically updates.

Revit users assign a department parameter to each area and create area color schemes using this department parameter. This enables facility managers to create floor plans that are color-coded by department. These area plans are graphic views or representations of areas and if the model changes these color-coded floor plans change automatically.

Schedules enable facility managers to view the same information in a tabular format. Area schedules based on manual or CAD processes are typically laborious and error prone. Using Revit, area schedules are merely informational presentations of the underlying model. Facility managers can easily create schedules of any type of information in the model such as window and door takeoffs or interior finish schedules. Area schedules can also be created to quantify departmental space allocations. As mentioned earlier, if the model changes, the information in the schedules automatically updates. These schedules can be added to any drawing sheet or floor plan, and the information can also be exported to a tabular spreadsheet format.

Benefits of Using BIM for Space Management

BIM can be a crucial component of a good facilities management strategy for healthcare owners and the appendix offers specific examples of how some owners are using Revit software applications to help manage space and the benefits they are experiencing. Using BIM for the space management of facilities offers these advantages:

- The accuracy of a building model improves the accuracy of documentation and calculations that facility managers use for their day-to-day activities and for annual chargeback reporting. The automatic change management features of Revit software products further enhance the quality and accuracy of the documentation and reports that are derived from the Revit building model.
- The development of schedules and quantities do not require manual polylining, calculations, or takeoffs—improving the accuracy of space reporting. In addition, since that information is automatically generated from the building model, it remains fully coordinated with the underlying model, which also improves the accuracy of space reporting.
- Improved ability to communicate space graphically (in the form of color-coded floorplans for example) requires no extra effort on the part of facility managers.

“The accuracy of the data in the Revit handover models of our new facilities is considerably greater than traditional handover information we received in the past,” says Greg Meyer, assistant director for facility assessment, **Xavier University**. “These models saved us a year’s worth of manual field collection and data entry, and helped eliminate the need for polylining.”

Space Reporting for CMS Reimbursements

With regards to CMS reimbursements, BIM can directly impact the bottom line of healthcare owners through more accurate space reporting. The percentage of the annual CMS reimbursement related to facilities costs varies, but the dollars recouped typically amount to tens or hundreds of million and some hospitals report that facilities account for as much as 20 percent of their total reimbursement. One hospital owner reported receiving \$165 million in CMS facility reimbursements. For that organization, an increase in the accuracy of its space reporting by just one-half a percent could increase their CMS reimbursement by nearly \$1 million a year.

“For CMS reimbursements, BIM provides accurate space information and has eliminated polylining for our group,” says Joe Porostosky, senior manager of facilities information & technology services, **Ohio State University and Wexner Medical Center**. “In addition, each floor of each building is completely coordinated—where every floor plan stacks correctly with the floors above and below, hugely improving the quality of our space data.”

Carolina HealthCare System’s BIM pilot produced these metrics: Using AutoCAD® software, CHS could polyline at a rate of 5,000 square feet per hour. In contrast, the rate to produce a facility model in Revit software products departmental boundaries was 10,000 square feet per hour—twice the rate of 2D CAD-based methods. “As hospitals tighten their financial belts, there is an increased need to more accurately quantify space—for day-to-day space management as well as CMS reimbursements,” says Meghan Ruffo, BIM manager at **Carolinas Healthcare System**. “We anticipate that the pressures from industry competition and healthcare reform will lower both revenue and reimbursements for CMS procedures, making the timely and accurate space reporting of facilities even more important for our bottom line.”

Conclusion

AEC firms and healthcare owners alike are turning to BIM to improve the delivery and management of healthcare facilities. AEC professionals can use BIM to improve the design, documentation, construction of healthcare facilities and also improve the handover of new space to healthcare owners. Facility managers can use BIM to better maintain accurate documentation of their existing facilities and streamline the processes used to manage space inventory. Healthcare owners can use BIM to provide accurate and efficient space reporting for Medicare and Medicaid reimbursement.

Autodesk's BIM Solutions for healthcare are helping to support the design, construction, management, and operation of better performing healthcare facilities. Learn more about how BIM and Autodesk BIM solutions for healthcare by visiting www.autodesk.com/healthcare or contacting healthcare@autodesk.com.

Appendix

Ohio State University - Wexner Medical Center

At the end of 2010, Ohio State University (OSU) decided to convert existing AutoCAD drawings of 6 million square feet (in 53 buildings) of its Wexner Medical Center to Revit. OSU collaborated with Ohio-based DesignGroup to help with the conversion. The university conducted a field verification to determine the accuracy of the existing AutoCAD floor plans and converted the medical center to Revit-based building models.

Now that the medical center has been modeled in Revit, BIM is allowing the university's facility management group to support general space reporting and to mock up spaces in greater detail for more informed decision-making processes and for future project funding. "The transition to model-based space management has helped us make better decisions more quickly," says Joe Porostosky, senior manager of facilities information & technology services at OSU.

For example, recently the Medical Center was working to determine if they should invest in renovating the emergency department with all new finishes. Using a Revit building model, the actual finishes were quickly added to the space to produce a near-photo-realistic visualization of the space. Rather than using a traditional finish board and asking the decision makers to interpret what the space might look like, they were able to see renderings and a video walkthrough of how the space could appear, complete with accurate finishes and furniture.

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Carolina HealthCare System

Caroline HealthCare System (CHS) provides a full spectrum of healthcare and wellness programs throughout North and South Carolina through a network of more than 791 care locations includes academic medical centers, hospitals, healthcare pavilions, physician practices, destination centers, surgical and rehabilitation centers, home health agencies, nursing homes, and hospice and palliative care.

CHS's first BIM project, the [Carolinas Medical Center-Lincoln Replacement Hospital in North Carolina](#), benefited from reduced errors and omissions, but the final handover deliverables were not useful for CHS's facilities management processes or even for future renovations. Nevertheless, the initial success of this BIM capital project led to CHS's desire for greater control over future BIM process to improve building performance and improve facility management, operations,

and maintenance. To begin, CHS imported the raw data from the BIM projects into its work order system, avoiding manual data entry of that information. In addition, CHS piloted the use of the Revit models for the space management of several facilities.

CHS measured the time to create polylines in their AutoCAD drawings and compared the results to the time it took to create a simplified model in Revit that was sufficient for space management. Their pilot produced these metrics: using AutoCAD, CHS could polyline at a rate of 5,000 square feet per hour. In contrast, the rate to produce a facility model in Revit with departmental boundaries was 10,000 square feet per hour—twice the rate of 2D CAD-based methods.

Based on these results, CHS secured the approval from its management to move its primary enterprises to Revit software products. “As hospitals tighten their financial belts, there is an increased need to more accurately quantify space—for day-to-day space management as well as CMS reimbursements,” says Meghan Ruffo, BIM manager at Carolinas Healthcare System. “We anticipate that the pressures from industry competition and healthcare reform will lower both revenue and reimbursements for CMS procedures, making the timely and accurate space reporting of facilities even more important for our bottom line.”

Xavier University

Xavier University in Cincinnati, Ohio is a small university offering primarily an undergraduate, liberal arts education. Xavier's campus includes 54 buildings comprising approximately 2.3 million square feet. In the last four years, the university increased their campus size by 25 percent. The university's AEC teams were using Revit software products to design and construct these new facilities and Xavier is now using those models for space management and have integrated the models with their facility management system.

“For many years we struggled with knowing exactly how much space we had and how that space was allocated to the various university departments,” says Greg Meyer, the university's assistant director for facility assessment. Three years ago the facility group needed to demonstrate the need for additional funding for deferred maintenance (approximately \$10 million against an annual budget of \$750 thousand). A critical part of that cost justification was an accurate space inventory. Most of the campus documentation was in AutoCAD, but those new buildings were delivered as Revit models. “The accuracy of the data contained in the Revit models was greater than the normal handover information we received in the past,” says Meyer. “Those models saved us a year's worth of manual field collection and data entry, and helped eliminate the need for polylining.”

“We now consider space as an asset and, like any other asset, we manage that asset and its value,” says Meyer. “We know exact square footages and who is assigned to every square footage and their department. This information is particularly important to Xavier's financial department to assess how the various programs and departments are utilizing space and evaluate the viability of university programs.”