RENAISSANCE
CONSTRUCTION

5-D Integrated Earned Value Analysis

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RENAISSANCE CONSTRUCTION

Budgeting

Technical Office

Scheduling

Technical Office

Design Coordination Quantity Survey

Design Dept & Technical Office

Cost Control & Execution

Technical Office

Costs & Pricing / Estimating: Tendering

Tender Dept.

Billings

Technical Office

Project Management Working Cycle

RENAISSANCE CONSTRUCTION

1. Tender Department starts the process by Cost, Pricing and Estimating.
   - Quick & accurate
   - Systematical & easy to reach data flow and RC estimations database

2. The Design Department and Technical Office coordinate in liaison the design and perform the quantity survey.
   - Revit integration - quantity calculation and clash detection
   - Filtering cost relevant data

3. Budgeting done by Technical Office
   - Methodical & Easy comparison & consolidation
   - Transparency

4. Scheduling done by Technical Office
   - Primavera & 3D model, accrual income integration
   - Direct link to BoQ via activity model

5. Cost Control & Execution done by Technical Office
   - Integration to 1C-8 BI Software & other BI tools
   - Relatively dynamic budgets and transparent budgeting
   - Strong reporting, more controlled environment
   - Quicker & accurate quantity take-off during revisions
   - Analyse performances

6. Billings prepared by Technical Office
   - Managing client BoQ-s and payment certificates, valuation of subs interim payments
   - Managing variation orders and notify potential future claims

Introduction to EVM

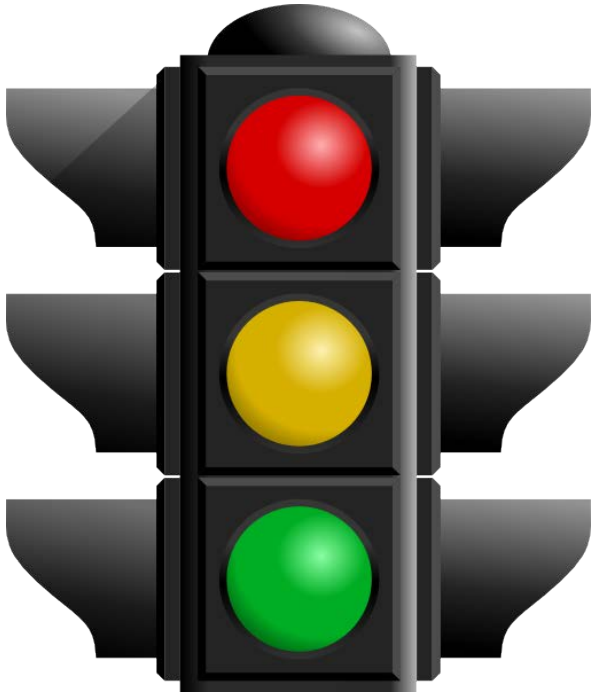
Definition

Has been around for over a hundred years.

The accurate measurement of physical performance against a detailed plan

AKA “Management with the lights on”.

It can help clearly and objectively illuminate where a project is and where it is going.



Introduction to EVM

- Customized cost control system.
- Designed to aid the manager in controlling and monitoring the project versus project budget
- First step ; *cost accounts*

It enables managers to close the loop in the plan-do-check-act management cycle.

Introduction to EVM

Answering management questions

- Are we ahead of or behind schedule?
- Are we currently under or over our budget?
- What is the remaining work likely to cost?
- How much will we be under or over budget at the end?

Introduction to EVM

Helps to identify;

- Where problems are occurring,
- Whether the problems are critical or not,
- What it will take to get the project back on track.

Prerequisite to work with EV

Definitions

BCWS: Budgeted Cost of Work Scheduled

*formula: Planned Quantity * Planned Unit Rate*

BCWP: Budgeted Cost of Work Performed

*formula: Installed Quantity * Planned Unit Rate*

ACWP: Actual Cost of Work Performed

*formula: Installed Quantity * Actual Unit Rate*

CTC: Cost to Complete

formula: BCWS – BCWP

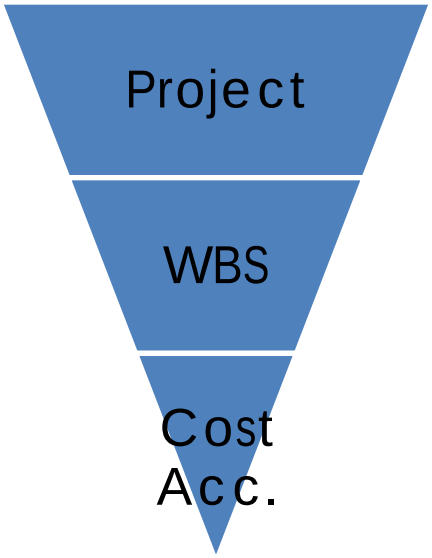
CAC: Cost at Completion

formula: CTC + ACWP

Prerequisite to work with EV

WBS & Cost Accounts (Controlling Codes)

- WBS starts with the whole projects and divided the project into individual systems.
- This individual systems are also divided into physical items.
- The lowest levels of the hierarchy are called cost accounts which are meaningful units of physical work to monitor the progress on field.



Prerequisite to work with EV

Actuals

- To measure the performance of actuals on the field, actuals are linked with the related controlling codes.
- Actual costs are tracked in 1C, which refers our ERP System, and actual quantities (installed quantities) are entered in RIB ITWO.
- RIB ITWO is our primary tool to measure the performance of projects and it is necessary to aggregate all of the actual data.
- A connector between RIB ITWO and 1C is designed to transfer the actual costs from 1C to ITWO and provides us full control on actuals.

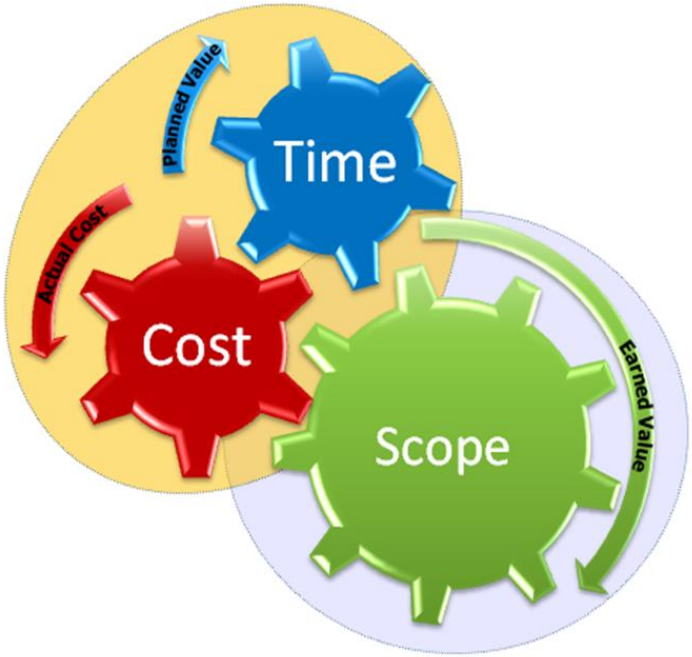
Prerequisite to work with EV

Scheduling and Resource Allocation

- Scheduling and allocation of resources are the other prerequisites of Earned Value (EV) Analysis.
- Earned Value requires a baseline and the distribution of resources integrated with baseline to set a specific time to measure the performance.
- Primavera P6 is our primary scheduling tool.
- The schedules created in Primavera are importing to ITWO in order to link the activities with BoQ items.
- And activities linked with BoQ items are also linked with the controlling code structure to get the distribution of planned quantities and integrated resources.

Key Data & Ratios

Renaissance Construction uses Earned Value Management (EVM) to track the progress, current status and future performance of the project. In order to determine these variables there are some calculation standards



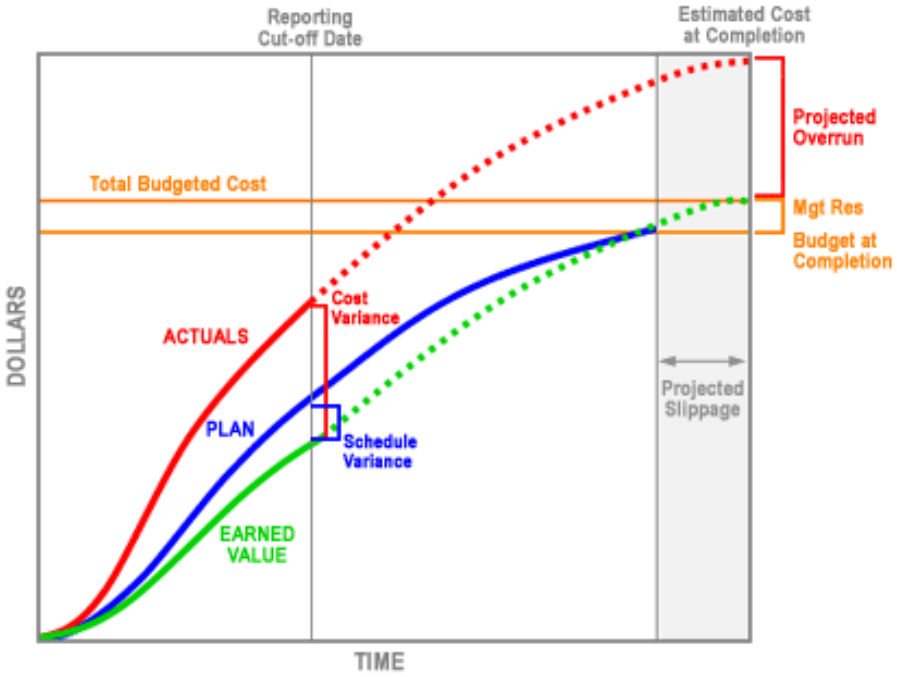
Schedule Variance (SV) & Cost Variance (CV)

- Schedule Variance (SV) is the calculation method, which determines how much the project is ahead or behind the schedule. This can be calculated using the formula below:
- SV = BCWP – BCWS

(BCWS denotes Budgeted Cost Work Scheduled and BCWP denotes Budgeted Cost Work Performed)

- Cost Variance (CV) is the indication of how much the project is over or under the budget. This variance can be found using the formula below:
- CV = BCWP – ACWP

(ACWP denotes Actual Cost Work Performed)



Cost Performance Index (CPI)

- Cost Performance Index (CPI) is the indicator that measures the financial effectiveness of a project.
- Renaissance merges the data coming from RIB ITWO and 1C Erp system in order to calculate CPI.
- We get BCWP after entering IQ (installed quantities) in RIB ITWO
- We get ACWP from our Accounting system (1C ERP)

  Formula:
  CPI = BCWP / ACWP

- A project with a CPI greater than 1.0 indicates that actual cost is less than budgeted cost or that the project is under budget.
- A CPI less than 1.0 indicates that the project is over budget.

Schedule Performance Index (SPI)

- Schedule Performance Index (SPI) is the ratio that shows how the work is progressing compared to the original schedule.
- It is the ratio of approved budget for the work performed to the approved budget for the work planned.
- In Renaissance, we calculate this ratio with the information coming from RIB ITWO.

  Formula:
  SPI = BCWP / BCWS

- If the project SPI is less than 1.0 the project is behind schedule.
- An SPI equal to 1.0 indicates that a project is precisely on schedule.

Sample Performance Report

With the help of these Key Data & Ratios, it is possible to focus on the problematic items and realize the current situation of Projects.

RENAISSANCE CONSTRUCTION

PERFORMANCE REPORT

31.05.2013

EXECUTIVE SUMMARY - DIRECT ITEMS ($)	CAC (Cost at Completion)	Planned (BCWS)	Earned (BCWP)	Actual (ACWP)	CPI	CPI Status	SPI	SPI Status
PROJECT A	184 231 301	80 153 767	79 970 667	78 565 504	1,02	◆	1,00	△
DIV. CIVIL CIVIL ITEMS	140 723 578	68 300 843	68 076 963	67 671 870	1,01	◆	1,00	△
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	43 961 748	11 852 924	11 893 704	11 893 704	1,00	△	1,00	●
PROJECT B	91 918 818	20 630 707	20 202 571	19 846 013	1,02	●	0,98	△
DIV. CIVIL CIVIL ITEMS	62 780 235	20 134 401	19 866 211	19 557 300	1,02	●	0,99	△
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	29 138 583	496 306	336 360	288 712	1,17	●	0,68	◆
PROJECT C	142 591 954	42 741 115	46 137 837	44 675 353	1,03	●	1,08	●
DIV. CIVIL CIVIL ITEMS	115 285 674	40 788 557	43 986 141	42 900 045	1,03	●	1,08	●
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	27 593 134	1 952 558	2 151 696	2 168 161	0,99	△	1,10	●
PROJECT D	89 342 894	32 642 994	20 693 895	8 101 518	2,55	●	0,63	◆
DIV. CIVIL CIVIL ITEMS	53 812 463	31 137 337	20 475 943	8 049 246	2,54	●	0,66	◆
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	35 530 431	1 505 657	217 953	52 272	4,17	●	0,14	◆
PROJECT E	33 900 688	18 327 006	17 678 165	20 265 414	0,87	◆	0,96	△
DIV. CIVIL CIVIL ITEMS	25 723 571	16 372 368	15 546 055	18 349 823	0,85	◆	0,95	◆
DIVISION01 GENERAL REQUIREMENTS	1 057			1 057				
DIVISION02 EXISTING CONDITIONS	80 771	343 005	341 567	77 640	4,40	●	1,00	△
DIVISION03 CONCRETE	4 425 967	1 616 915	1 569 225	2 373 565	0,66	◆	0,97	△
DIVISION04 MASONRY	190 436	90 511	52 188	93 623	0,56	◆	0,58	◆
DIVISION05 METALS	3 923 157	2 757 692	2 646 139	2 443 080	1,08	●	0,96	△
DIVISION07 THERMAL AND MOISTURE PROTECTION	2 750 715	1 725 126	1 651 176	1 632 033	1,01	●	0,96	△
DIVISION08 OPENINGS	491 728	108 026	108 026	186 321	0,58	◆	1,00	●
DIVISION09 FINISHES	620 233	438 563	442 749	261 812	1,69	●	1,01	●
DIVISION10 SPECIALTIES	6 340			37				
DIVISION11 EQUIPMENT								
DIVISION12 FURNISHINGS	1 624							
DIVISION31 EARTHWORK	10 335 572	7 001 472	6 565 073	8 085 210	0,81	◆	0,94	◆
DIVISION32 EXTERIOR IMPROVEMENTS	3 522 896	1 964 466	1 885 007	2 289 157	0,82	◆	0,96	△
DIVISION33 UTILITIES	1 174 748	326 593	284 906	980 787	0,29	◆	0,87	◆
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	8 281 626	1 954 638	2 132 111	1 915 592	1,11	●	1,09	●
DIV. ELEC ELECTRICAL ITEMS	4 340 435	1 535 024	1 514 766	1 218 607	1,24	●	0,99	△
DIV. MECH MECHANICAL ITEMS	4 015 679	419 614	617 345	696 984	0,89	◆	1,47	●
PROJECT F	185 653 164	35 576 547	35 462 877	36 439 790	0,97	△	1,00	△
DIV. CIVIL CIVIL ITEMS	80 191 595	32 122 894	32 506 721	33 745 266	0,96	△	1,01	●
DIV. MEP MECHANICAL, ELECTRICAL & PLUMBING ITEMS	105 583 162	3 453 653	2 956 156	2 694 524	1,10	●	0,86	◆
Grand Total	**725 657 364**	**230 072 136**	**220 146 012**	**207 893 592**	**1,06**	●	**0,96**	◆

BIM & 5D Project Management

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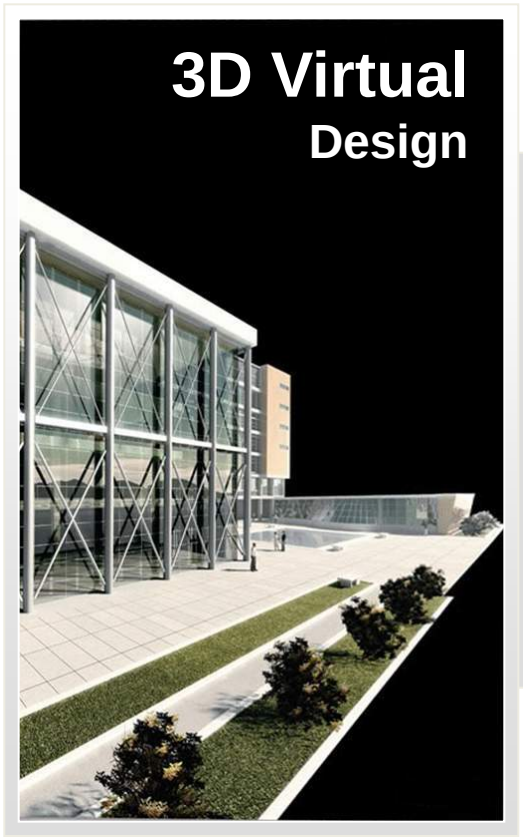

Revit®

4thD - Time

5thD - Cost

5D
Technology

RIB
running together

BIM & 5D Project Management

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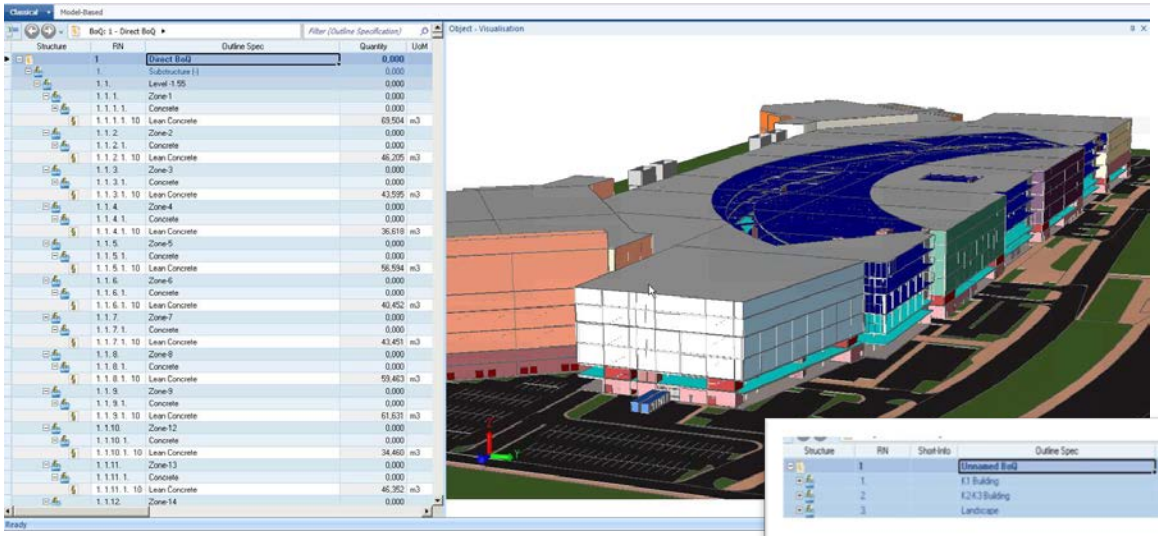
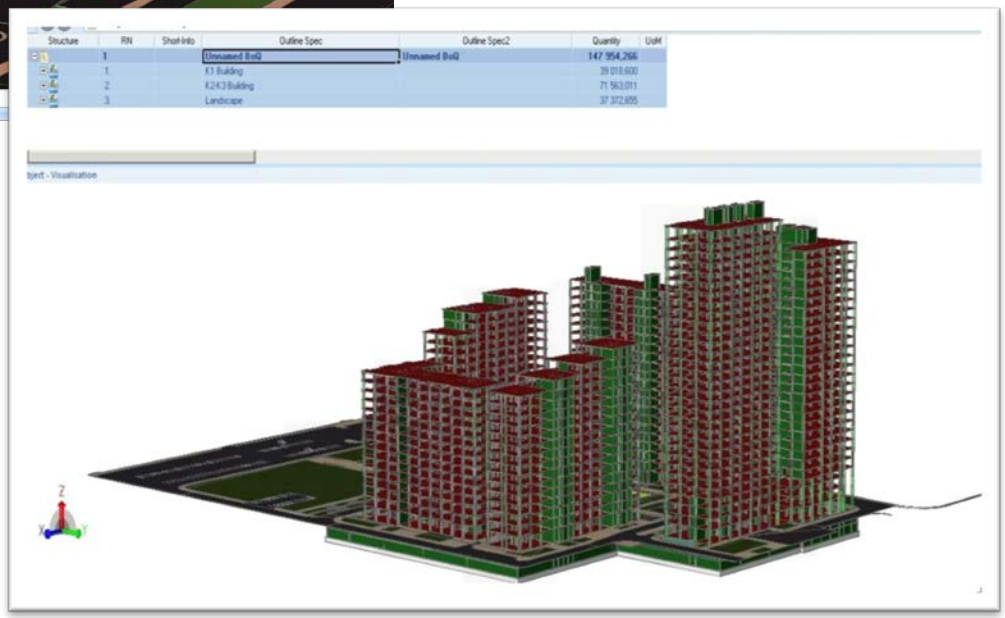
- Project is 3D modeled in **Revit**
- 3D Model is imported to **iTWO** via CPI file
- 3D Model is viewed and checked in **iTWO**
- Quantities are calculated and BoQ is prepared in **iTWO**
- Project cost is estimated in **iTWO**
- Work schedule is either prepared in **iTWO** or imported from **Primavera**
- Actual Costs are imported from ERP program **1C**
- Project 5D simulation can be performed in **iTWO**

3D Model←→BIM information





- √ **Quantity Calculation**
- √ **Better Visualization**
- √ **Clash Detection**
- √ **Direct Attachment of any Spec List**

3D Model←→ Project Actual Information

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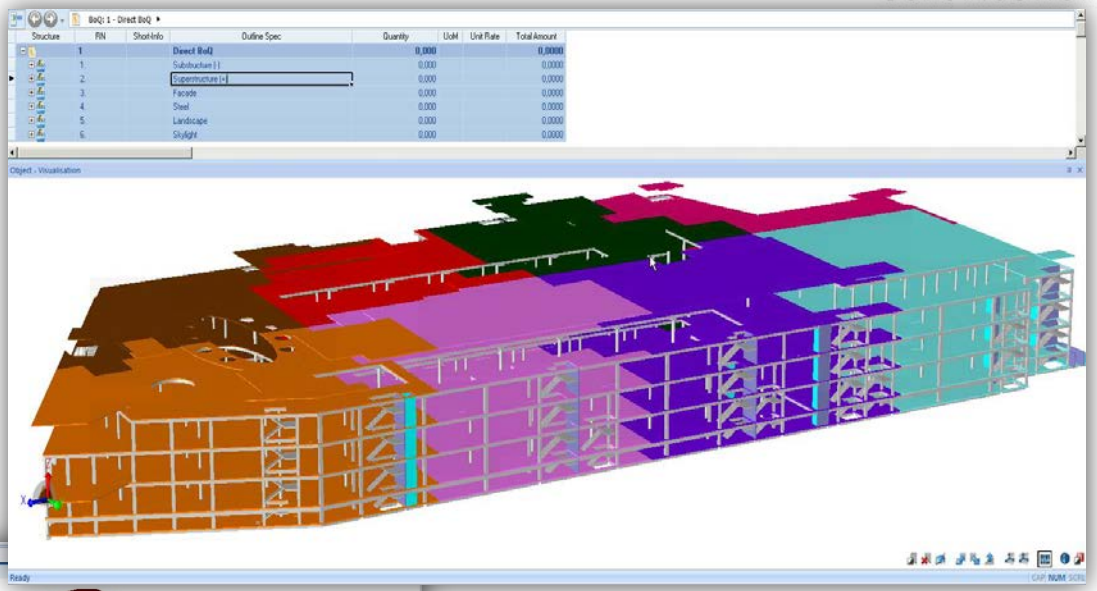
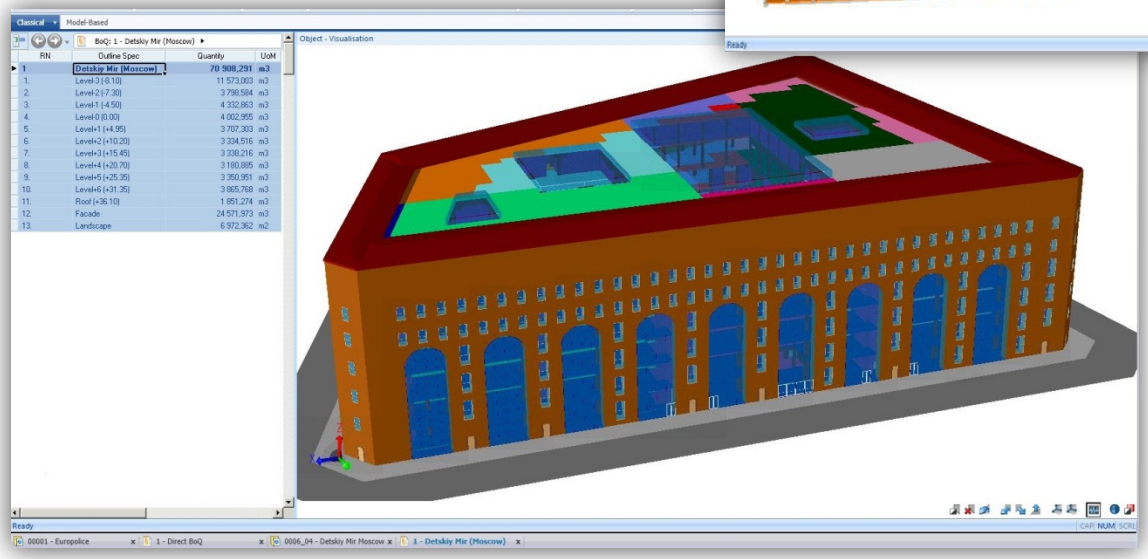
- √ **Visualize Result**
- √ **Fast Evaluation**
- √ **Transparency**
- √ **Real time budget control**





- √ **Filtering Cost Relevant Data**
- √ **Direct Link to BoQ**

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5D simulation demonstration: