



TEKLA[®] *potential*³

BIM at Tekla

ECPPM 2012 Reykjavik

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Leif Granholm

Tekla Corporation

- > Leading provider of model-based software for customers in
 - construction and
 - infrastructure and energy industries
- > Founded in 1966
- > Listed on NASDAQ OMX Helsinki during 2000-2012
- > Customers in 100 countries
- > Own offices in 14 countries
- > Research and development expenses over 25% of net sales



Leif Granholm

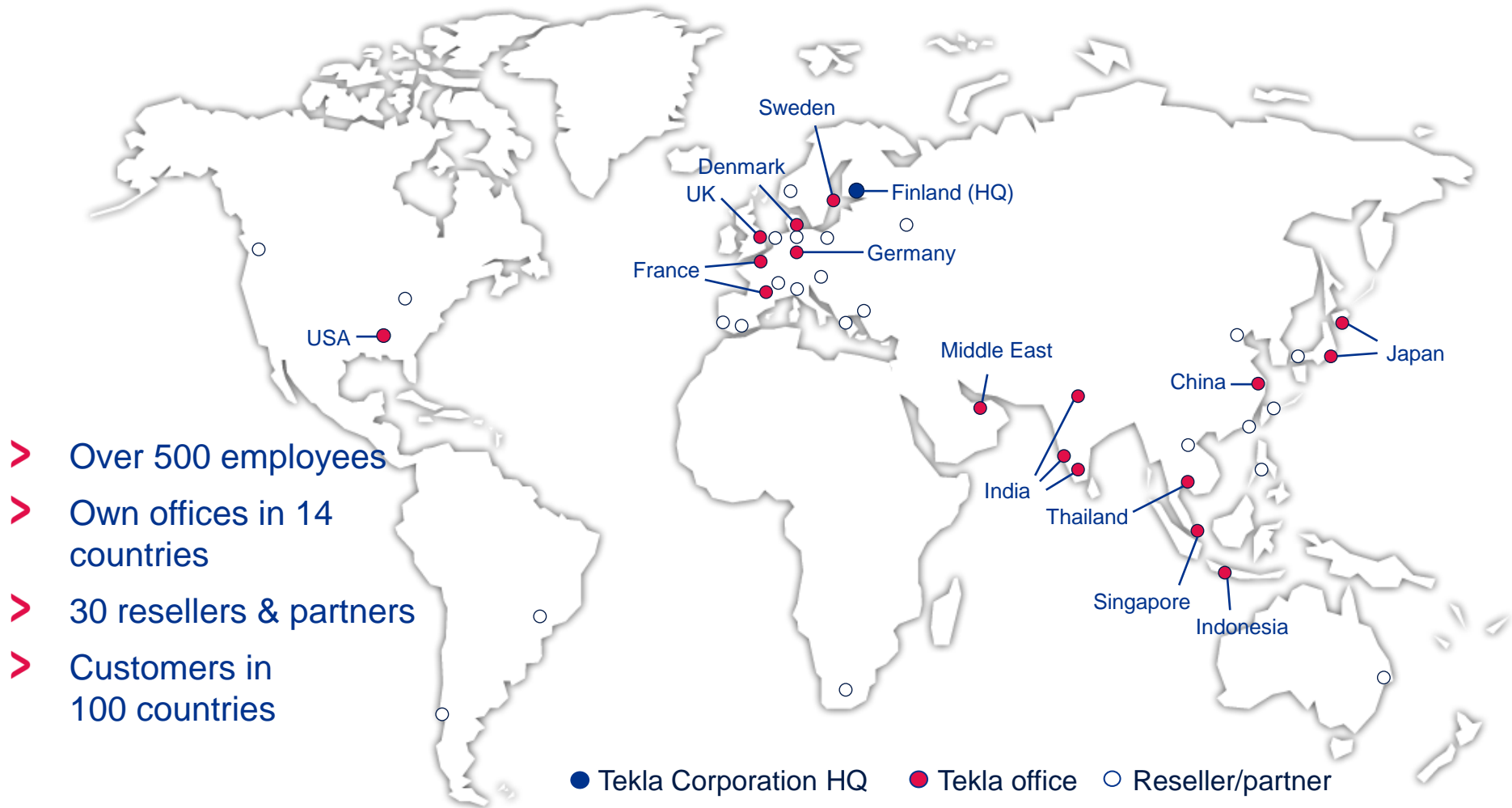
Tekla and Trimble

- > Tekla and Trimble have collaborated since 2008
- > Combination agreement signed on May 8, 2011
- > Trimble's public tender offer on May 9, 2011
- > Tender period May 19 – June 27, 2011
- > Final result of the offer announced on June 30, 2011
 - Trimble owns 99.46% of Tekla shares
 - Compulsory redemption proceedings for the remaining shares was initiated
- > Tekla became part of Trimble group on July 8, 2011
- > Trimble acquires all Tekla's shares which are delisted from the NASDAQ OMX Helsinki Stock Exchange on February 10, 2012

Trimble Navigation Limited

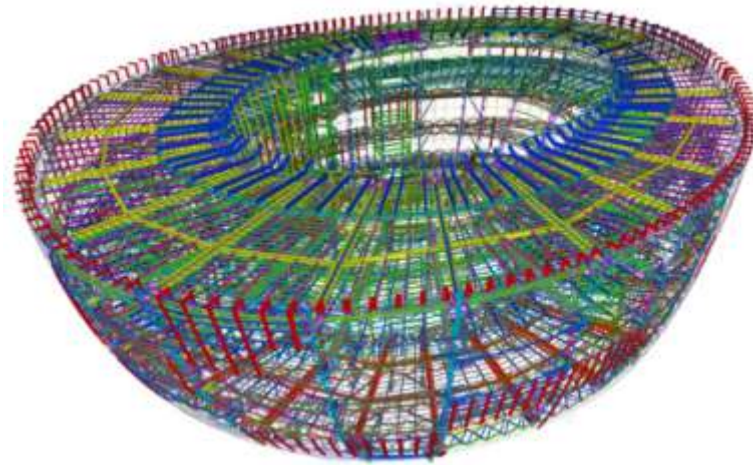
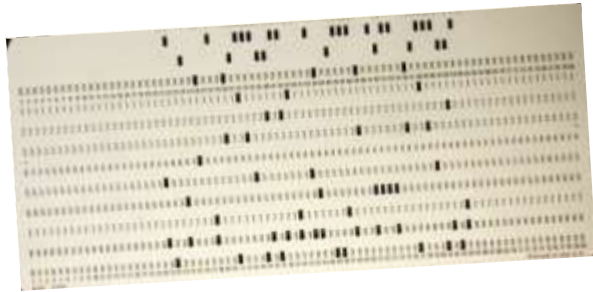
- > Trimble is a leading provider of advanced positioning solutions for customers in
 - engineering and construction,
 - surveying,
 - agriculture,
 - fleet management and
 - field service
- > Founded in 1978
- > Listed on the NASDAQ Stock Exchange
- > Trimble products are used in over 100 countries
- > Own offices in over 21 countries
- > Revenue \$1.6 billion in 2011

Global network



- > Over 500 employees
- > Own offices in 14 countries
- > 30 resellers & partners
- > Customers in 100 countries

From punch cards to product modeling



From punch cards to product modeling

- > Tekla adopted product modeling idea in software development early (early 80:s)
- > Tekla model based philosophy and principles
 - Low level platform, application schema known by the whole sw
 - Information- and data modeling based on real world phenomena, not documents
 - Minimize redundant data and relationships from data model, i.e. everything that can be calculated and created on the fly is done so.
 - Separate information created, owned and maintained by the software from information obtained from other sources, both schema and information management

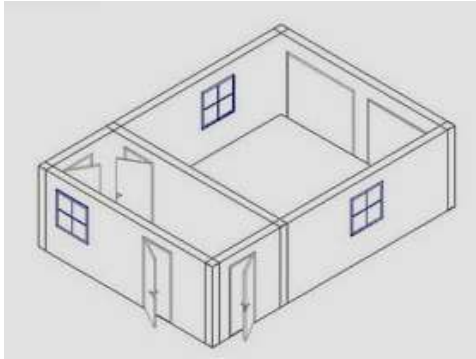
BIM status



BIM – Structured data

Objects describing building

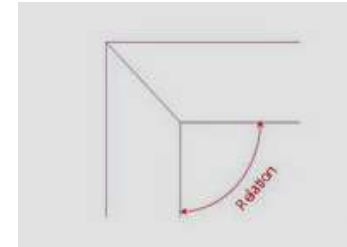
Functional objects



Physical objects



Logical objects

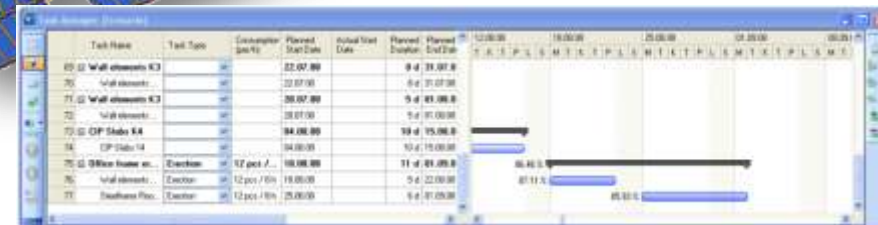
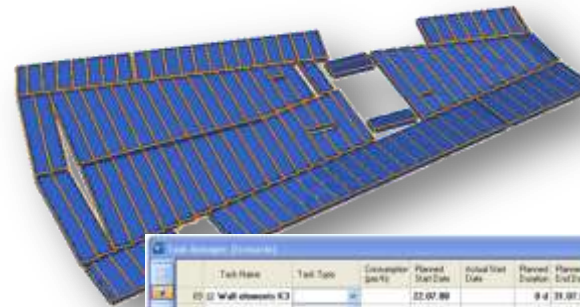


Abstract objects



Objects describing process

- Schedules
- Resources
- Costs
- Quality assurance
- Tasks
- Work
- Approvals
- RFI:s
- Submittals
- ...



DRUM - Distributed information management

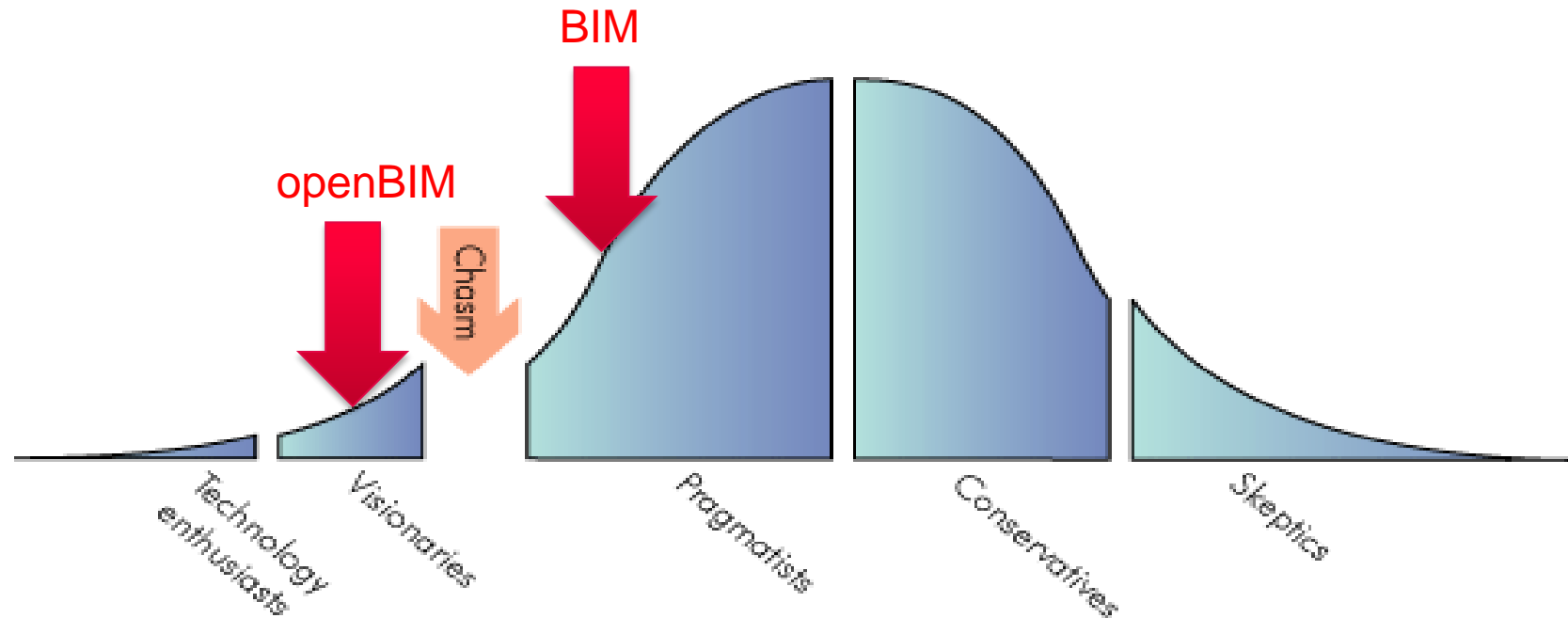
BIM today

- > Mostly Lone BIM, models used to produce documents and Visualizations
- > Information flow in process document based (electronic or paper)
- > Models transferred between parties on an ad-hoc basis, as support for documents.
- > No established collaboration workflows

BIM today

- > BIM applications very much in focus
- > Discipline specific models
 - Architectural (masses, spaces, building parts, doors, windows, interior finishing) Revit, ArchiCAD, Bentley Architecture, Vectorworks, Allplan)
 - Structural (load bearing structures, foundations, piling, cladding...) Tekla Structures, Revit Structure, Bentley Structure
 - Mechanical (Electrical, Piping, Ventilation, Heating...) Revit MEP, Magicad, DDS, CADDuct, QuickPEN

BIM and openBIM adoption



BIM based process



BIM based process, background

- > The Construction Industry works very project oriented today
 - The Project manager has great influence in the organizing of operations (example: big contractor in Sweden, 50,000 suppliers)
- > IT-support very fragmented (example: big contractor in Finland, 180 different applications that communicate badly or not at all)
- > As good as all information flows based on documents (paper or electronic)

BIM based process, definition

- > BIM - building information **modeling**
- > BIM – building information **management**
- > Information Exchange between persons and organizations is implemented using digital structured model based information.
- > This means in practice that the information is primarily structured for “machine consumption” so that software can automatically understand and act upon the information.
- > Documents are intended for “human consumption”.

BIM based process, benefits and opportunities

- > More effective and error free operations in all stages thanks to automation in information processing
- > Possibilities for better design of building and better planning of actual construction thanks to dramatically improved access to actual and correct information
- > More flexibility in defining processes because type and extent of information decoupled
- > More opportunities for prefabrication and automation in all construction, for the first time can all details be fully solved, no type details at site.
- > End result (building or structure) well documented

BIM system architecture DRUM project



DRUM - Transaction based information sharing and distributed information management

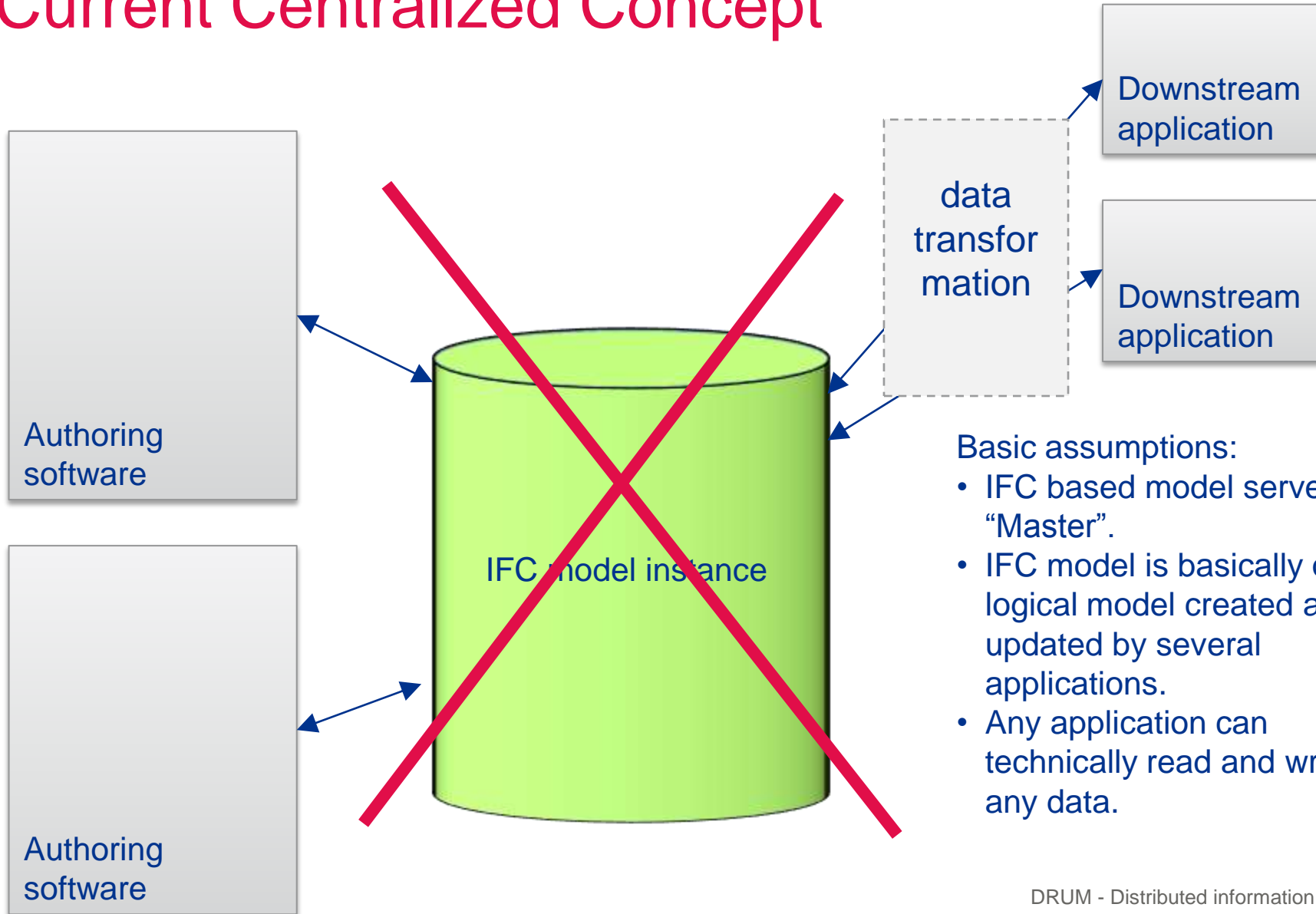
- > Budget 2 M€
- > Industrial Parties:
 - Tekla (leader)
 - Skanska
 - Solibri
 - Progman (MagiCAD)
 - Logica (ERP)
 - MAP (ArchiCAD dealer)
- > Research parties
 - Aalto university
 - Georgia Tech

DRUM

- > Funded by Tekes (Finnish government) Part of SHOK program

- > Original project idea:
Create "GSM" (Mobile network) for construction industry

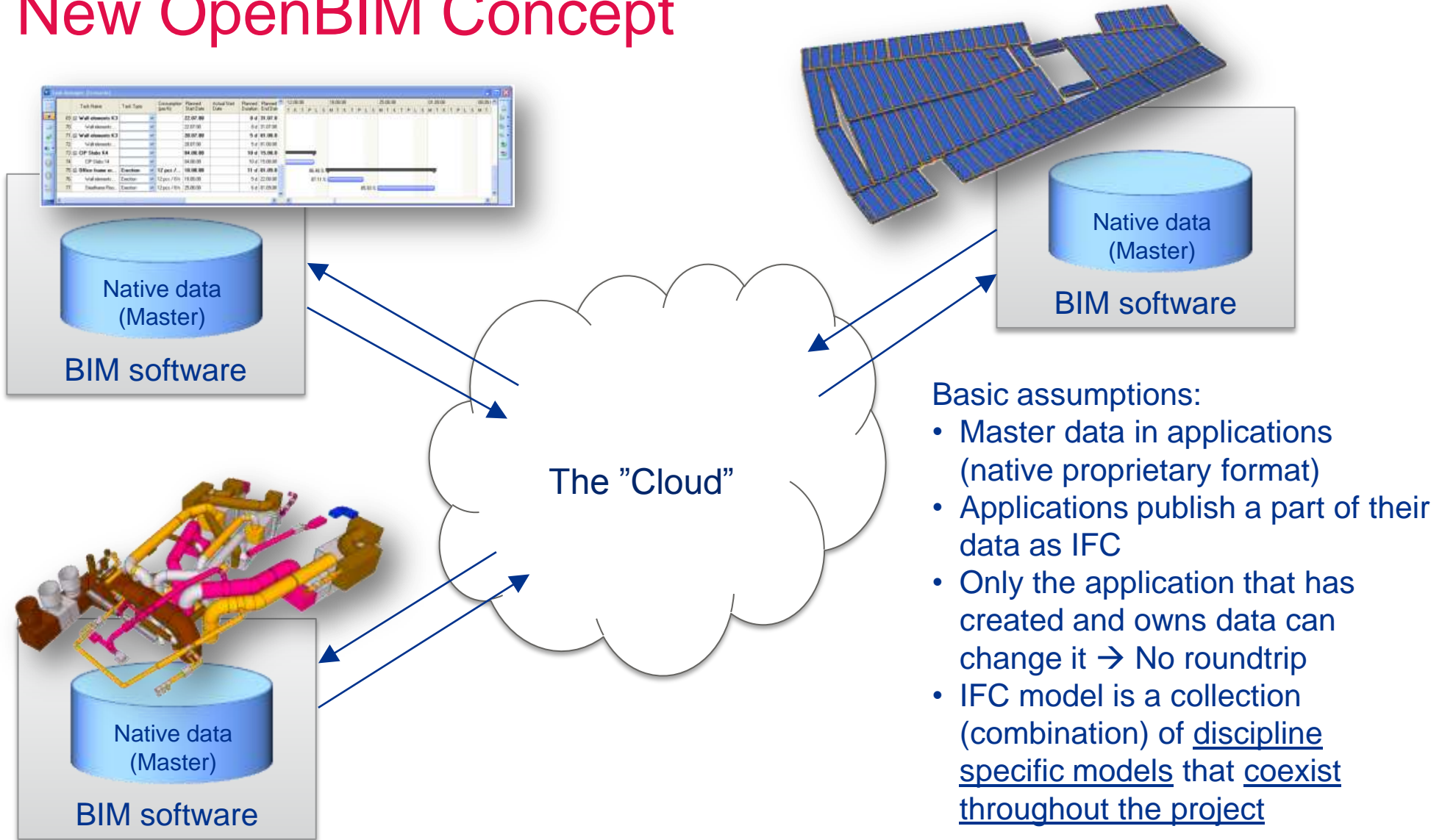
Current Centralized Concept



Basic assumptions:

- IFC based model server is "Master".
- IFC model is basically one logical model created and updated by several applications.
- Any application can technically read and write any data.

New OpenBIM Concept



Actual BIM model structure



Architectural spaces

Architectural building parts

Architectural detailing

Architectural production



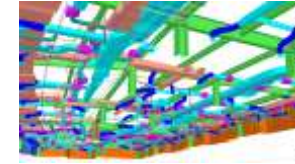
Structural general design

Structural in situ concrete detailing

Structural precast concrete det.

Structural steel detailing

Structural site production



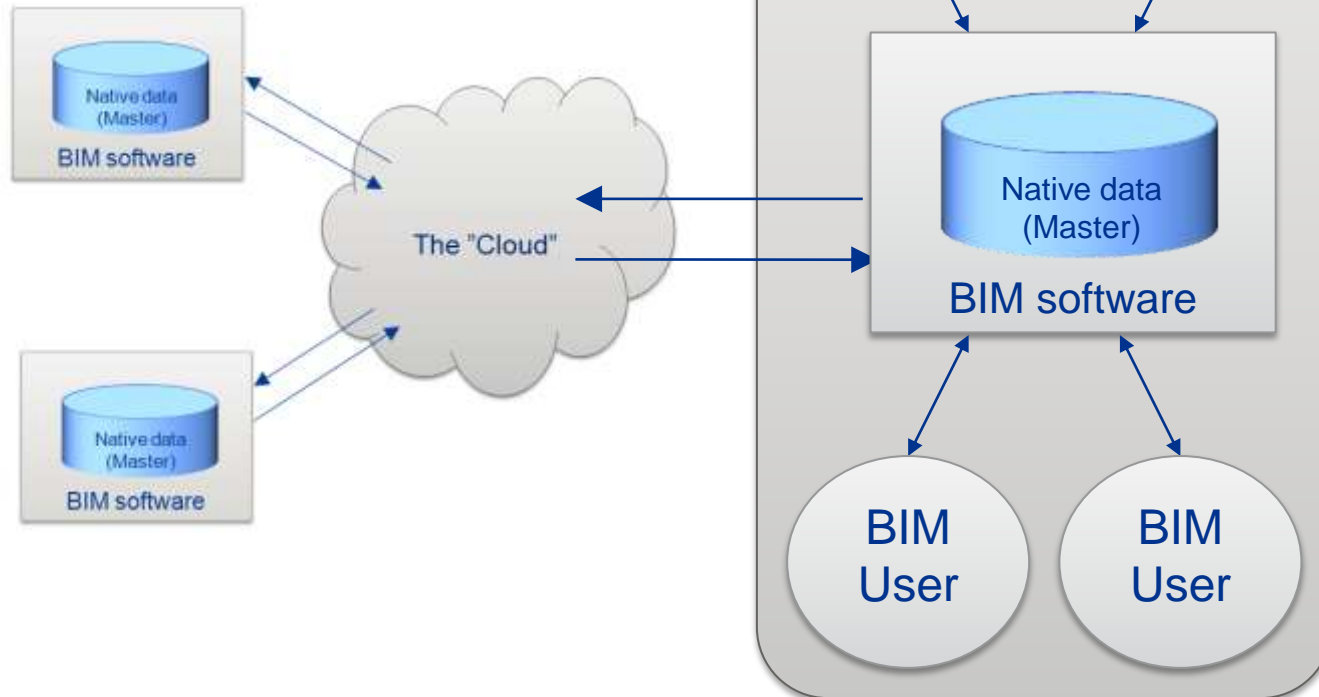
MEP design

MEP fabrication

MEP production

Partial models coexist throughout the Project

OpenBIM Concept

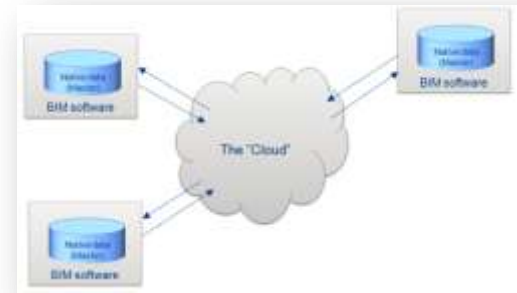


Each participating client is one instance of logical database in specific BIM software

Native multiuser functionality between BIM users of one system (client) with fully shared information (roundtrip), also across organizations

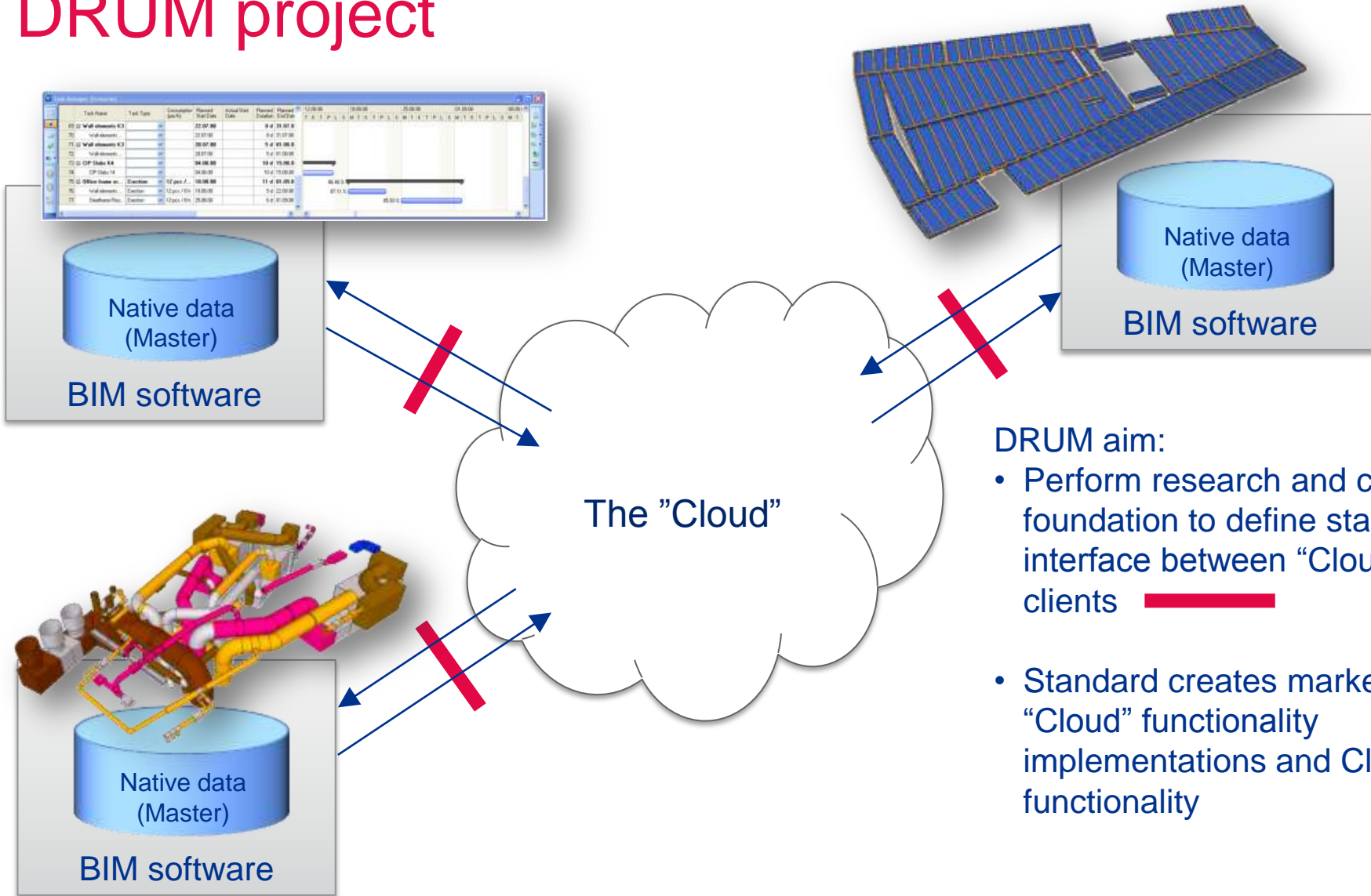
Two level collaboration, tight (roundtrip) integration within one logical model, loose (no roundtrip) integration between clients

"Cloud" functionality



- > Transaction based communication
 - Subscribing to published IFC datasets with incremental updates
 - Any client can subscribe to any data published by another application
 - Current situation transferred initially and after that changes only, as they are published
 - Workflow type of action transactions with (semi)automatic routing
 - F.ex MEP engineer needs penetrations through structures and requests these from architect and/or structural engineer
- > Managing and publishing metadata of and from participating models
- > Creating, managing and publishing relationships between objects in the participating models

DRUM project



DRUM aim:

- Perform research and create foundation to define standard for interface between "Cloud" and clients
- Standard creates markets for "Cloud" functionality implementations and Client functionality

Other IFC initiatives

- > Tekla BIMsight, free collaboration tool
 - Based on IFC
 - Supports BCF
- > Steel fabrication BIM
 - Information from detailing to fabrication (all the way to NC machines and robots) as IFC
 - Endorsed and supported by AISC
 - IDM and MVD work by Georgia Tech
- > Rebar fabrication BIM
 - Rebars using swept disc geometry

Thank you!