



Network-based Scheduling Industry day – bips conference

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Nyborg, September 2010

Agenda



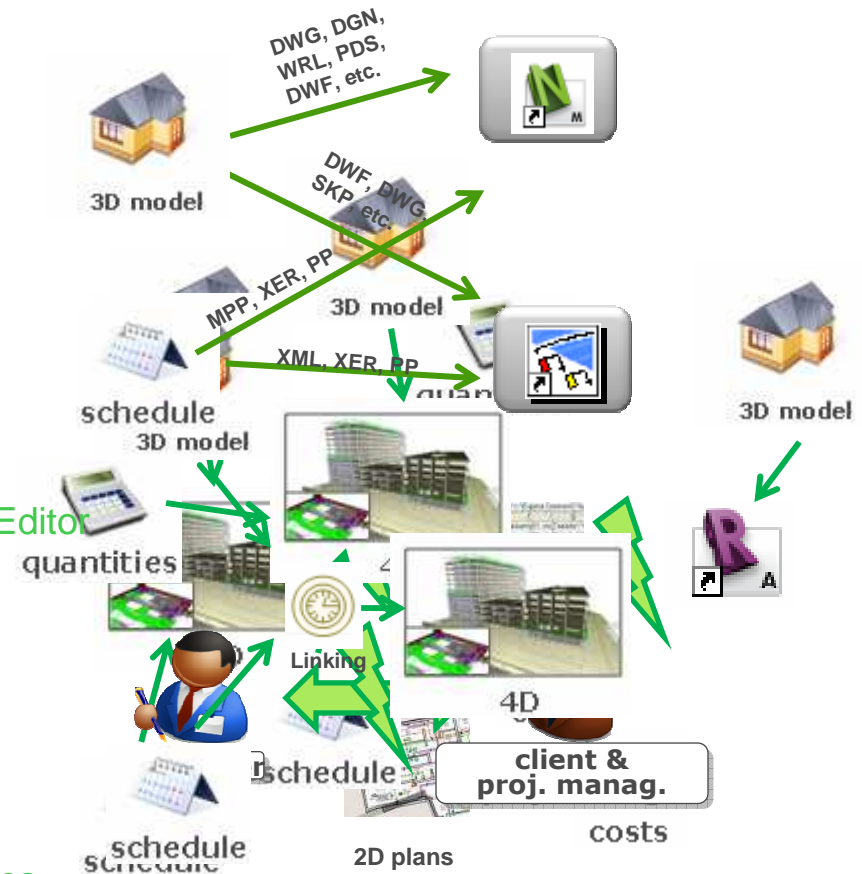
- ❑ **Status Quo(Drawbacks/ Objectives)**
- ❑ **Process Workflow**
- ❑ **Tools Overview**
- ❑ **Real-life project**
- ❑ **Main developments**
- ❑ **Conclusion/Discussion**

Status Quo / Best practice

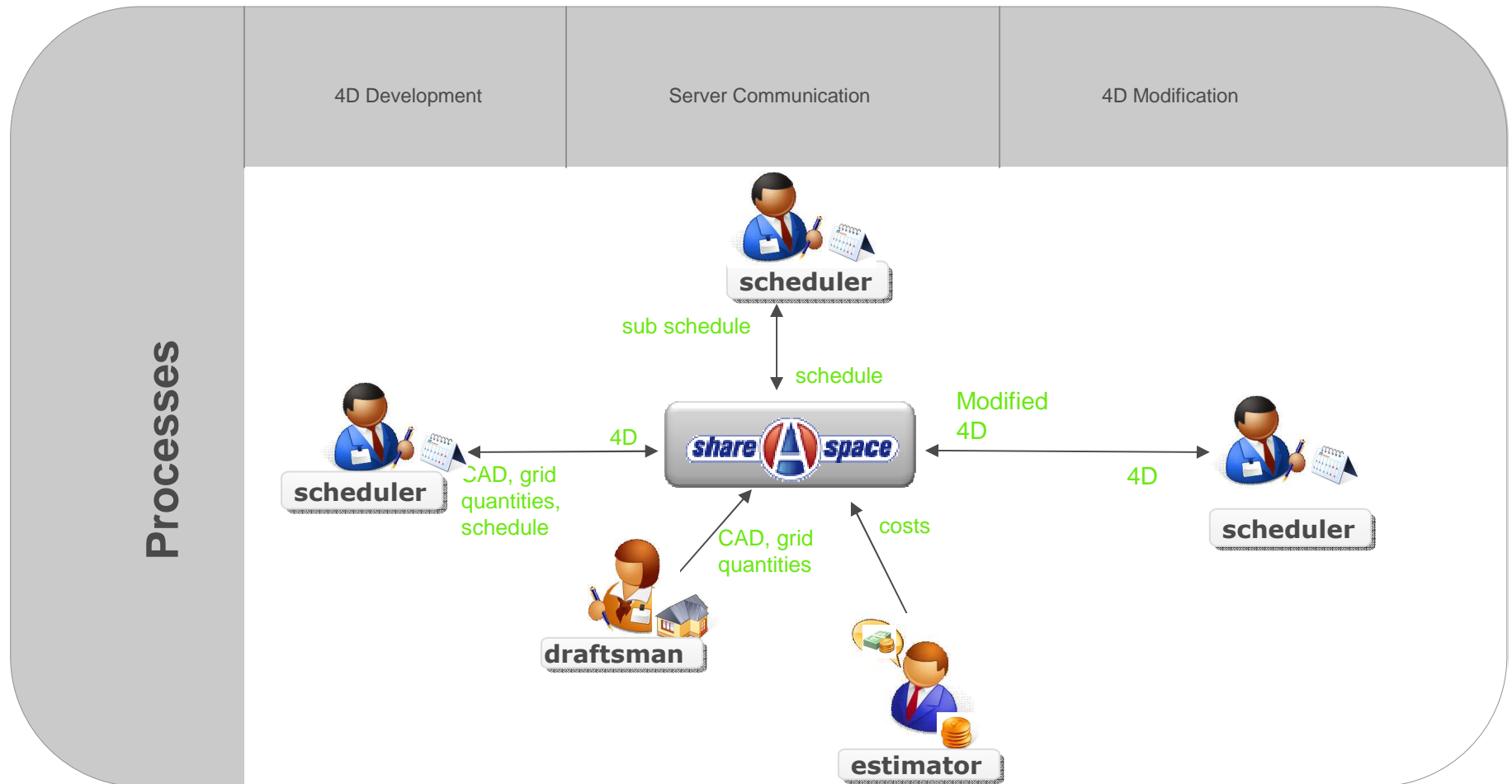
Drawbacks of current practice and Objectives



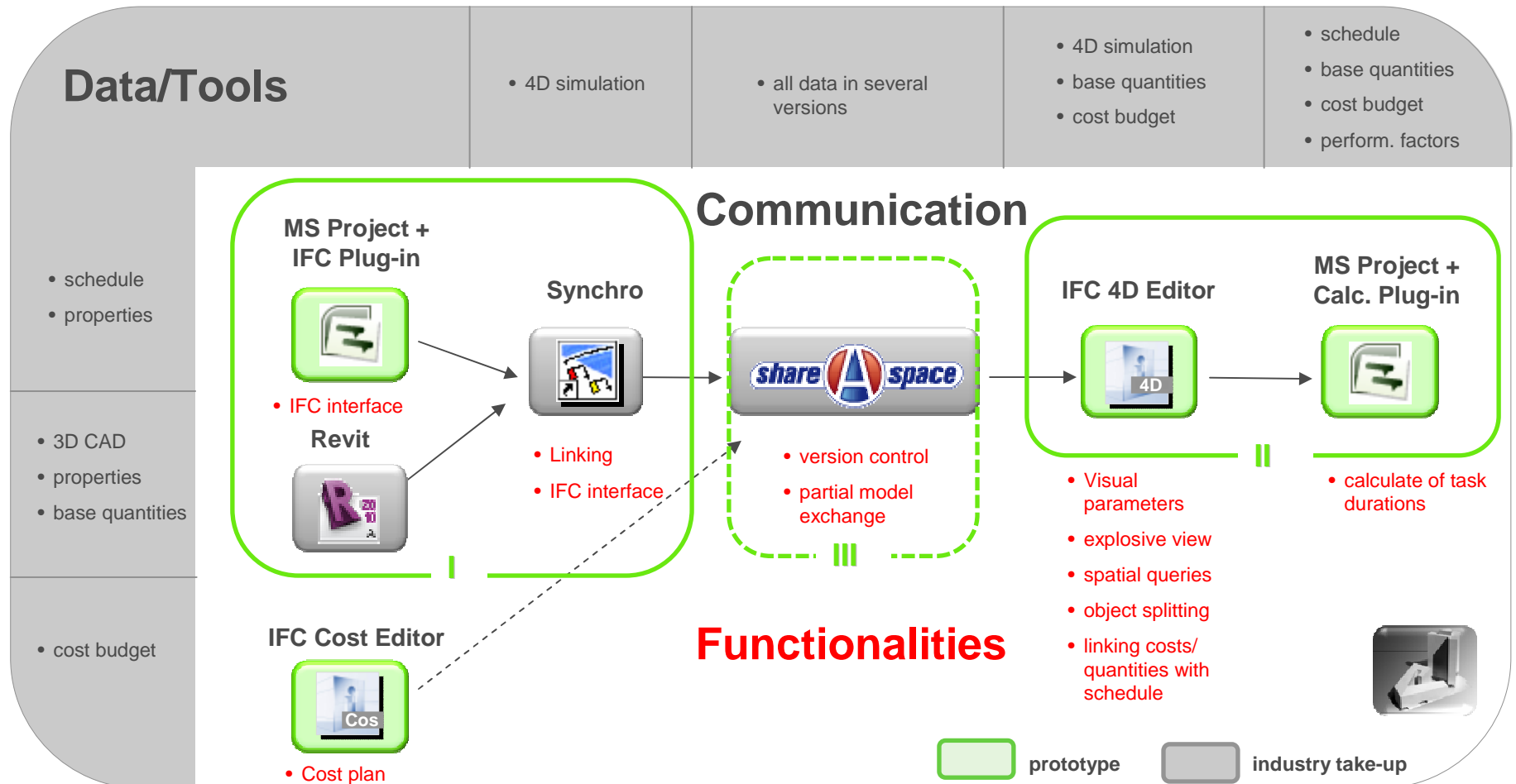
- ❑ No consistent interface to exchange 3D model and schedule with 4D Editor
 - ➡ Establish IFC as a standard
- ❑ No possibility to access required data out of one system
 - ➡ Develop an integrated IFC-based 4D Editor
- ❑ Media disruption while structuring and scheduling activities
 - ➡ Integrate extended functionalities within 4D Editor
- ❑ Time consuming 4D development
 - ➡ Enhance available linking mechanism
- ❑ Limited possibilities to communicate resulted 3D, schedule and 4D with other actors
 - ➡ Improve interface and communication features



Process Workflow



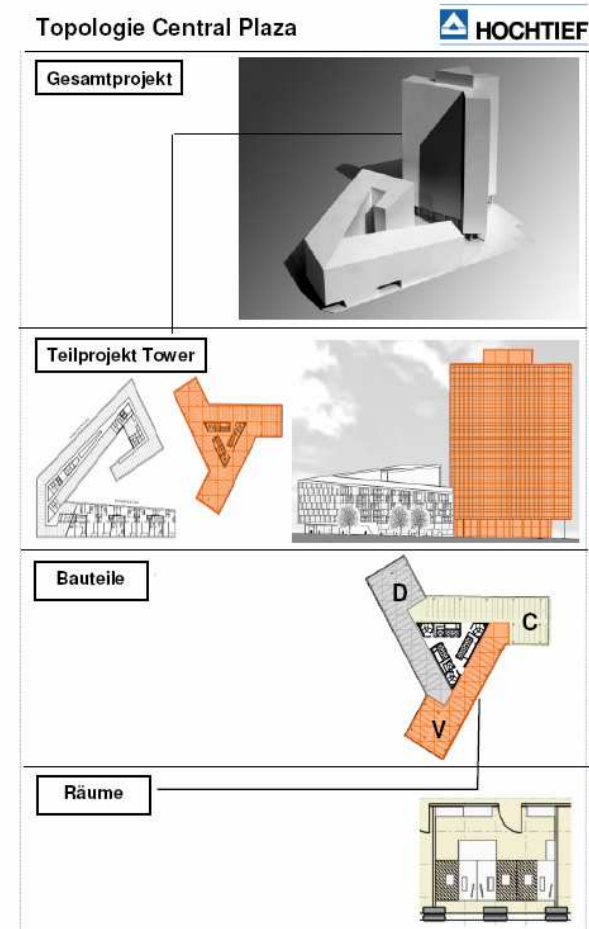
Demo Scope Workflow



Demo Project Emporio



- Restoration project in the downtown of Hamburg
- Owner: Union Investment Real Estate AG
- Office building that is to be divided in max 3 rent units per storey
- 23 storeys exist and 2 storeys to be heightened ca. 86,50 m high
- Main scheduling tasks: Removing interior finishing works, construction, Façade works & finishing works



Main Developments

Simplifying the linking process



The screenshot displays the Inpro software interface with several key components highlighted by green callout boxes:

- Attributes of 3D objects:** A callout box points to the 'User fields' table in the left sidebar, which lists various attributes like 'IfcType', 'Baugruppen...', and 'Phase erstell...'.
- Linking rules definitions:** A callout box points to the 'Edit Rule' dialog box, which shows a rule name '100414_Abruch' and a complex logical expression: `AND (User field: Section[PSet_Revit_Sonstige] = User field: Section[TaskU AND (User field: Name[PSet_Revit_ID-Daten] = User field: Storey[TaskUser AND (User field: IfcType = User field: Element[TaskUserFields])))`. Below the expression are sections for 'Resource attribute', 'Task attribute', 'Algorithm', and 'Operator'.
- User fields of scheduling tasks:** A callout box points to the 'User fields' table in the right sidebar, which lists user-defined fields for tasks, such as 'Lo[TaskUser...', 'Storey[TaskU...', 'Remark[Task...', and 'Element[Task...'.

Main Developments

Object splitting



Splitting (along zones)

Splitting (free hand/slices)

prototype
 industry take-up

Gliederungsnummer	ID	Vorgangname
- 1	1	Innerer Abbruch
- 1.1	2	Abbruch Innena
- 1.1.1	3	23.OG - Abschni
- 1.1.1.1	4	Demontage Weif
- 1.1.1.2	5	Demontage im S
- 1.1.2	6	23.OG - Abschni
- 1.1.2.1	7	Demontage Weif
- 1.1.2.2	8	Demontage im S
- 1.2	9	Abbruch Innena
- 1.2.1	10	22.OG - Abschni
- 1.2.1.1	11	Demontage Weif

3D Subdivision window details:

- Subdivision type:
 - None
 - Free Hand
 - Slice
 - User Slice
- Polylines: Polyline[00]((1,0.420173),(0,0.428678))
- Axes:
 - Local
 - Manipulate
 - World
 - Snap to Face
 - Layers Up
 - None
- Options:
 - Create/Remove Resources for 3D Subparts
 - Assign 3D Subparts to the same Task(s) like Parent 3D Object
 - Show Subdivision Planes

Main Developments

Calculate Duration



Eigenschaften

Hauptgewerk	Bauteil	Material	Gewerk	Arbeitsschritt
Allgemeiner Al.	Boden	Teppich	Belagsarbeiten	Bahnware
Allgemeiner Ausb.	Boden	Teppich	Bodenbelagsarbeit	Bahnware

DB Zugriffdaten

Bearbeiter: BPM Änderungsdatum: 12.02.2010

Datenbank Eintragungen

min Zeit [h/Einheit/Mann]	min Leist. [Einheit/Tag]	Kolonne min [Mann]	Kranbedarf min [h]	
0,15	64,00	2	0,00	
max Zeit [h/Einheit/Mann]	max Leist. [Einheiten/Tag]	Kolonne max [Mann]	Kranbedarf max [h]	Lohnanteil [%]
0,25	106,67	2	0,00	0%

gew. Zeit [h/Einheit/Mann]	gew. Leist. [Einheiten/Tag]	gew. Kolonne [Mann]	Eingabe: Menge	Einheit	Stunden je Tag [h]
0,20	80,00	2	500	m ²	8

HOCHTIEF CONSTRUCTION AG

Daten-Schnittstelle

Daten von MS Project lesen Daten an MS Project schreiben

Manuell

Bauzeit in Tagen [d]

6,25

Frage hier eingeben

P_Emporio_baseQuantities.mpp|Construction_Time_Calculator

	Feb '11	Mrz '11	Apr '11
	17. 24. 31. 07. 14. 21. 28. 07. 14. 21. 28. 04. 11. 18.		

Ballastplanum (Garrett)	Bezeichnung	Dauer	Einheit	Menge	Einheit	Stunden je Tag
514	Ausbau/TGA-Regelplatte Abschnitt 2	0	95 Tage			
515	Gesamtetage/Büroflächen/Flure	0	92 Tage			
516	GK-Wände F90-Ständerwerk inkl. TGA Gobinstall	0	10 Tage			
517	Hohlraumboden	0	5 Tage	neiner Ausbau	Teppich arbeiten einware	500 m ² 8 2 0,2
518	GK-Flur/Bürowände-Ständerwerk inkl. Türzargen	0	10 Tage			
519	Maler-Anstrich Wände	7,19	5 Tage	neiner Ausbau	Farbe Anstrich le gerollt	1000 m ² 8 2 0,12
520	Teppichboden	6,25	5 Tage	neiner Ausbau	Teppich arbeiten einware	500 m ² 8 2 0,2
521	Türblätter	5	5 Tage	neiner Ausbau	Holz arbeiten einbauen	20 Stck 8 2 4
522	ElektroMSR-Feininstallation/Beleuchtung	0	5 Tage			
523	Sanitärbereiche	0	95 Tage			
524	GK-Kernwände-Ständerwerk inkl. TGA Grobnst:	0	15 Tage			
525	Estrich	1	5 Tage	neiner Ausbau	Estrich arbeiten lestrich	100 m ² 8 1 0,08
526	Fliesen Wände /Boden in WC	3,98	15 Tage	neiner Ausbau	nik / Ton Fliesen Xünnbett	75 m ² 8 2 0,85
527	WC-Trennwände/-Türen	0	5 Tage			
528	ElektroMSR-Feininstallation/Beleuchtung	0	10 Tage			
529	Restarbeiten/Finisch/Grundreinigung	0	5 Tage			
530	Ausbau/TGA-Regelplatte Abschnitt 3	0	90 Tage			

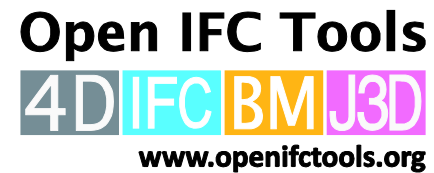
Conclusion



- ❑ **integration of “Scheduling” within project network**
- ❑ **Improving 4D Editors to meet scheduling requirements**
- ❑ **Prototype as open source, TNO plug-in for Ms-Project, Synchro**
- ❑ **Contribution to IFC 2x4**

Project Partners

Network-based Scheduling KP4





thank you

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