



SPREMINJAMO
GRADBENO
KULTURO

Izboljšana komunikacija in sodelovanje

Common data environment – CDE

maj 2017

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Zaposlen

Univerza v Ljubljani, Fakulteta za gradbeništvo
in geodezijo, Katedra za gradbeno informatiko

Izobrazba

Doktorska disertacija (2001) - Programske
komponente za analizo konstrukcij po metodi
končnih elementov

Raziskovalno delo

gradbena informatika, računska okolja

Internet, SOA, HPC/HTC, grid/oblak, odprta koda

Ruby, Python, Java, C/C++, .NET, Swift

Kontakt

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🐦 [@matevzdolenc](https://twitter.com/matevzdolenc)

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Spomin na IntelliGrid

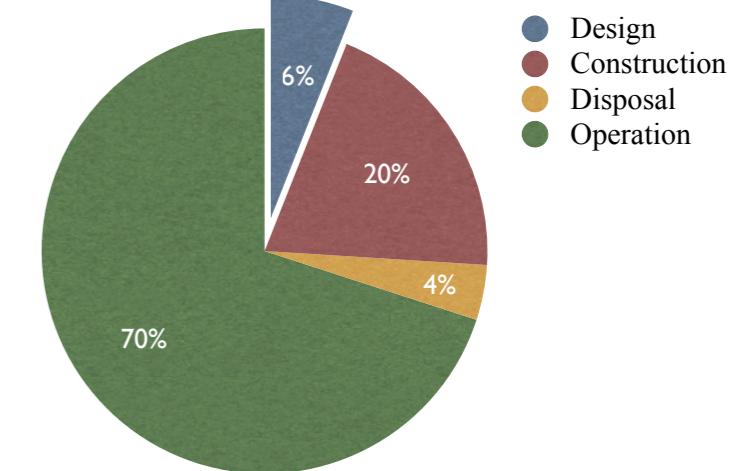
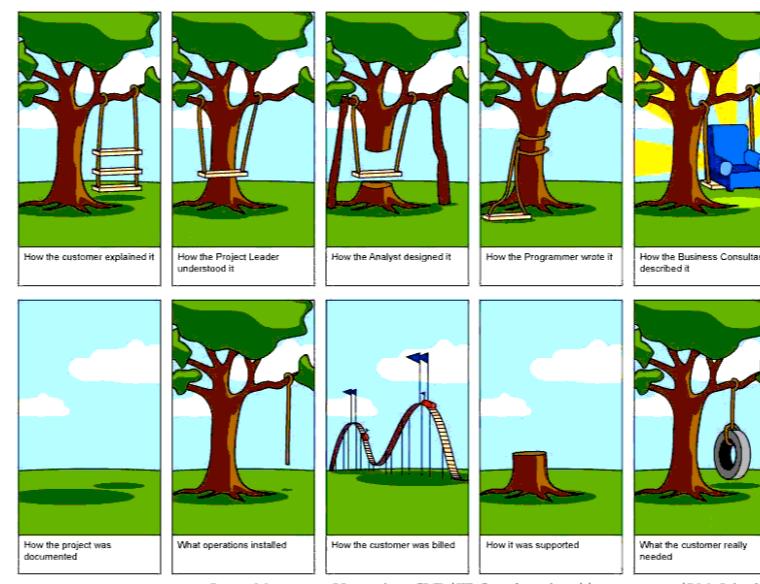
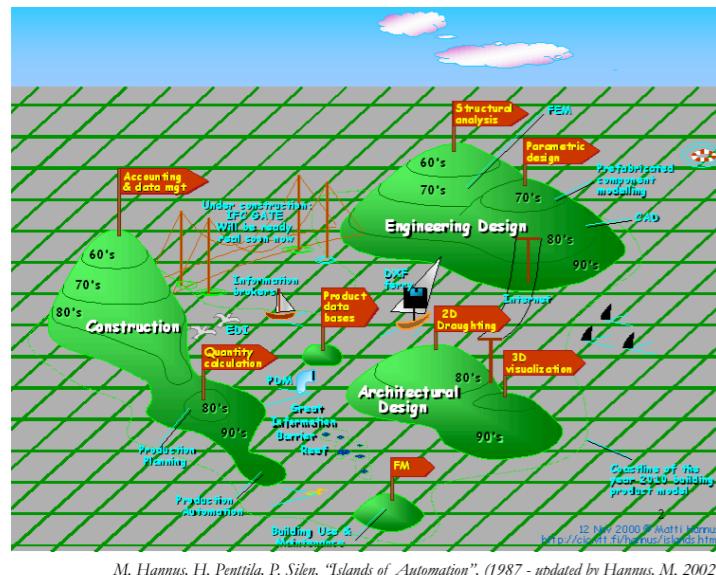
Common Data Environment: definicija, standardi, implementacija, oblike, zahteve, ...

Zaključek

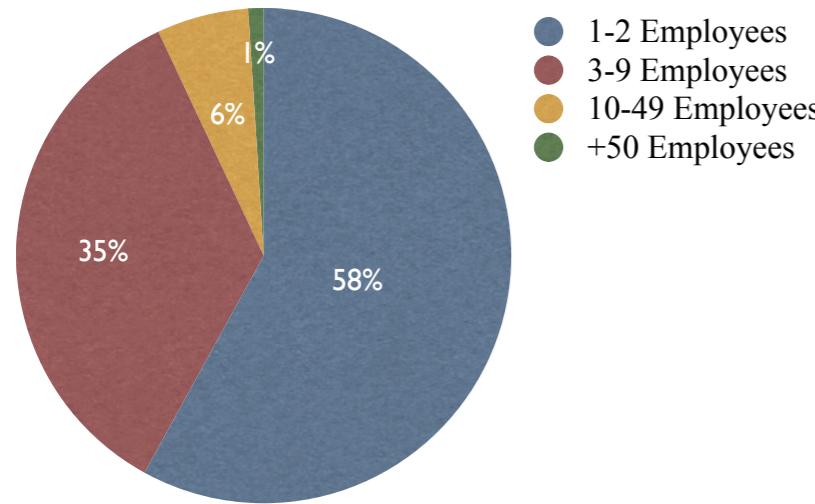
Povzetek

Povezave

Posebnosti gradbeništva



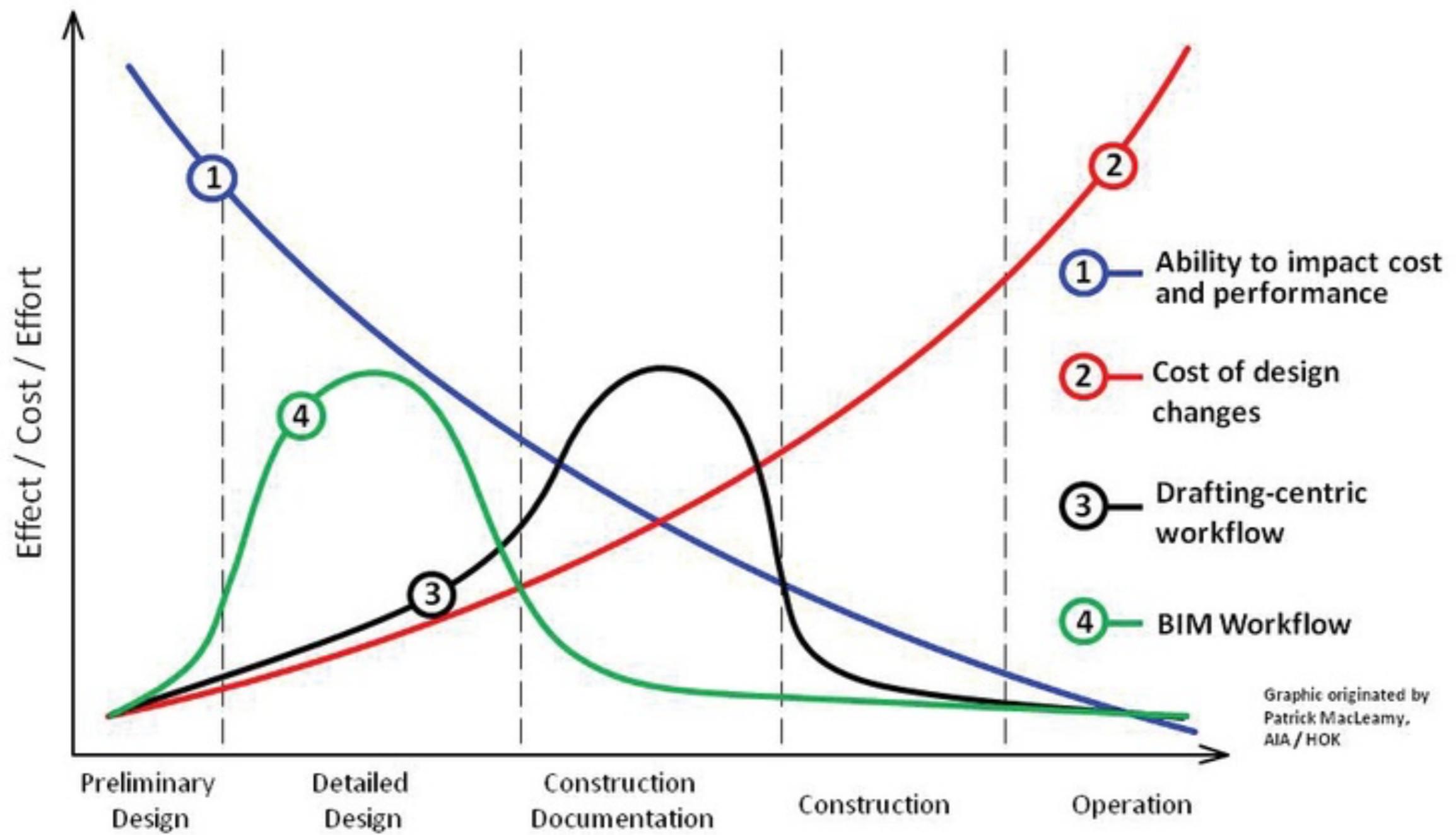
The Building Information Model: A Look at Graphisoft's Virtual Building Concept, Cyon Research White Paper, January 2, 2003



Pazlar, T., Dolenc, M. in Dubovnik, J. 2004. Rezultati raziskave prodAEC o rabi informacijskih tehnologij v arhitekturi, inženirstvu in gradbeništvu v Sloveniji. *Gradb. vestn.* 53, 9: 223–229.



Relativen vpliv odločitev na projekt



Komunikacija

Komuniciranje je proces, s pomočjo katerega ljudje skupno ustvarjamo in upravljamo socialno stvarnost.

(Trenholm in Jensen, 2000)

O komuniciranju govorimo tedaj, ko med nami in našimi partnerji teče kontinuiran tok sporočil.

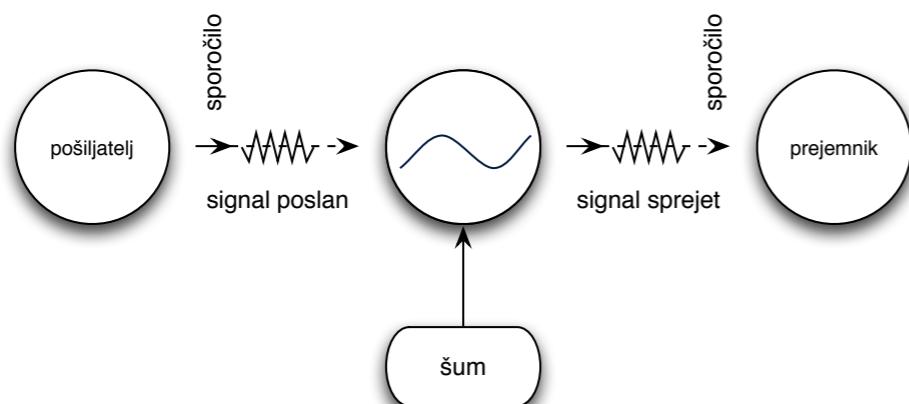
(Adler in Roman, 2003)



"THE ARCHITECT SAYS YOU DON'T NEED DIMENSIONS ON THE DRAWING WHEN YOU CAN SIMPLY QUERY THE COMPUTER MODEL"

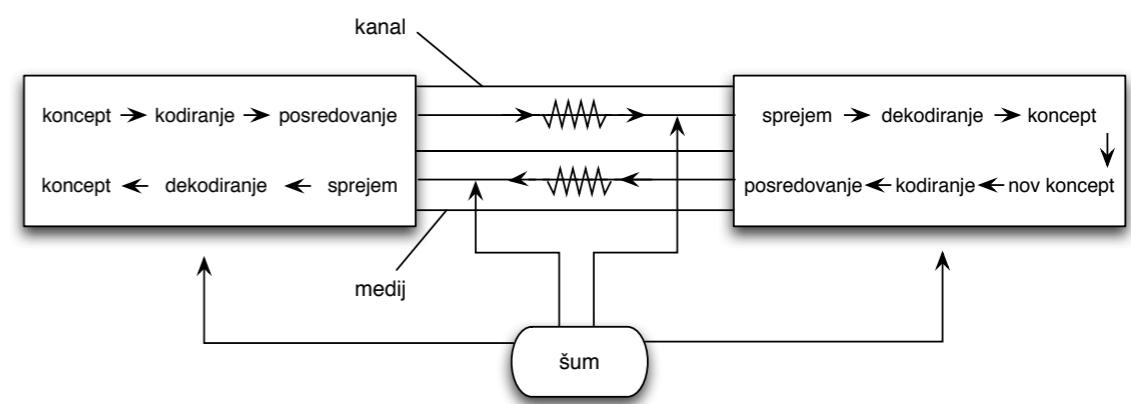
Modeli komunikacij

Linearni model komunikacije



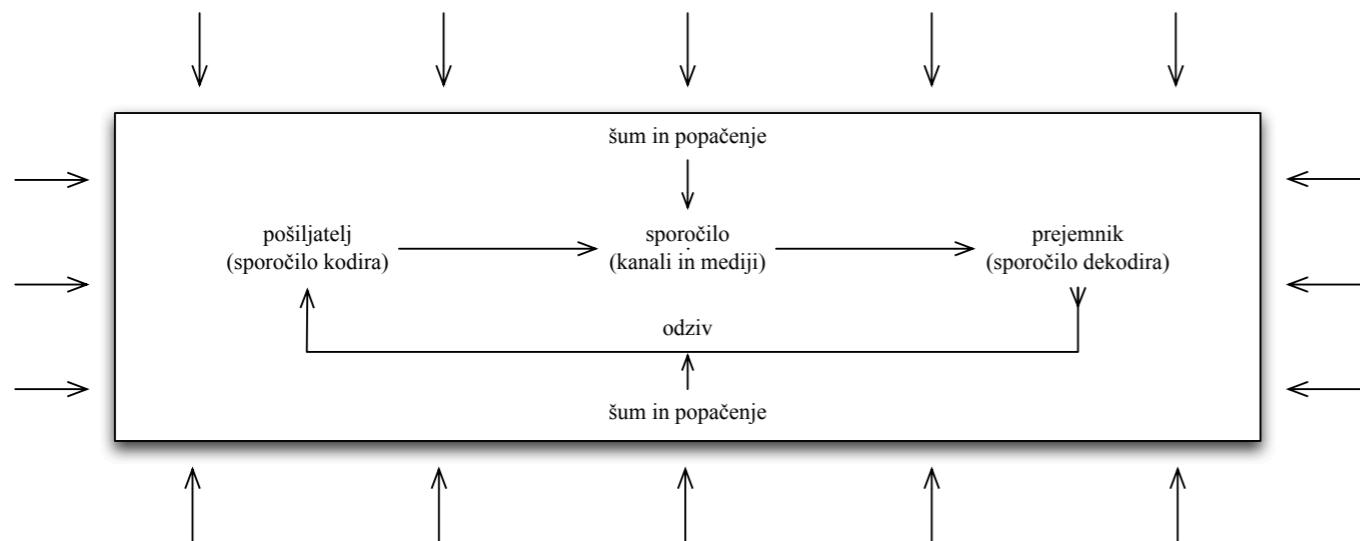
(Shannon in Weaver)

Iteracijski model komunikacije



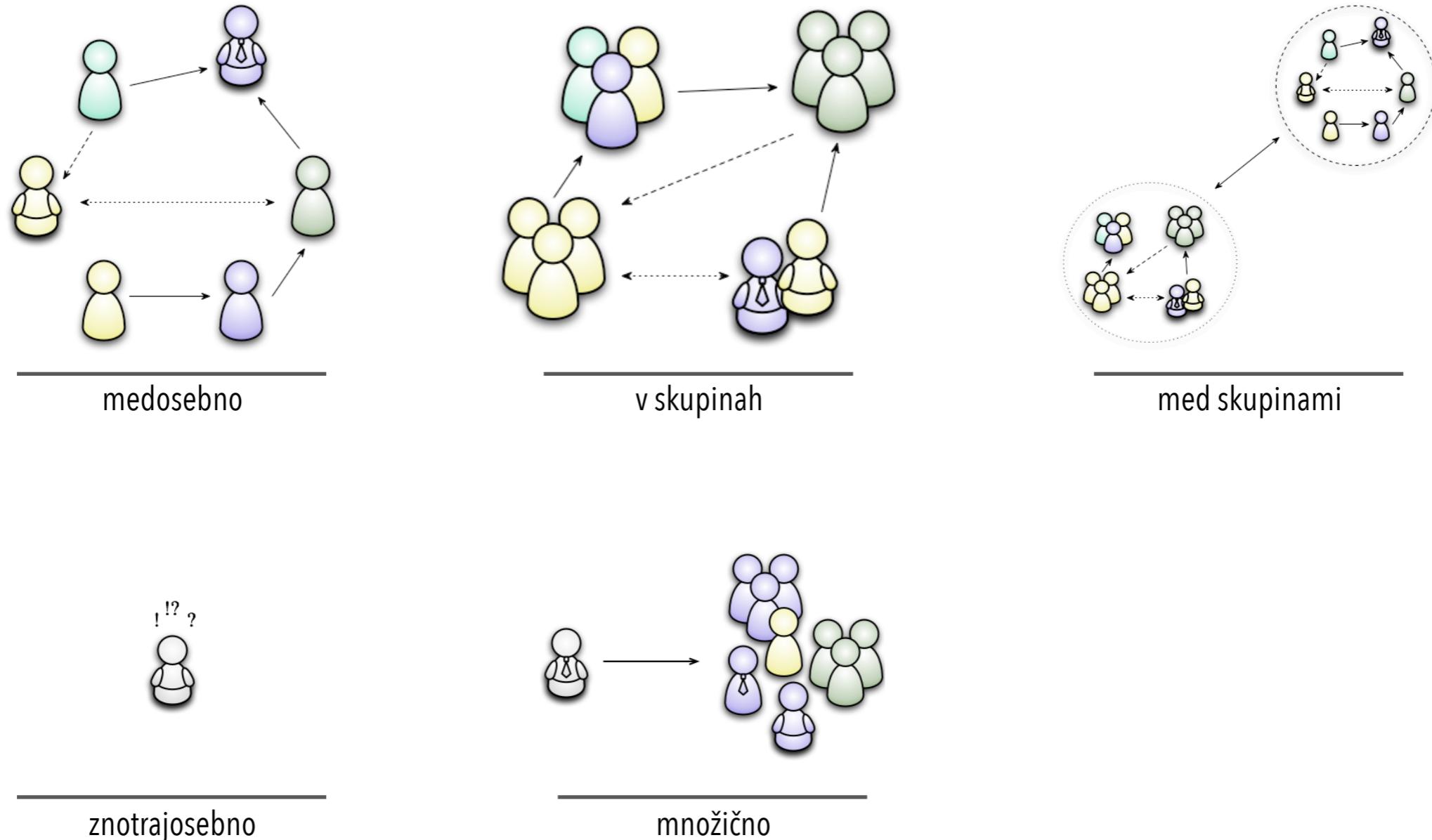
(Baguley)

Gradbeniški model komunikacije

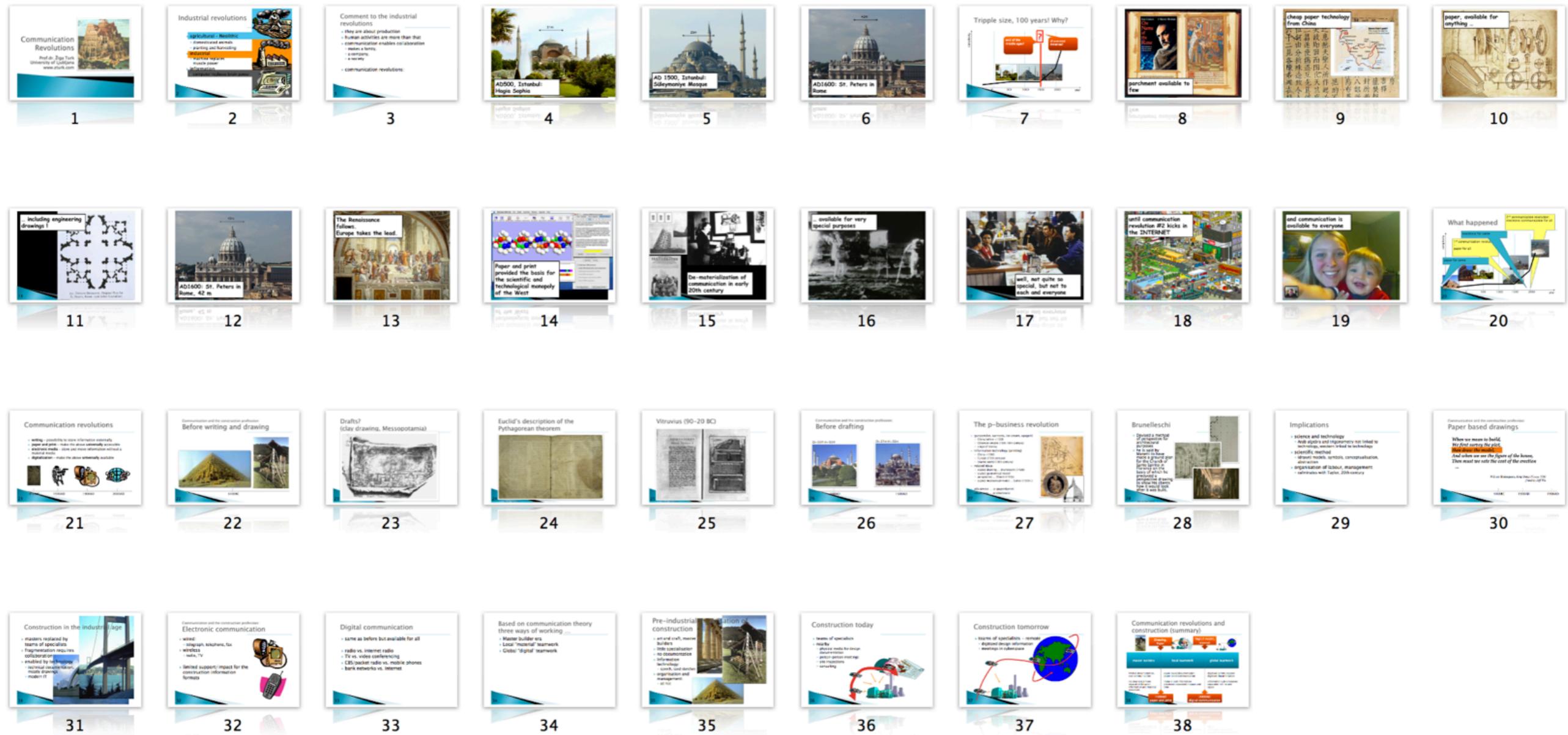


(Thompson in McHugh)

Vrste komunikacij



Komunikacijske revolucije

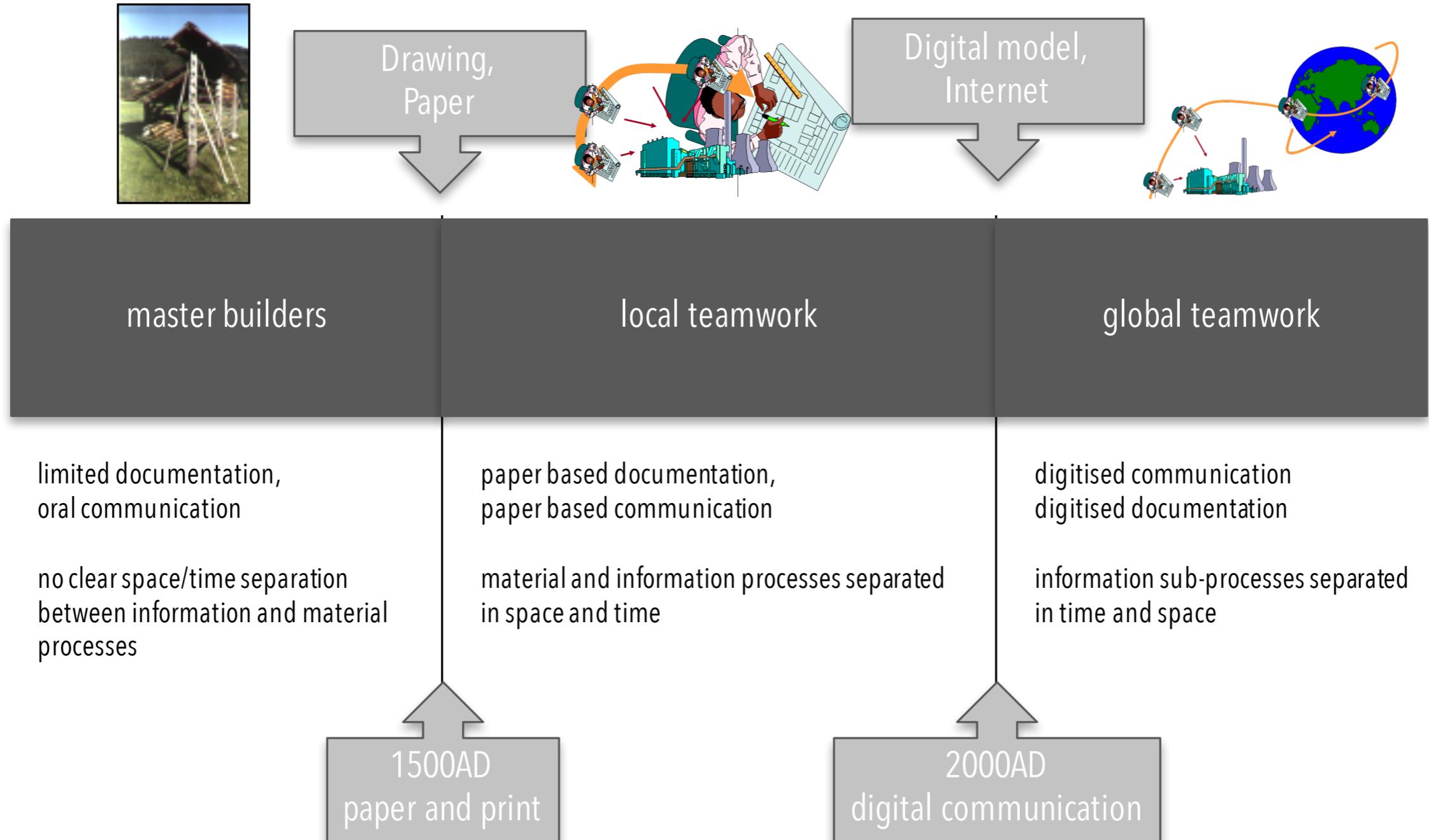


prof. Žiga Turk

http://media.matevzdolenc.com/itc-euromaster/communication_revolutions.pdf (predstavitev)

http://media.matevzdolenc.com/itc-euromaster/communication_revolutions.mov (video)

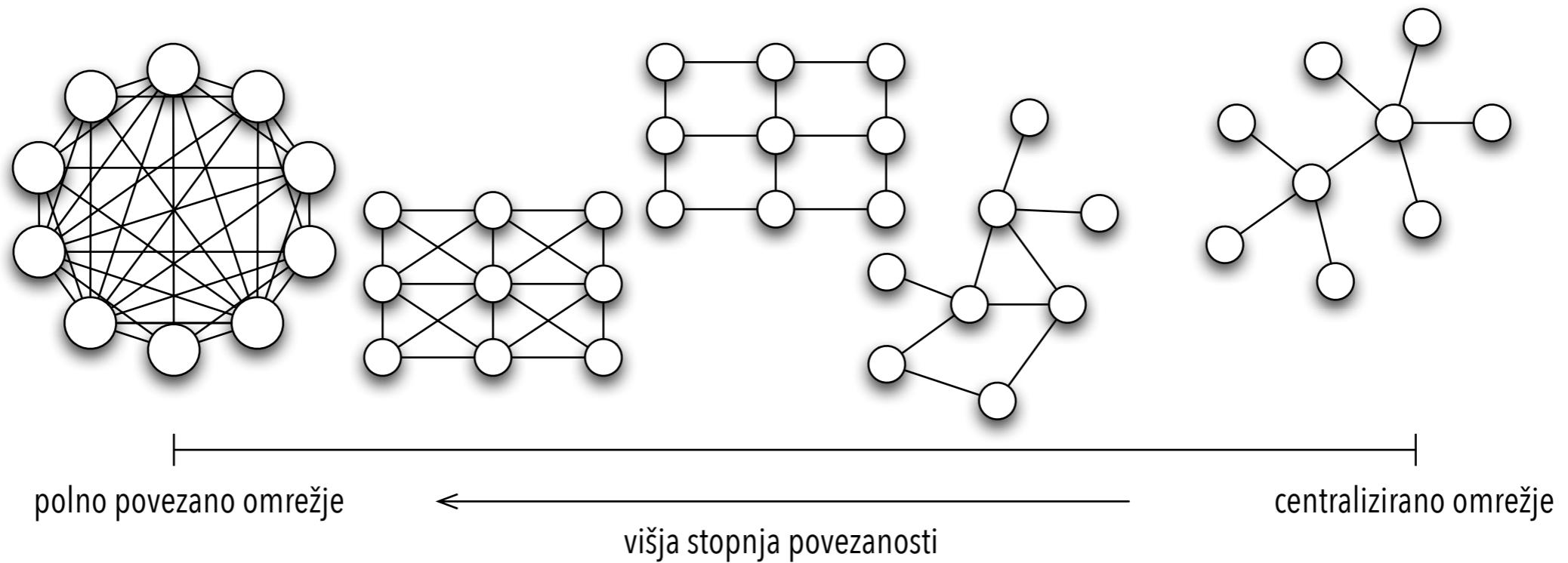
Komunikacijske revolucije



prof. Žiga Turk

http://media.matevzdolenc.com/itc-euromaster/communication_revolution.pdf (predstavitev)
http://media.matevzdolenc.com/itc-euromaster/communication_revolution.mov (video)

Topologija

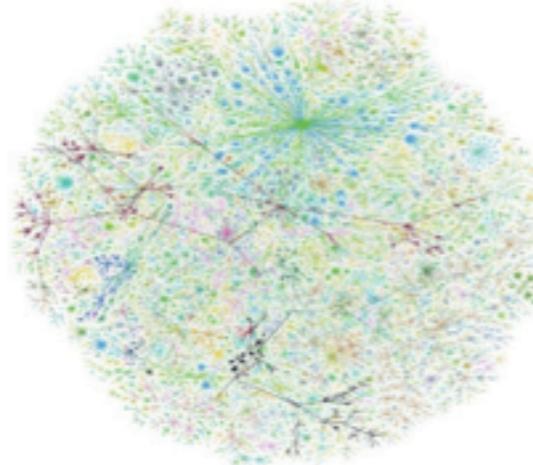


(Sanchez-Silva, 2009)

Tipi (komunikacijskih) omrežij



biološka omrežja



Internet



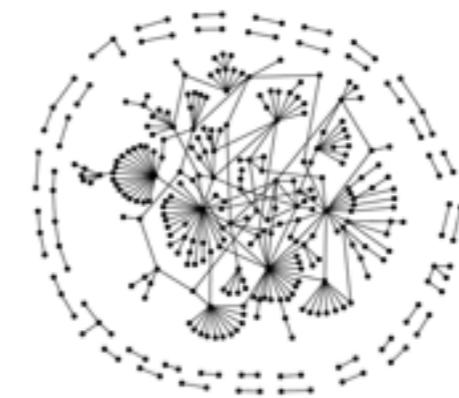
socialna omrežja



komunikacijska omrežja



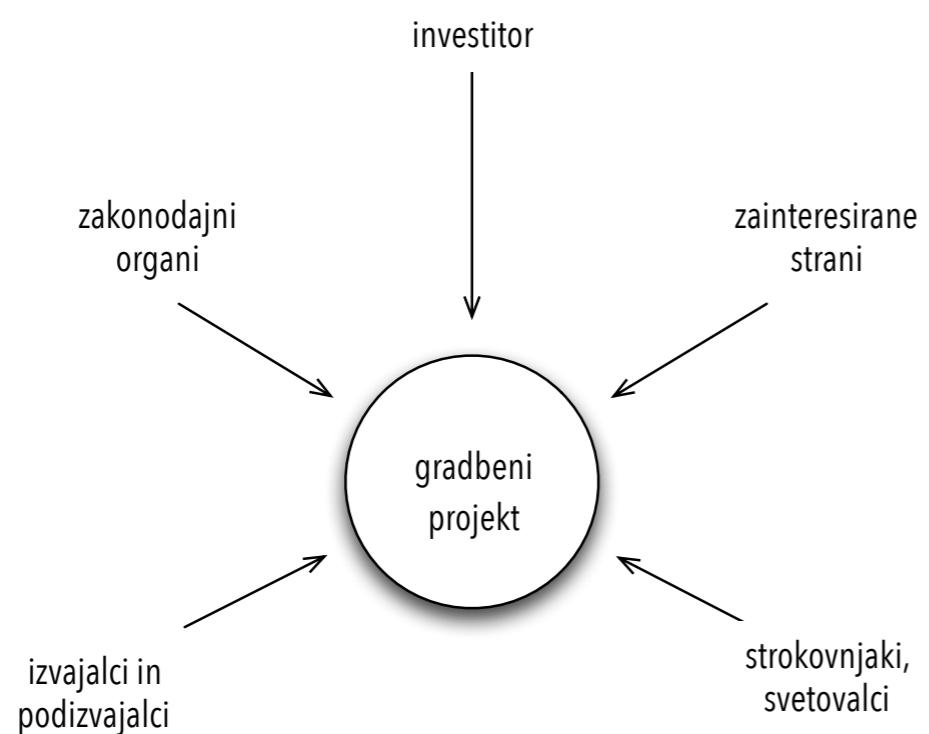
bibliografska omrežja



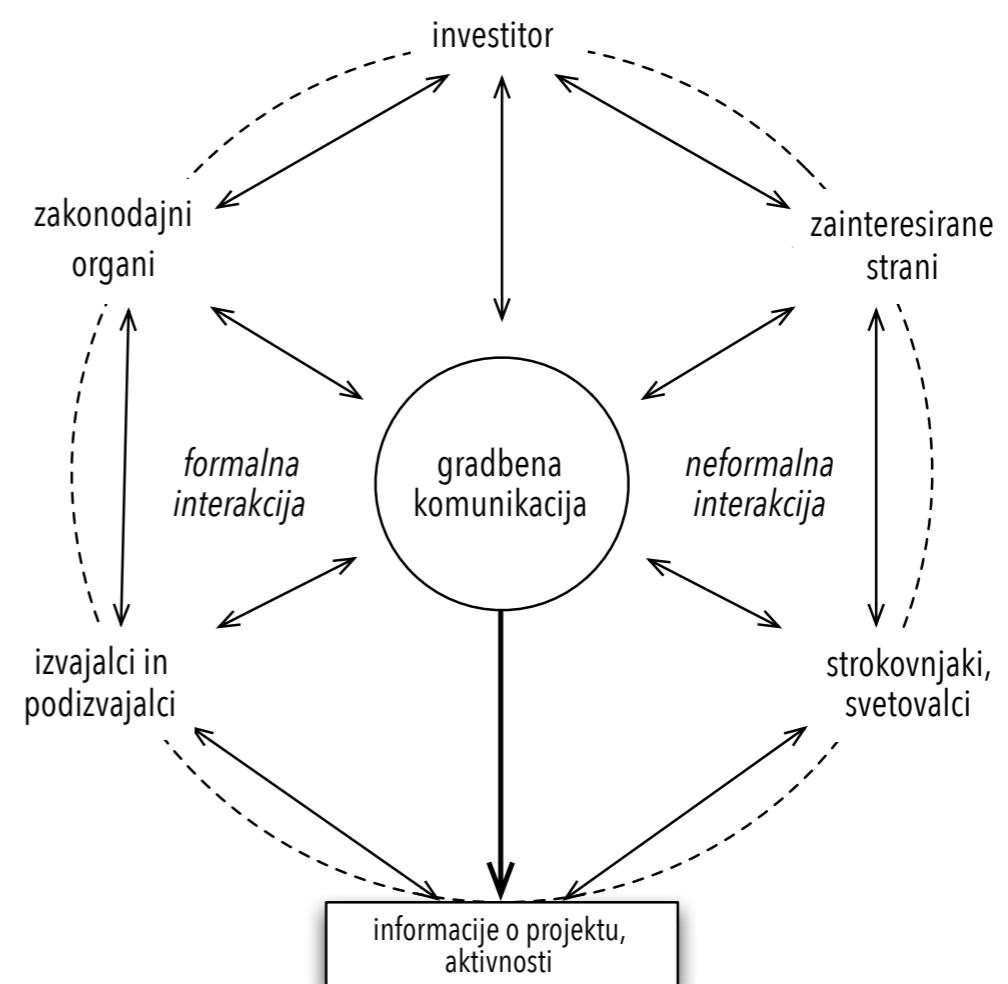
bibliografska omrežja

Interakcija

Idealna

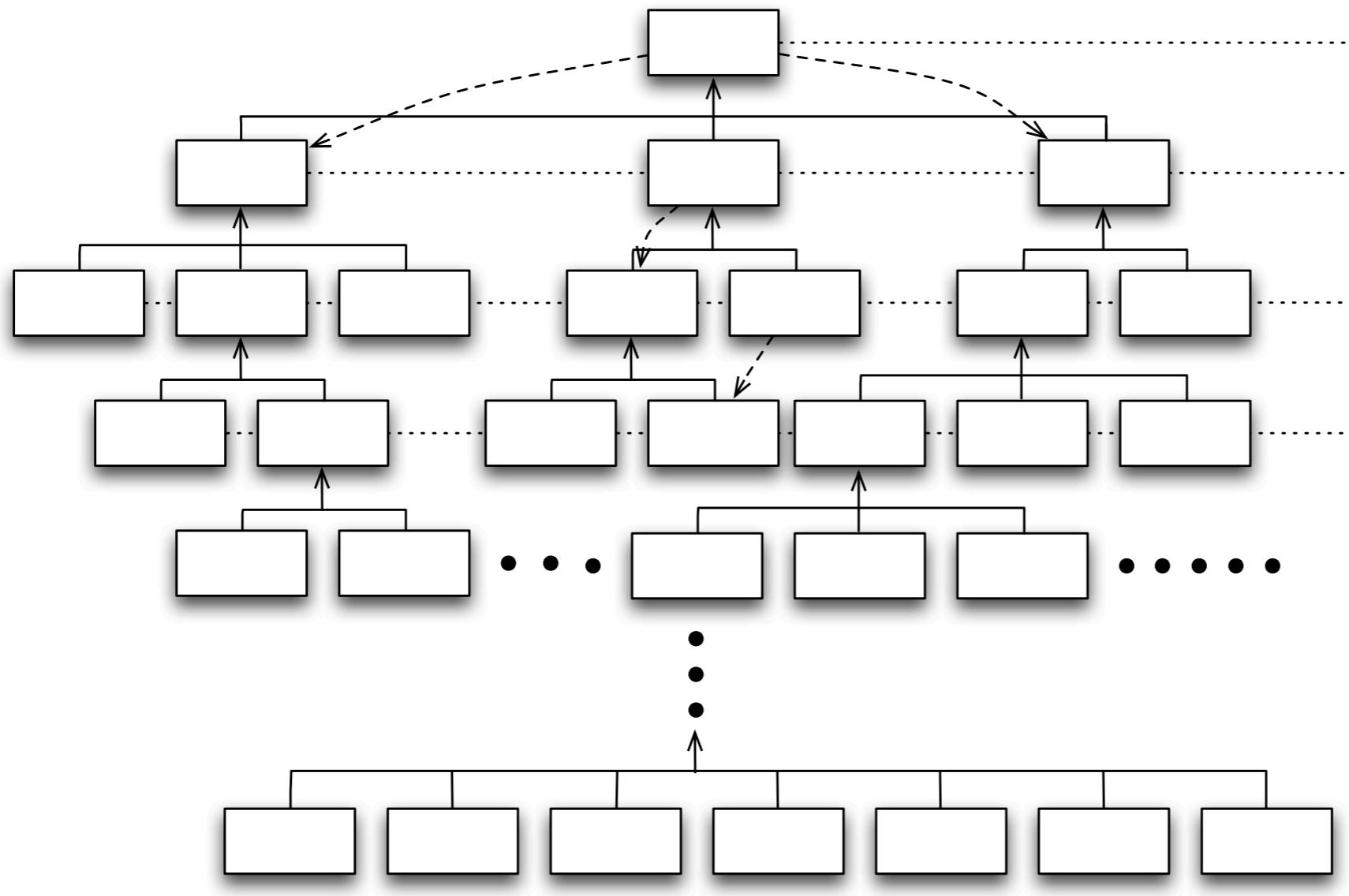


Dejanska

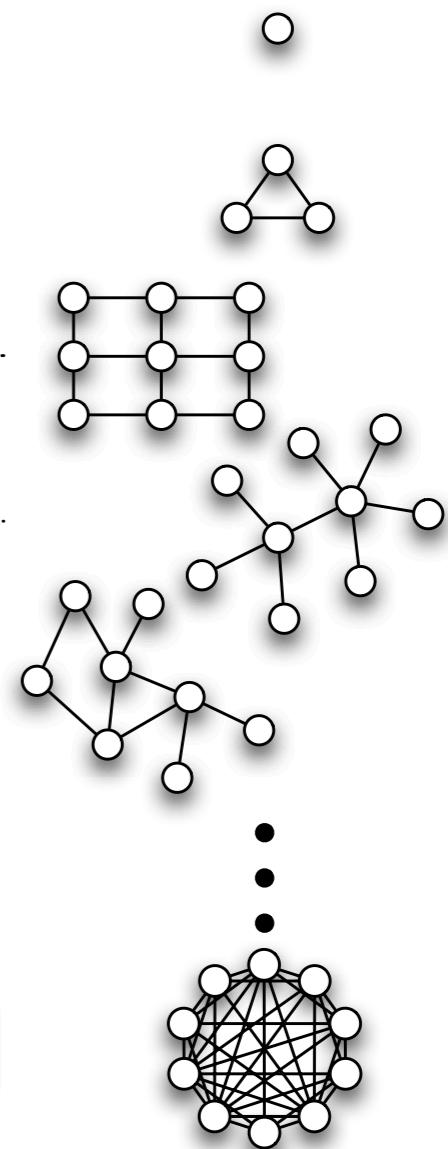


Organizacijska struktura

organizacijska struktura

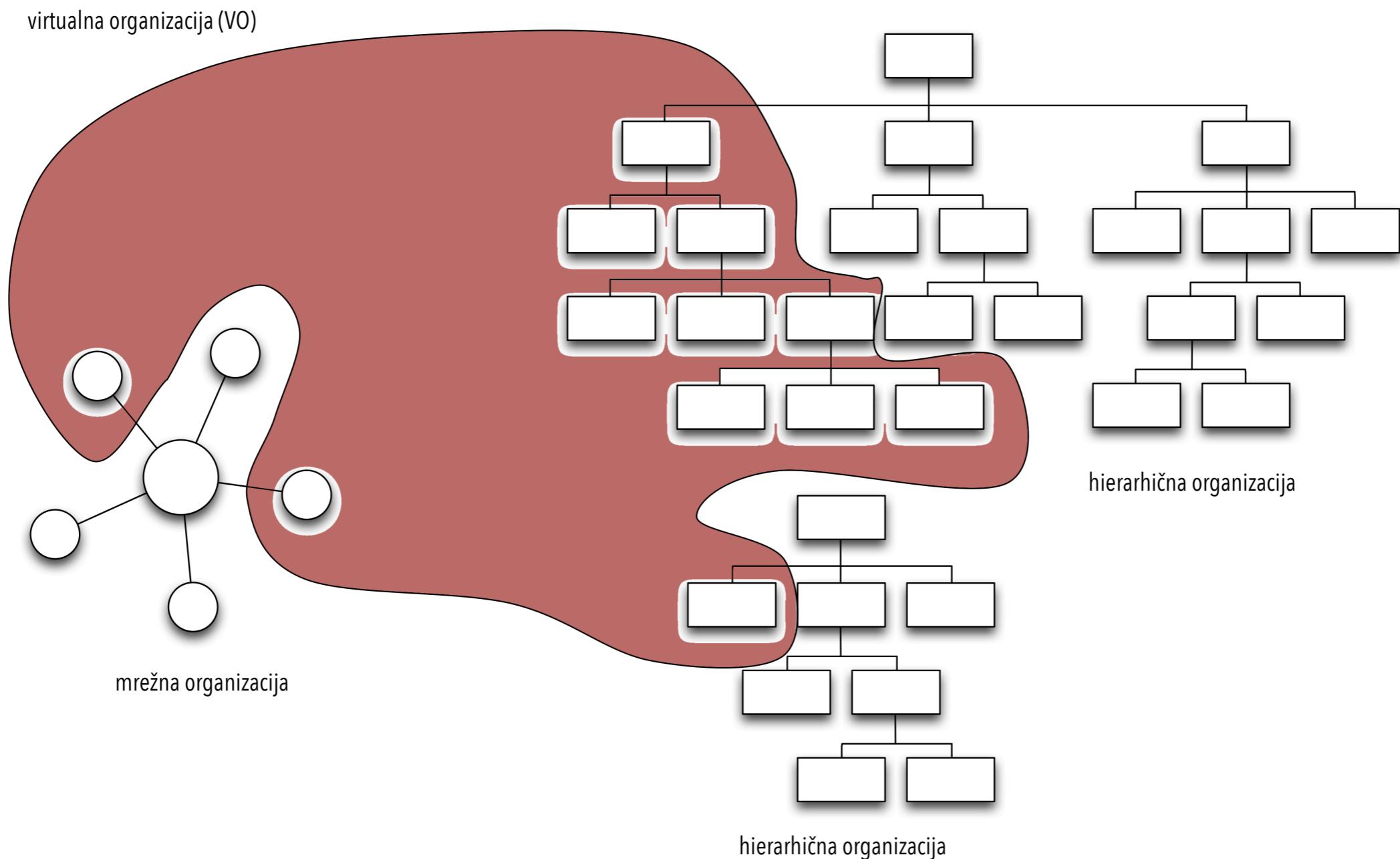


navidezno omrežje



(Sanchez-Silva, 2009)

Hierarhija, mreža in VO



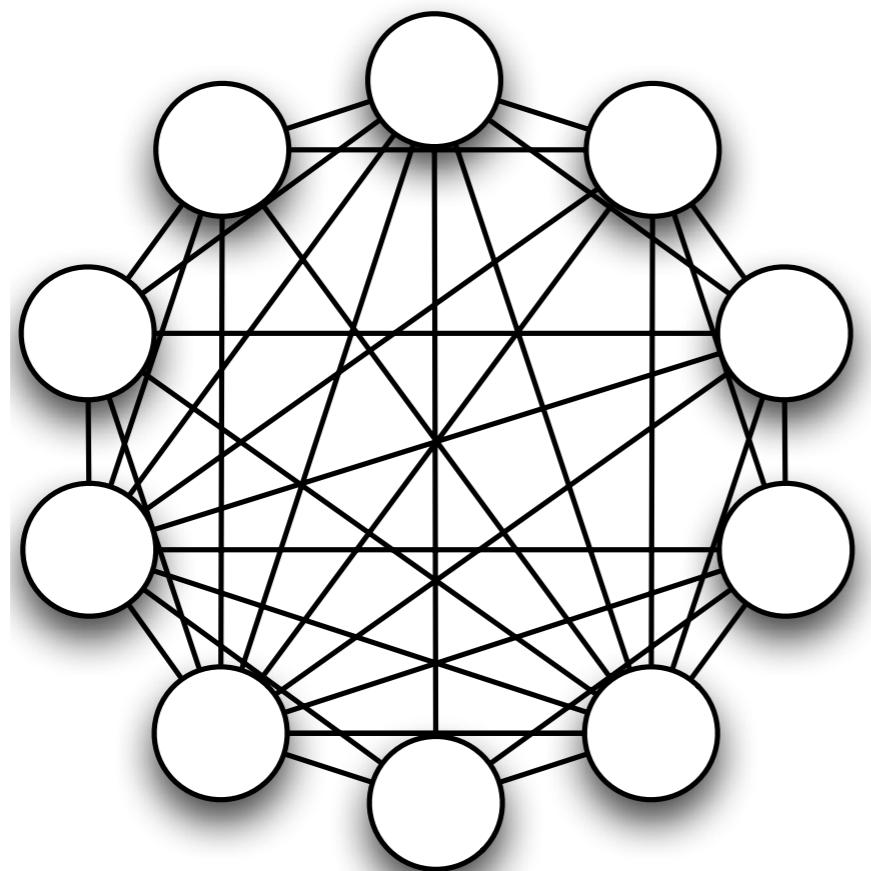
(Barnett, 1995)

Komunikacijska matrika

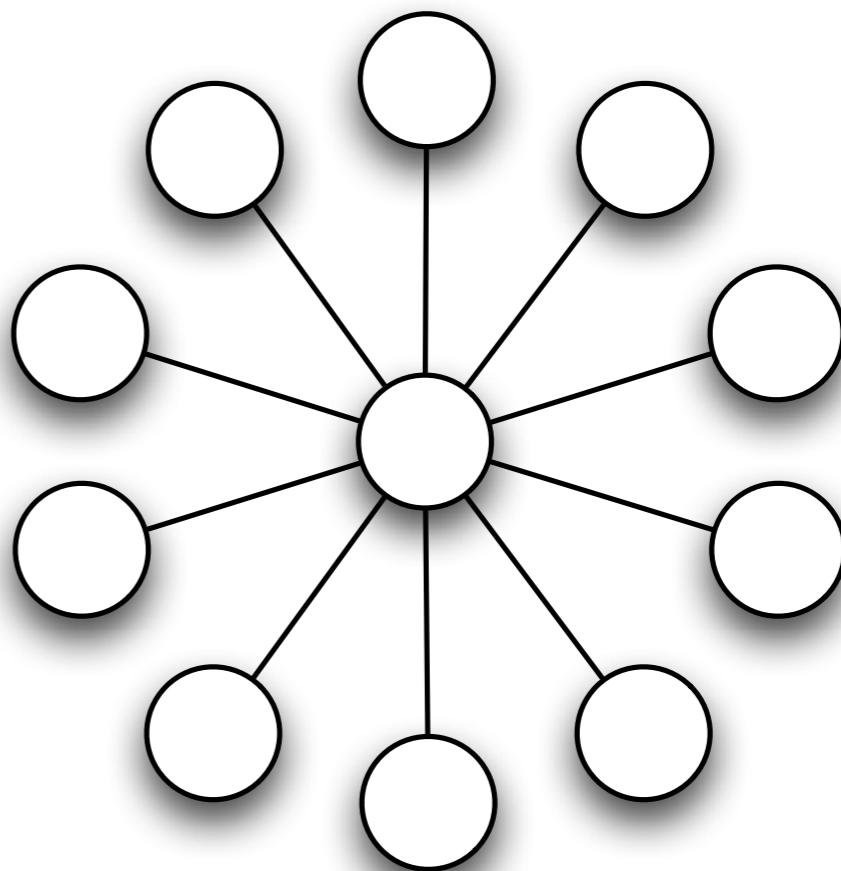


(Otter in Emmit, 2007)

Shema interakcij v gradbeništvu



tradicionalno



z uporabo
informacijsko-komunikacijskih tehnologij

Vodenje projektov: model vodnega slapa

Značilnosti

Zaporedno izvajanje faz razvoja

Zelo redko težimo k vračanju razvoja nazaj na prejšnje faze

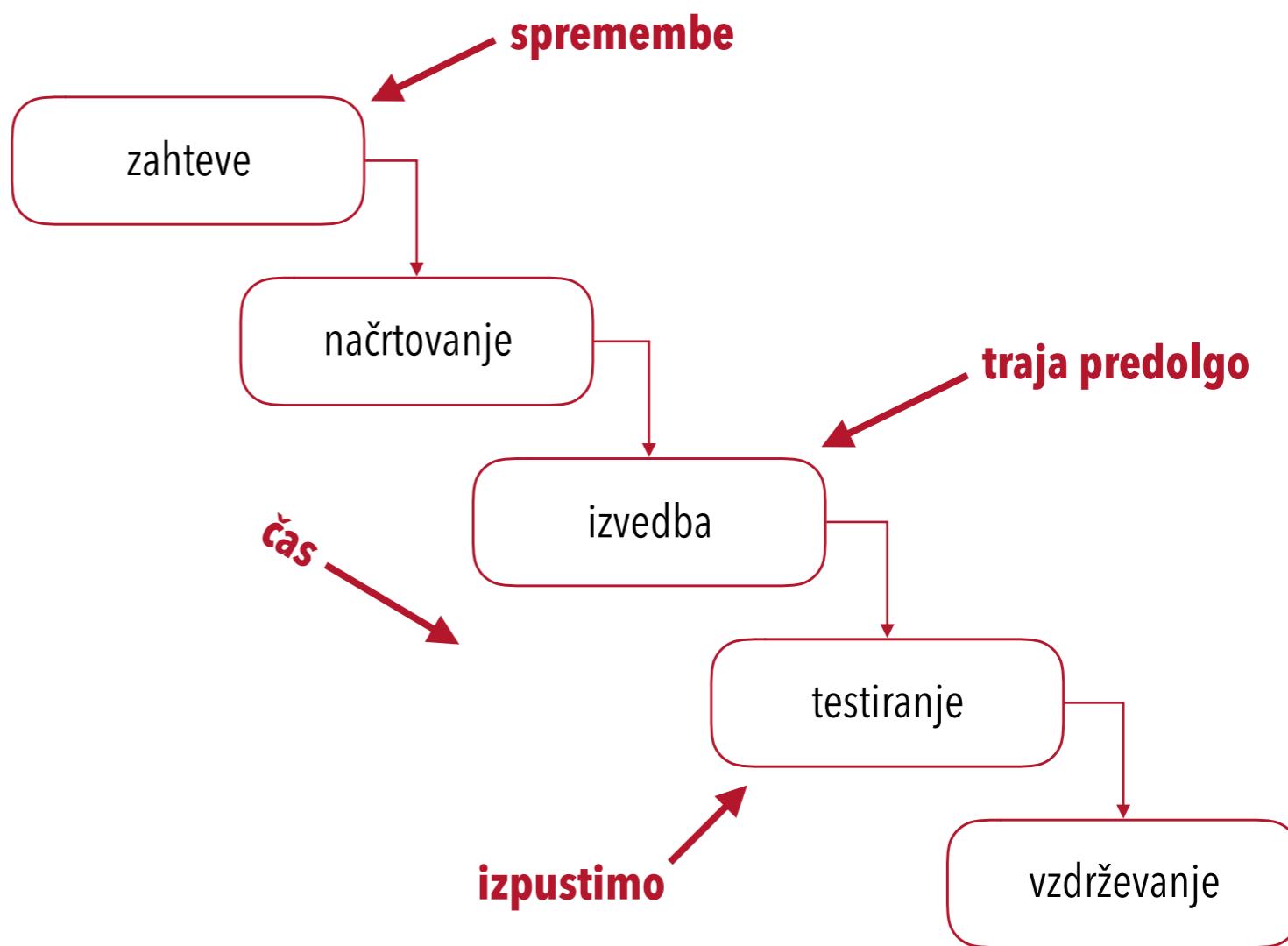
Velik poudarek na pravilnosti/celovitosti že v prvem koraku

Problemi

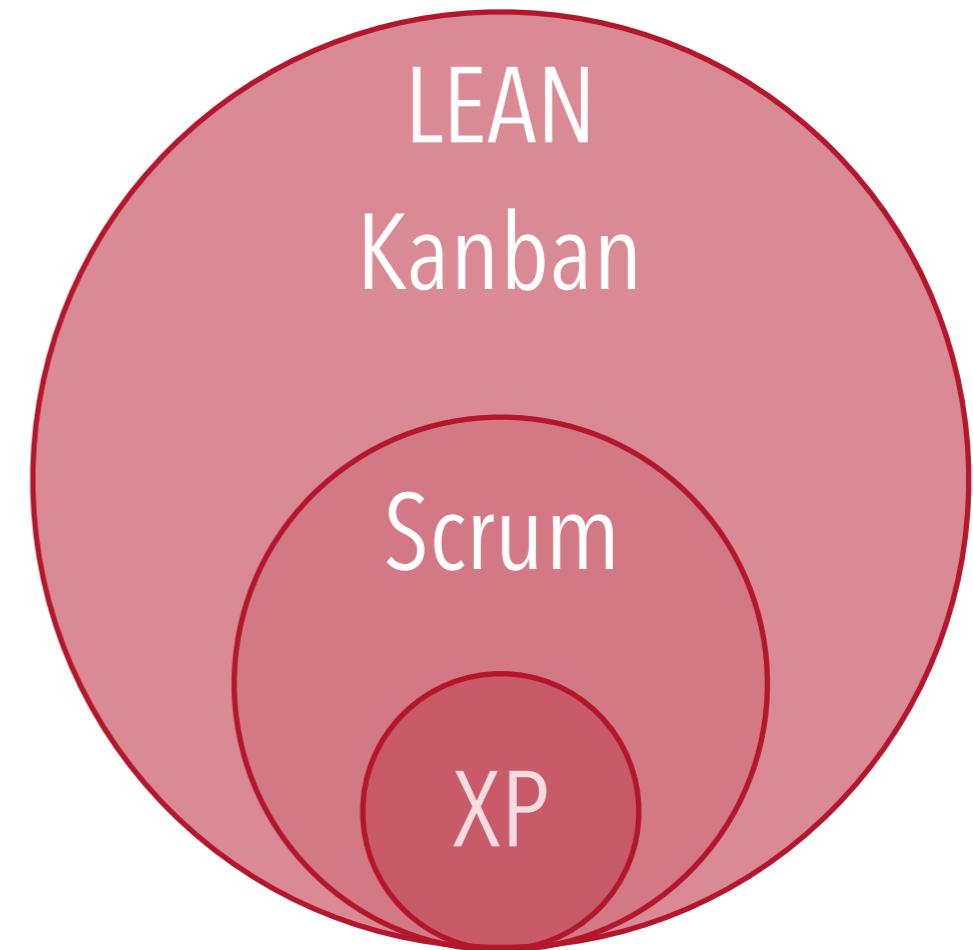
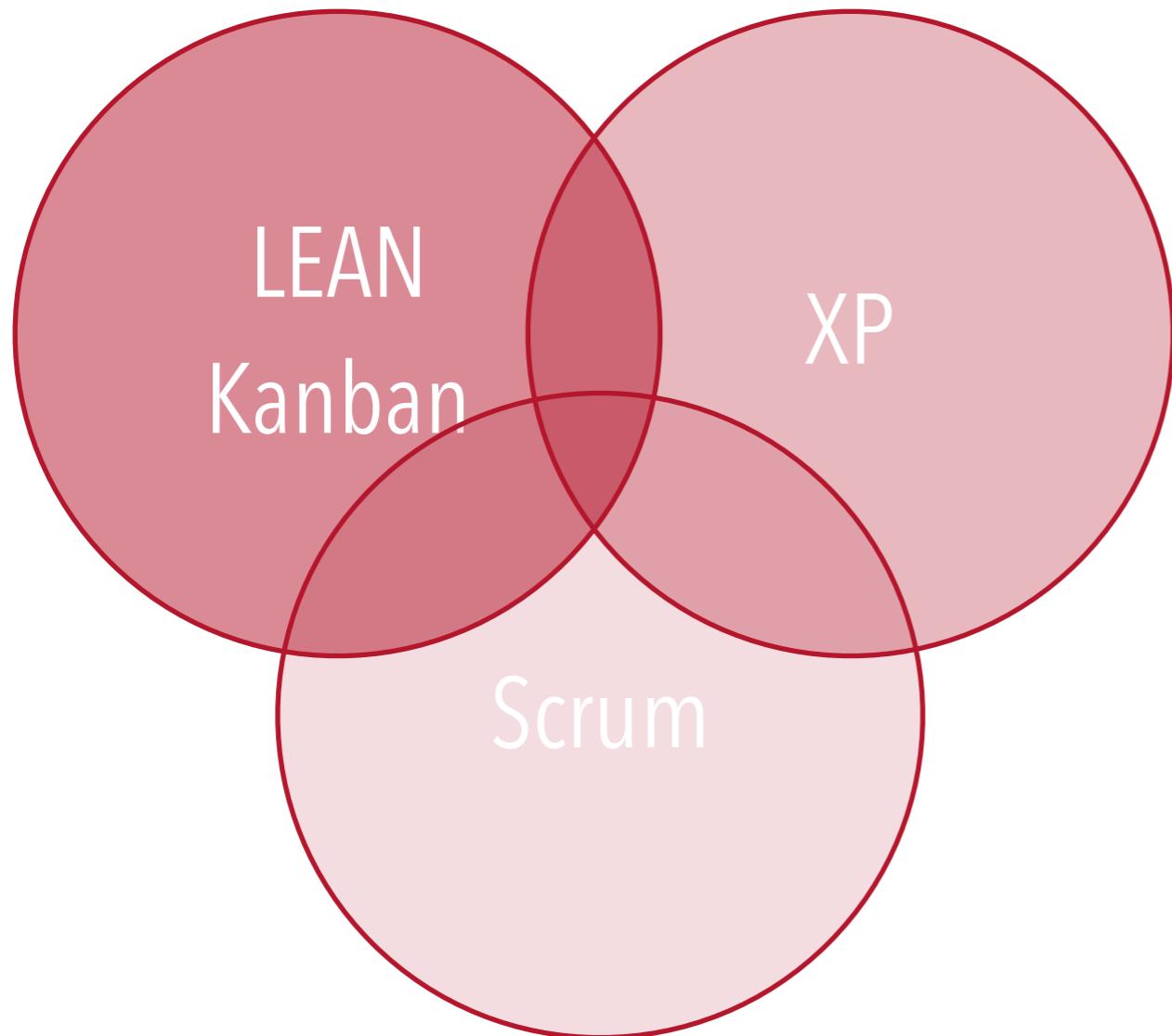
Produkt dobimo na koncu projekta

Testiramo proti koncu projekta
(običajno zmanjka časa)

Potrditev rešitev dobimo pozno
(običajno prepozno)



Vodenje projektov: agilne metodologije



Vrednote, zapisane v Agilnem manifestu, so skupne vsem agilnim metodologijam.

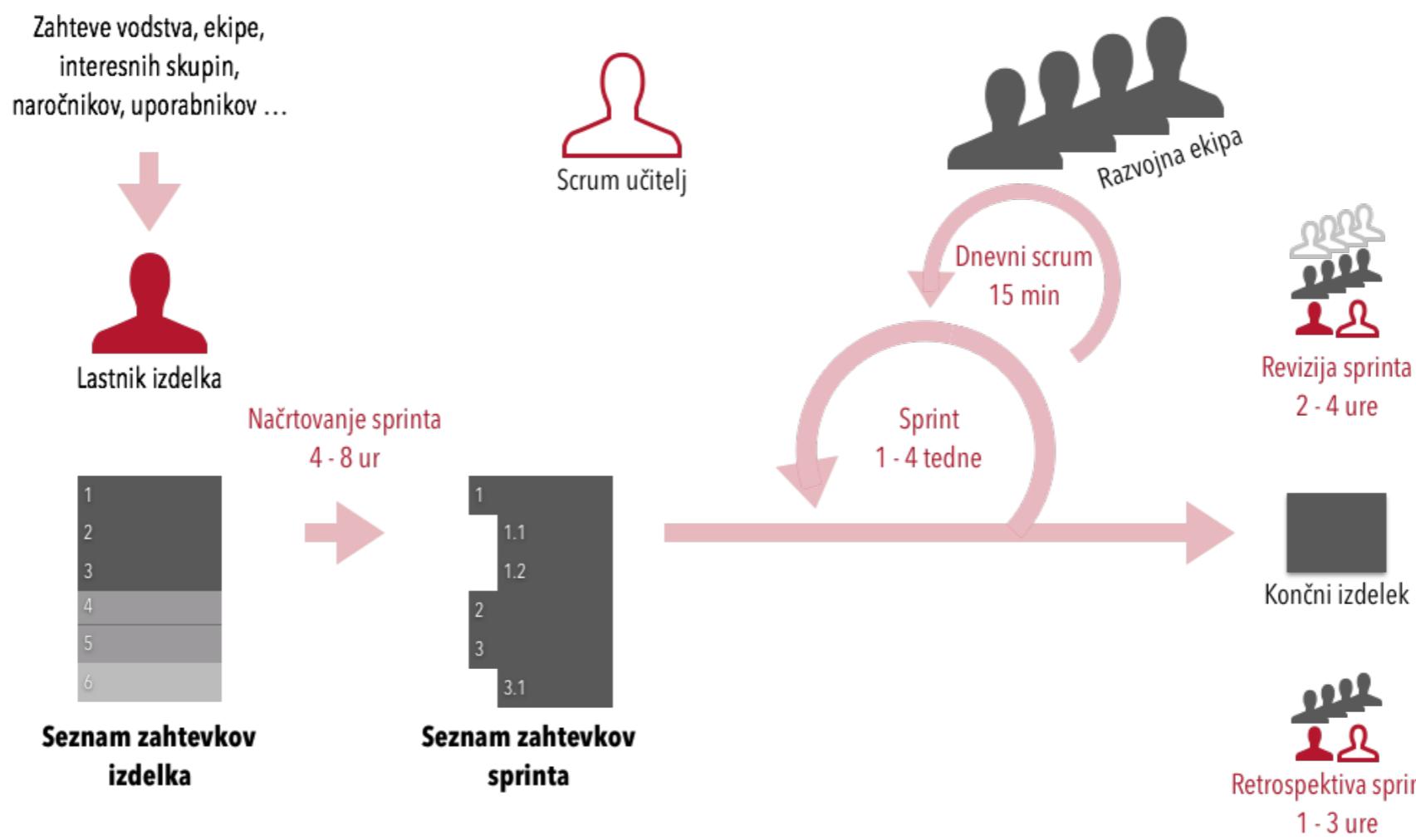
Manifest agilnega razvoja programske opreme (2001), <http://www.agilemanifesto.org/iso/sl/>

HITROST prilagodljivost
AGILNE metodologije
sodelovanje KVALITETA iterativnost
odprtost

To ni proces, temveč filozofija oziroma **nabor vrednot**

Scrum

Scrum je okvir znotraj katerega lahko **rešujemo kompleksne probleme** pri tem pa produktivno in kreativno razvijamo izdelke najvišje možne kvalitete.

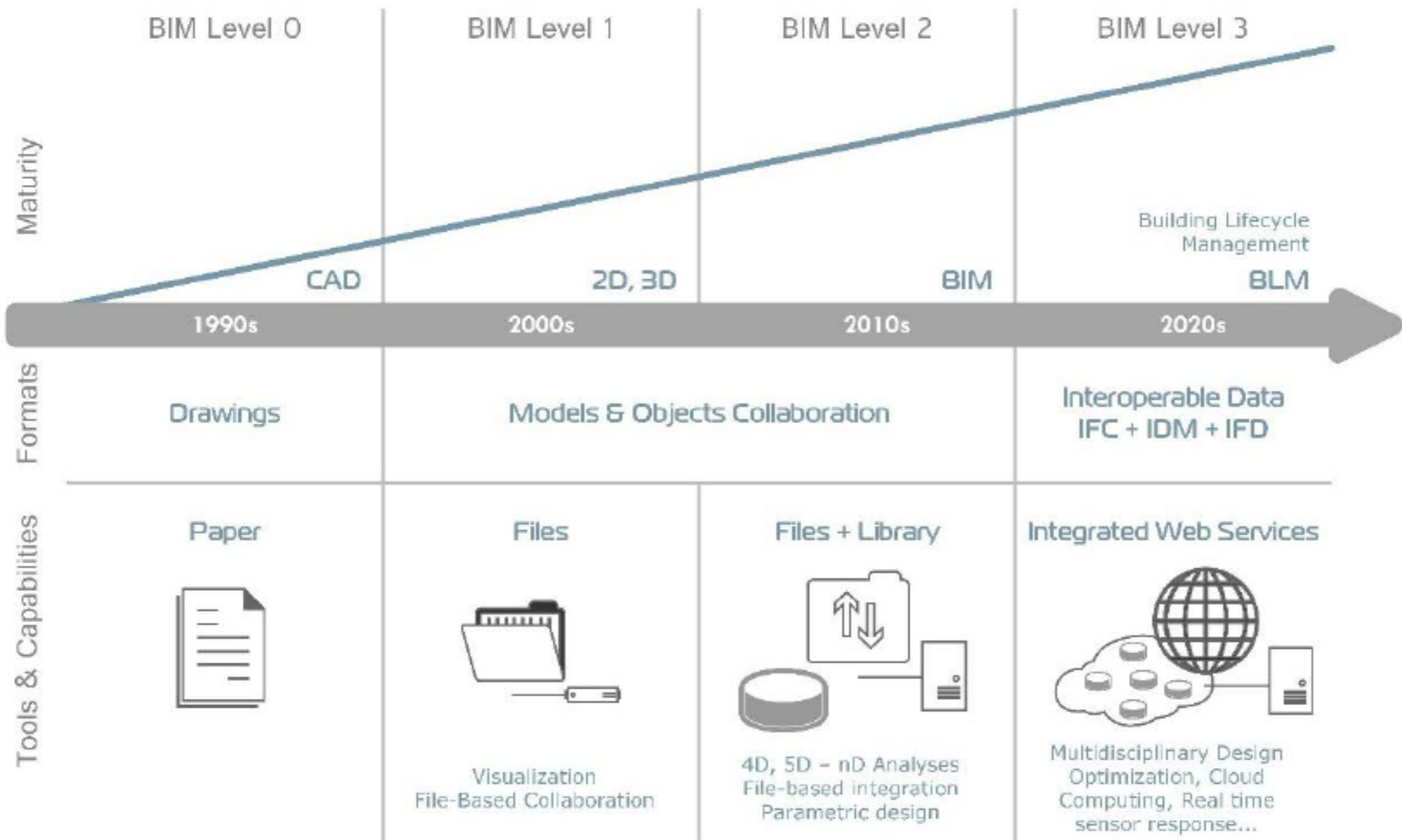


SCRUM vodič: pravila igre (2001), <http://www.scrumguides.org/docs/scrumguide/v1/Scrum-Guide-SI.pdf>

Building Information M*

Modelling / Model / Management

BIM nivoji



Eve S. LIN, Robert ROITHMAYR, Simon K. CHIU, A Review of BIM Maturity for Tensile Membrane Architecture,
Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2015, Amsterdam Future Visions

The Periodic Table of BIM

| | |
|---|--|
| 1 Bs BIM Strategy | 2 Su Surveys and Reports |
| 3 Fr Framework | 4 Cu Culture and behaviour |
| 9 Co Common methods | 10 Po Process |
| 22 Pr Procurement route | 23 Fo Forms of procurement |
| 35 Ca Capability and capacity | 36 Di Digital tools |
| 48 St Standardisation and Interoperability | 49 Ma Maintenance and use |
| 60 Dpow Digital Plan of Work | 61 If Information exchange |
| 71 Sr Strategy | 72 Bi Brief |
| 73 Df Definition | 74 Dn Design |
| 75 Bu Build and commission | 76 Hn Handover and closeout |
| 77 Oe Operation | 78 Ed End of life |

Strategy Process Standards
Foundations People Enabling Tools
Collaboration Technology Resources

Digital Plan of Work stages

| | | | | | | | |
|-----------------------------|--------------------------|-------------------------------|---------------------------|---|--|------------------------------|--------------------------------|
| 71 Sr Strategy | 72 Bi Brief | 73 Df Definition | 74 Dn Design | 75 Bu Build and commission | 76 Hn Handover and closeout | 77 Oe Operation | 78 Ed End of life |
|-----------------------------|--------------------------|-------------------------------|---------------------------|---|--|------------------------------|--------------------------------|



Find support on your BIM journey at theNBS.com/BIM

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| | | | | | | | | | | | | | | | |
|-----------------------------|--------------------------------------|---------------------------|-------------------------|--------------------|----------------------------------|-----------------------|------------------|-----------------------------|-----------------------------|--------------------------------------|---------------------------------|--------------------------------------|----------------------|------------------------|----|
| 1 | Bs | The Periodic Table of BIM | | | | | | | | | | | | 2 | Su |
| | BIM Strategy | | | | | | | | | | | | | Surveys and Reports | |
| 3 | Fr | 4 | Cu | Strategy | Process | Standards | 5 | Bt | 6 | Lod | 7 | Loi | 8 | Vi | |
| | Framework | | Culture and behaviour | Foundations | People | Enabling Tools | | BIM Toolkit | | Level of detail | | Level of Information | | Videos | |
| 9 | Co | 10 | Po | 11 As | 12 Eir | 13 Cm | 14 In | 15 Sf | 16 Cd | 17 Cl | 18 Li | 19 Cs | 20 An | 21 Ev | |
| | Common methods | | Process | Assesment and need | Employers info requirements | Communication | Investment | Software | Capital delivery phase | Collaborative business relationships | Library objects | Classification | Analysis tools | Events | |
| 22 | Pr | 23 | Fo | 24 Ex | 25 Bep | 26 So | 27 Ch | 28 Ha | 29 Op | 30 Pt | 31 Pe | 32 Cafm | 33 Ct | 34 Fu | |
| | Procurement route | | Forms of procurement | Execution | BIM execution plan | Soft skills | Change process | Hardware | Operational phase | Protocol | Prequalification questionnaires | Computer-Aided Facilities Management | Cost tools | Forums and user groups | |
| 35 | Ca | 36 | Di | 37 De | 38 Midp | 39 Cp | 40 Sh | 41 Tr | 42 Fm | 43 Qu | 44 Bsdd | 45 Pg | 46 Ad | 47 Sc | |
| | Capability and capacity | | Digital tools | Delivery | Master information delivery plan | Cooperation | Share success | Training | Facilities management | Quality management systems | buildingSMART data dictionary | Programme tools | Administration tools | Social media | |
| 48 | St | 49 Ma | 50 Cde | 51 Ci | 52 Av | 53 Fi | 54 Dg | 55 Ds | 56 Ifc | 57 Au | 58 Mo | 59 Bl | | | |
| | Standardisation and Interoperability | Maintenance and use | Common data environment | Champion | Availability | File storage | Digital security | Design management systems | Industry foundation classes | Authoring tools | Model viewers and checkers | | Blog posts | | |
| 60 | Dpow | 61 If | 62 Sp | 63 En | 64 Ir | 65 Br | 66 Am | 67 Idm | 68 Sp | 69 Fl | 70 Bo | | | | |
| | Digital Plan of Work | Information exchange | Support | Engage | Infrastructure | Briefing | Asset management | Information delivery manual | Specification tools | File sharing and collaboration | Books | | | | |
| Digital Plan of Work stages | | | | | | | | | | | | | | | |
| 71 | Sr | 72 Bi | 73 Df | 74 Dn | 75 Bu | 76 Hn | 77 Oe | 78 Ed | | | | | | | |
| | Strategy | Brief | Definition | Design | Build and commission | Handover and closeout | Operation | End of life | | | | | | | |

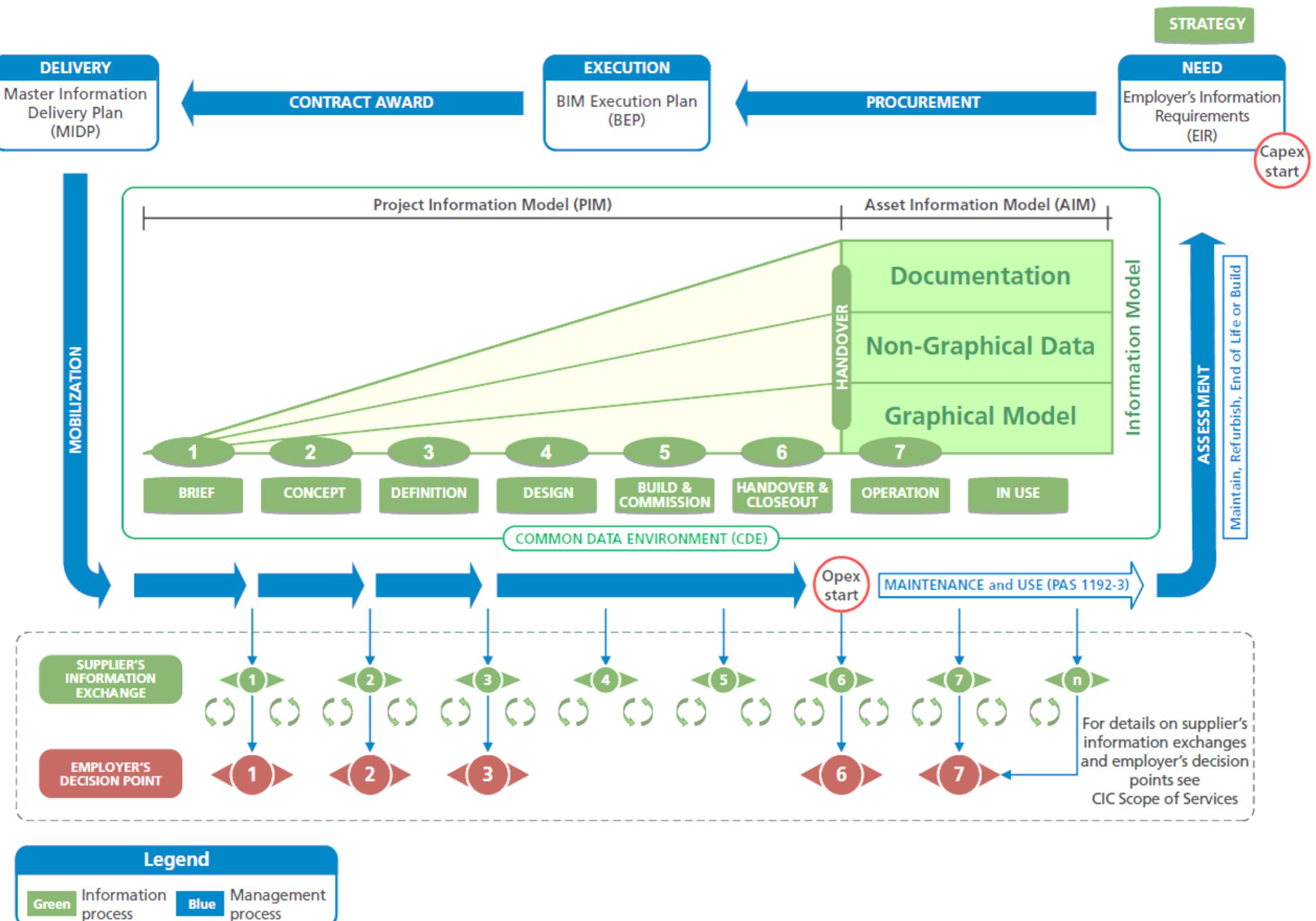


Digital Plan of Work stages

71 Sr
Strategy
72 Bi
Brief
73 Df
Definition
74 Dn
Design
75 Bu
Build and commission
76 Hn
Handover and closeout
77 Oe
Operation
78 Ed
End of life

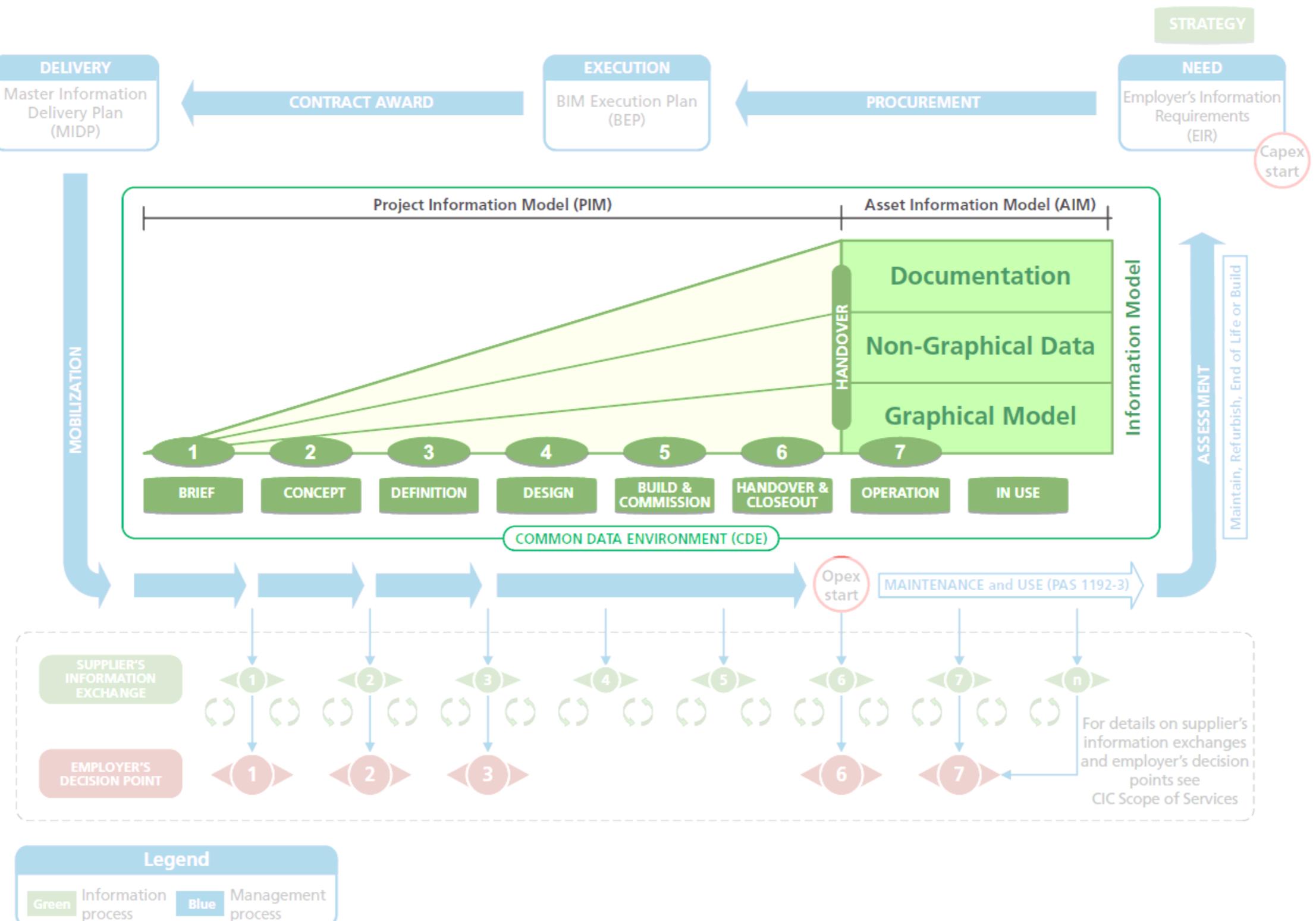
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PAS 1192-2:2013

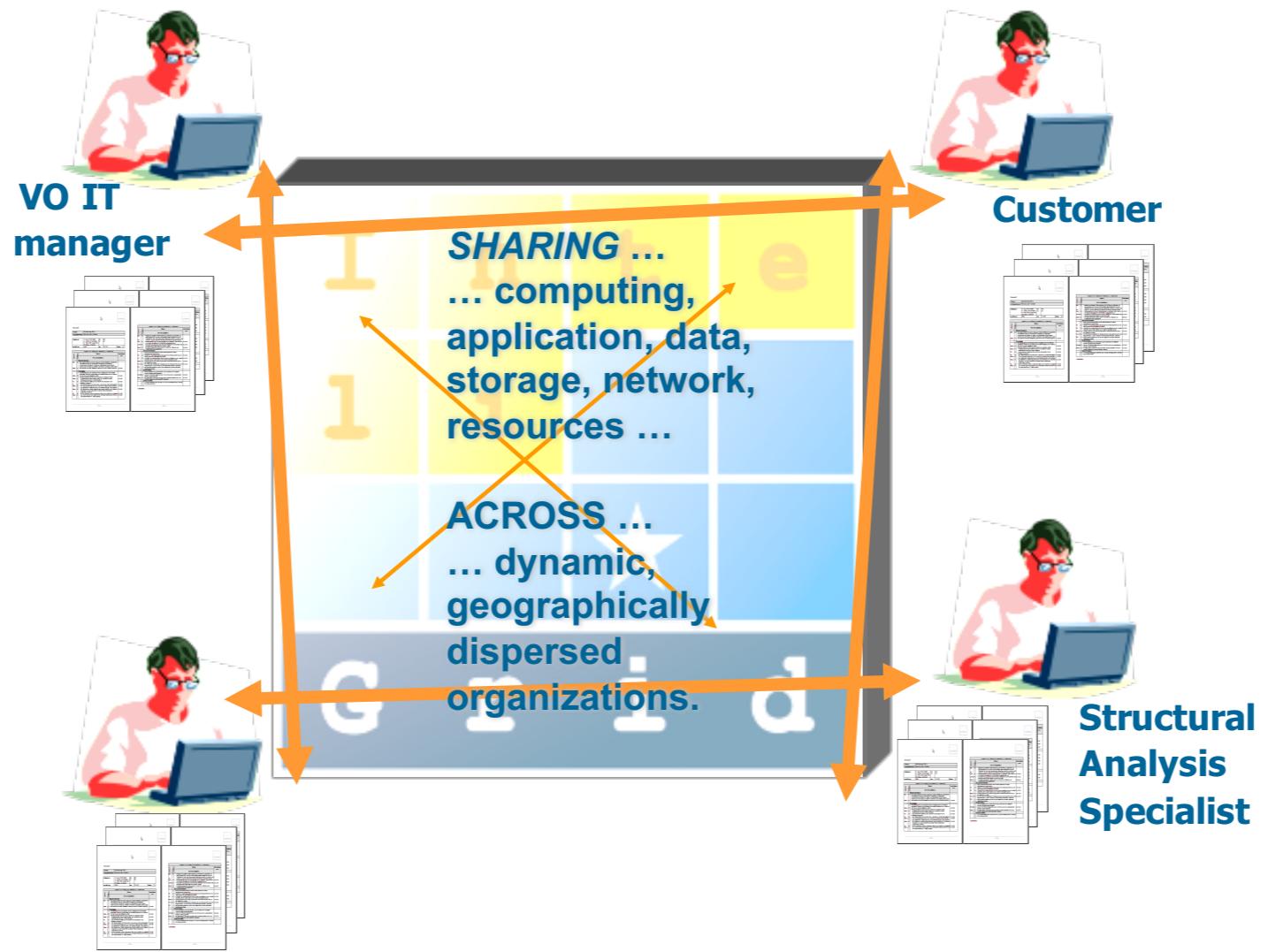
Mark Bew and Mervyn Richards



PAS 1192-2:2013

Mark Bew and Mervyn Richards

InteliGrid



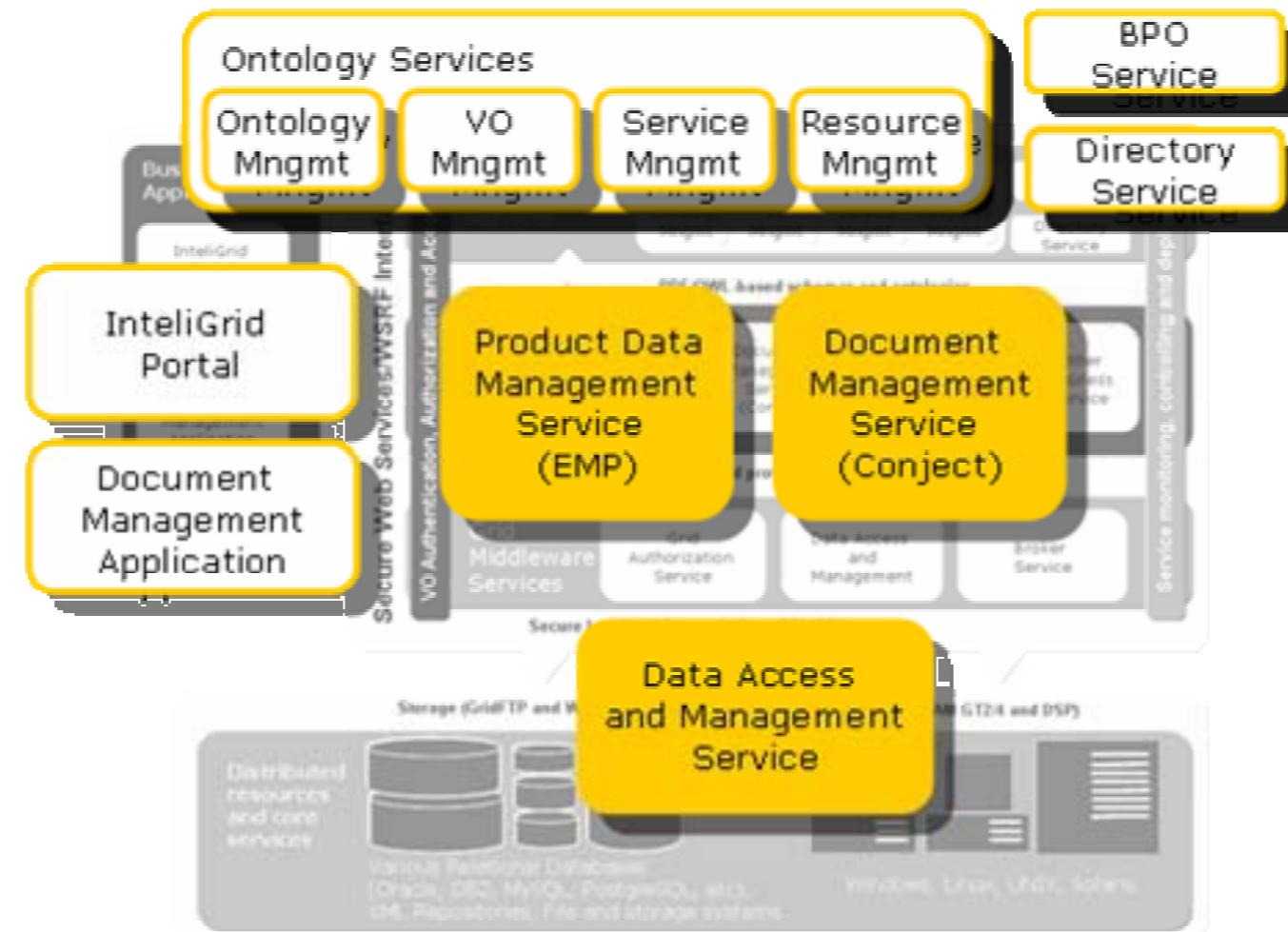
2004 →

InteliGrid addresses *the lack of integrated computing environment* that would providing the engineering industries with challenging **integration and interoperability** needs with a flexible, secure, robust, ambient accessible, interoperable, pay-per-demand access to (1) **information**, (2) **communication** and (3) **processing infrastructure**.

Interoperability of Virtual Organizations on a Complex Semantic Grid - Inteligrid (IST-2004-004664)

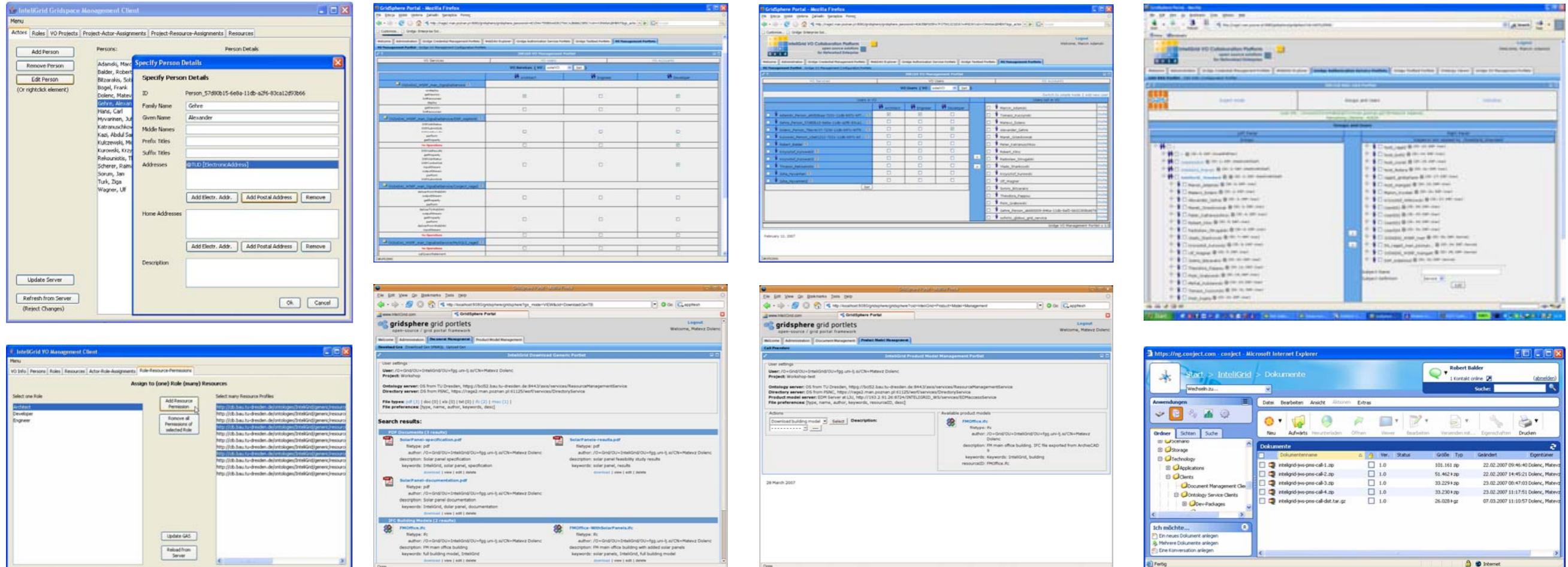
<http://inteligrid.eu-project.info>

InteliGrid - CDE?



Interoperability of Virtual Organizations on a Complex Semantic Grid - InteliGrid (IST-2004-004664)
<http://inteligrid.eu-project.info>

InteliGrid - CDE?



Interoperability of Virtual Organizations on a Complex Semantic Grid - InteliGrid (IST-2004-004664)
<http://inteligrid.eu-project.info>

Common Data Environment (CDE)

Definicija

CDE predstavlja centralni repozitorij projektnih informacij. Uporablja se za zbiranje, upravljanje in nadzorovano deljenje dokumentacije - grafičnih in ne grafičnih informacij za celotno projektno skupino. S tem se zmanjša možnost podvajanja informacij in napak.

Prednosti

Jasna definicija lastništva informacij - lastnik je tisti, ki je informacijo ustvaril.

Deljenje informacij zmanjšuje stroške in skrajša čas potreben za pripravo koordinacijskih informacij.

Z uporabo modelnih datotek lahko pripravimo različne dokumente.

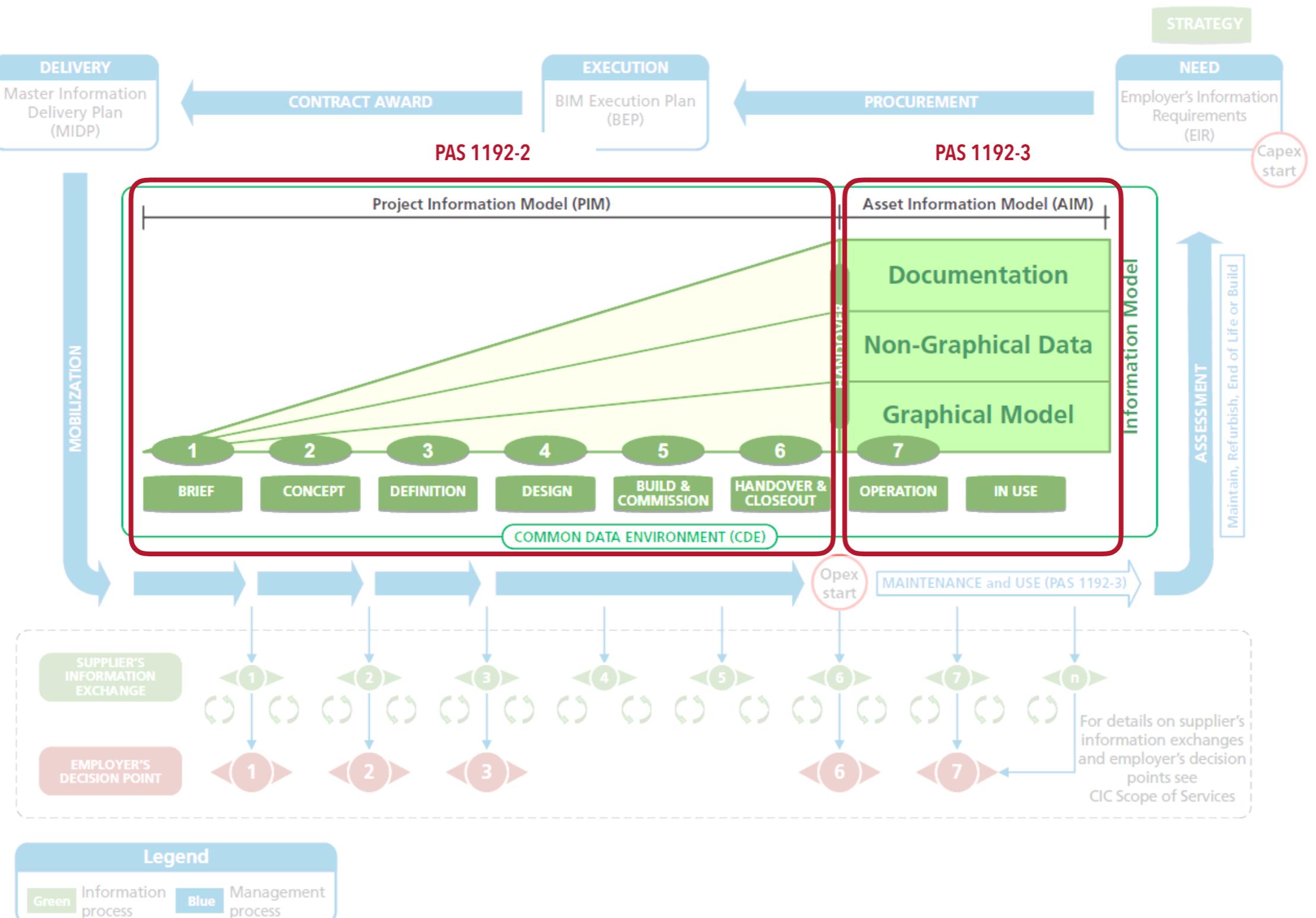
Specifikacije

PAS 1192-2:2013 - Specification for information management for the capital/delivery phase of construction projects using building information modelling

PAS 1192-3:2014 - Specification for information management for the operational phase of assets using building information modelling (BIM)

BS1192:2017 - Collaborative production of architectural, engineering and construction information – Code of practice

*British Standards and Publicly Available Specifications (PAS),
<http://bim-level2.org/en/standards/>*



Common Data Environment (CDE)

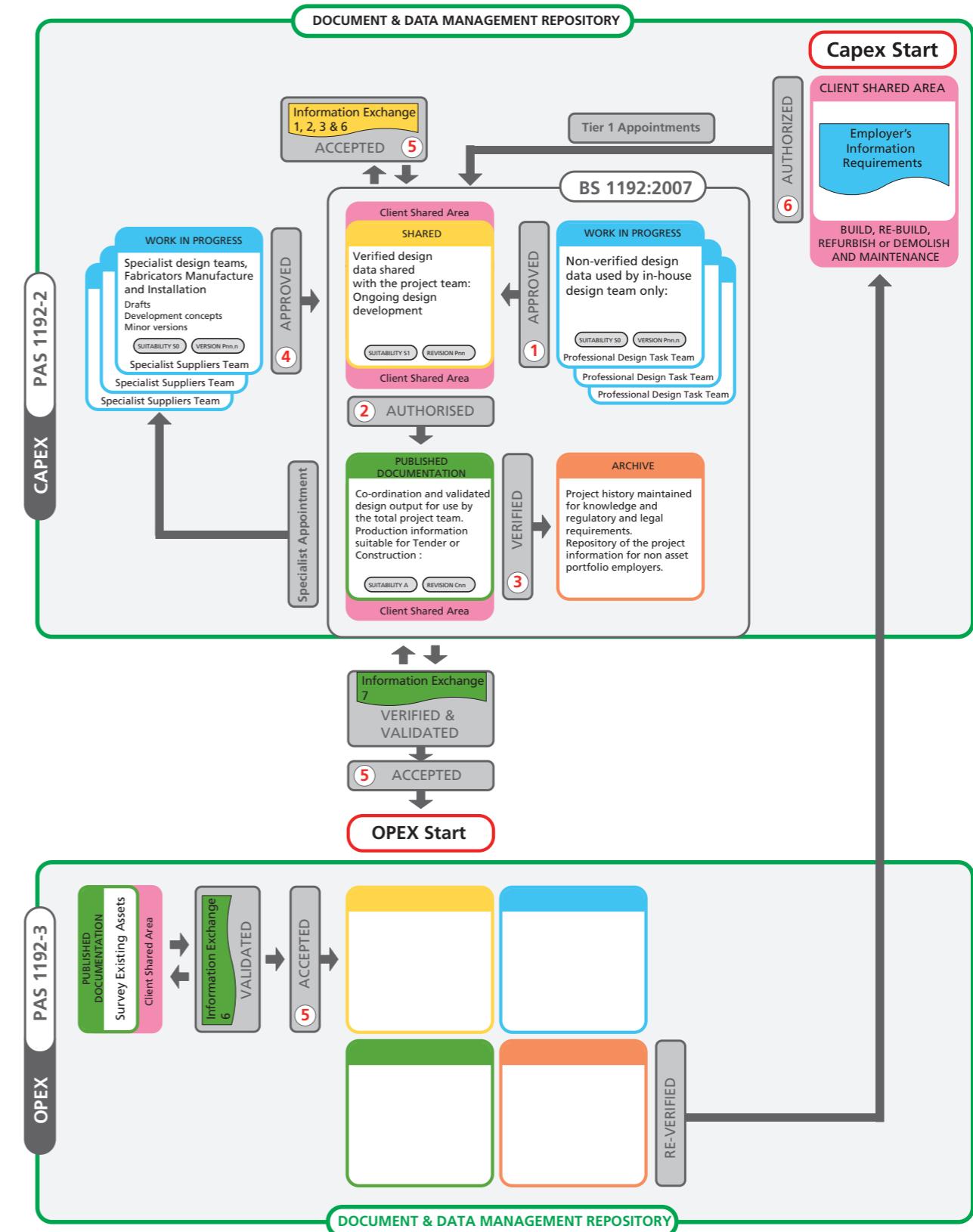
Status informacij

V delu (Work in progress - WIP). Delovno področje; v tem področju se hranijo neodobrene informacije za vse sodelujoče v projektu.

V skupni rabi (Shared area). Informacije v tem preverjene, pregledane in odobrene za deljenje z drugimi organizacijami, lahko tudi z naročnikom.

Objavljeno (Published). Informacije v tem področju so potrjene s strani naročnika oz. pooblaščenca (npr. odgovorni projektant).

Arhiv (Archive). Področje za shranjevanje podatkov ob vseh pomembnih projektnih mejnikih ter zapis in sledenje vsem zahtevam po spremembah.



Common Data Environment (CDE)

Pomembneje od CDE

Ljudje. Zahteva po visoko usposobljenem strokovnem kadru.

Proces. Uporaba standardov PAS1192, BS1192, ... zahteva določitev Employers Information Requirements (EIR). Le-ta določa vsebino izdelka, ki ga bo prejel naročnik.

Tehnologija. CDE naj omogoča nadgradnjo z vsemi potrebnimi programskimi rešitvami. Ustvarjeni podatki/informacije morajo naročniki zagotavljati predvidene koristi uporabe BIM pristopa.

Implementacija CDE

Začnite z vašimi zahtevami

Določite EIR (Employers Information Requirements)

Uporabite standarde PAS1192, BS1192 in druge

Dokumentirajte BEP (BIM Execution Plan)

Izberite ustrezen CDE

V EIR zapišite CDE in zahtevajte njegovo uporabo

Preverite, da so določeni in zapisani upravljalci nalog/informacij

Neprekinjeno preverjajte izpolnjevanje nalog in vpeljite izboljšave, če so potrebne

Employers Information Requirements (EIR)

Vsebina

Standardne metode in postopki, poimenovanje in oblike zapisa podatkov/informacij, navodila za delitev informacij.

Predpisani standardi in procedure, ki jih morajo sprejeti in izvajati vsi neposredno in posredno vključni v projekt.

Jasna definicija vlog in odgovornosti povezanih z ustvarjanjem, upravljanjem in deljenjem informacij.

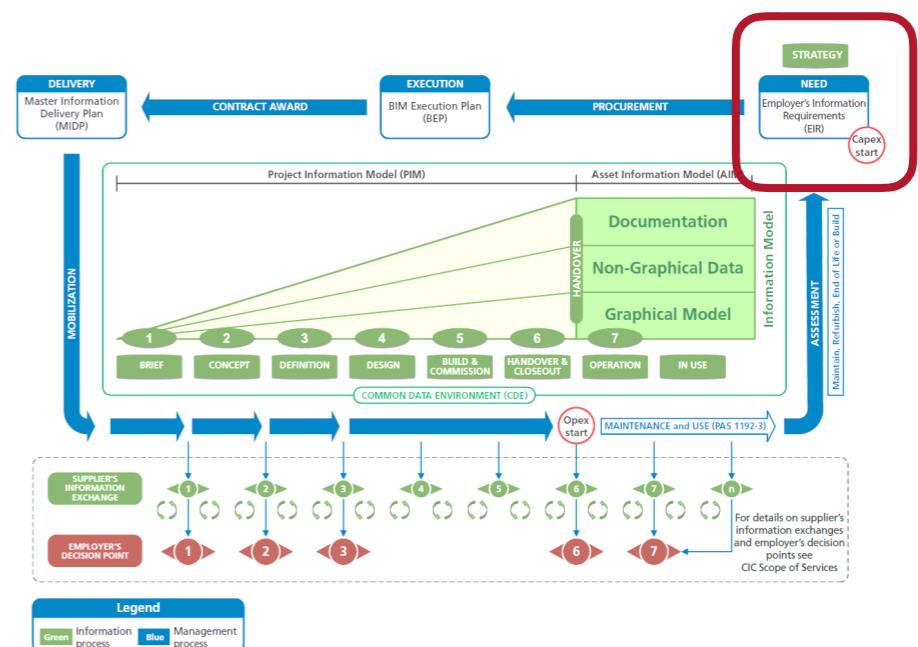
IDP (Information Delivery Plan), ki natančno določa načrt deljenja informacij (kdaj, kdo, komu).

Sestavni deli

Tehnični del. Programska oprema in platforme, zapis podatkov/informacij, koordinate, LoD, Lol, ...

Upravljaljski del. Standardi, vloge in odgovornosti, proces sodelovanja, varnost, ..

Podjetniški del. Urnik deljenja podatkov/informacij, definicija BIM izdelkov, ...



Common Data Environment (CDE)

Oblike

od zelo preprostih (deljen mrežni disk) do namenskih CDE storitev v oblaku

EDMS → CDE

EDMS = Electronic Document Management System

Osnovni ukazi za upravljanje: "From", "To", "When", "What", "Why"

Zahteve

Storitev v oblaku

Varnost

Preprost in učinkovit uporabniški vmesnik

Standardi (poimenovanje datotek, podatkovni zapisi, ...)

Digitalni delotoki

Združevanje informacij

Pregledovanje in komentiranje

Povezovanje informacij in podpora za raznolike podatkovne zapise

Povzetek

Gradbeništvo

Posebnosti, ki vplivajo na IKT

Komunikacija

Teoretične osnove

Vodenje projektov

Agilne metodologije

BIM

Nivoji, proces

Okolje za sodelovanje

CDE



"Before I write my name on the board, I'll need to know how you're planning to use that data."

Povezave

Standardi, priporočila, ...

Spletna stran BIM LEVEL 2, <http://bim-level2.org>



Informacije, izobraževanje, ...

Spletna stran B1M, <http://www.theb1m.com>

Podcast BIMpogovori, <http://bimpogovori.si>

030 BIMpogovori z Iztokom Zabreznikom
Objavljeno: 9.5.2017 | **Dolžina:** 1:20:09 | **Prenesi:** mp3 | **Predvajaj:** YouTube
 BIMpogovori z Iztokom Zabreznikom - govorimo o tem, kako narediti BIM podatke uporabne; zgodovini, razvoju in prihodnosti programa Autodesk Civil3D; vlogi BIM menagerja v podjetju Lineal, ... Tole je do sedaj tudi najdaljša oddaja podcasta BIMpogovori. Škoda le, da zvok na trenutke ni najboljši :-)

029 BIMpogovori so stari eno leto
Objavljeno: 25.4.2017 | **Dolžina:** 57:23 | **Prenesi:** mp3 | **Predvajaj:** YouTube
 BIMpogovori so stari eno leto - v oddaji se gostitelja spomnita začetkov podcasta BIMpogovori pred enim letom, preverita kako uspešna sta bila v prvem letu snemanja podcasta ter naredita nekaj načrtov za naslednjo sezono.

028 BIMpogovori z Martinom Lahom
Objavljeno: 11.4.2017 | **Dolžina:** 1:05:57 | **Prenesi:** mp3 | **Predvajaj:** YouTube
 Oddaja podcasta BIMpogovori z Martinom Lahom - v oddaji govorimo o uporabi BIM-a v podjetju ELEA in skupini iC Group. Martin spregovori o številnih zanimivih podrobnostih (BIM standardi v Avstriji, problemi z atributi oz. z BIM podatki, itd.) in ob tem omeni cel kup kratic (BIM, IFC, CDE, BCF) ... predvsem pa izverno tudi, da je Excel BIM orodje :-)