

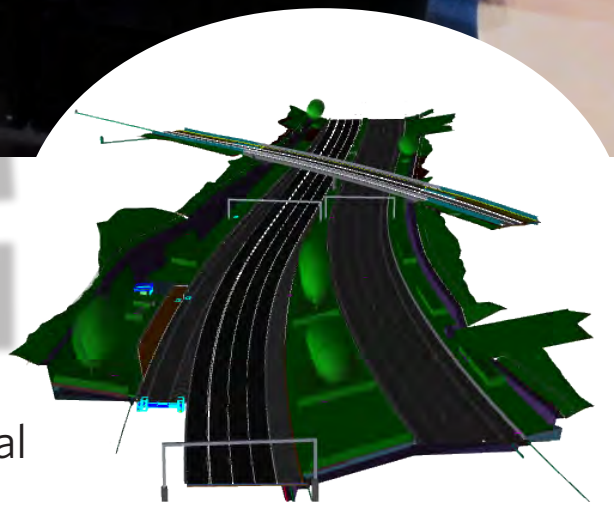


## The Stockholm Bypass

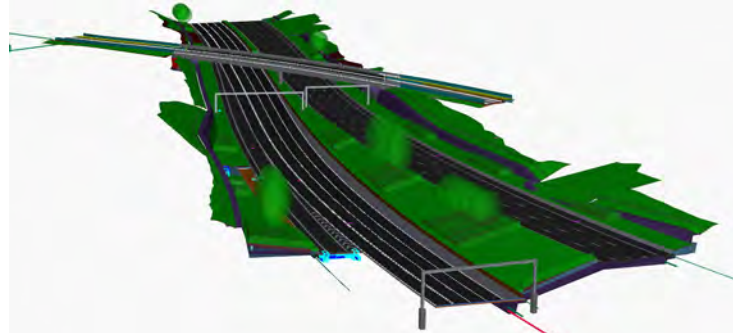
Seminar - 2014-02-11

Documentation from the seminar about digital models in tender specifications.

Includes Q&A and the presentation from the seminar.



# Questions And Answers



## Questions

**1** I would like to be able to use cells that show, for example, the type of gully concerned and text information about it. If I place the pointer on an object, I want to see what type it is, the material it is made of, its dimensions and its length. Why can't I do this in the enclosed files?

## Answer from The Stockholm Bypass

One of our principal ambitions in the project has been as far as possible to be “software neutral” The definition of this has developed into being that if files from the largest software suppliers (Bentley, Autodesk) can be read with no problem, without processing, when they are opened in each others’ programs, the files can be regarded as being neutral. This means that many “intelligent” objects in the models may not be allowed in exchange format.

We have devoted a lot of effort towards achieving as high a lowest level as possible, but have found that the CAD layer is in fact the only common denominator (together with file name, model texts, etc.) We have thus been forced to use the layer name to save relevant information on the object. You can read more about this in the Project IT Manual: CAD and Drawings that accompany FSE Test.

**2** Does the Stockholm Bypass Project intend to prepare Bills of Quantities or are the contractors expected to make quantity deductions in the models?

We intend in the case of build only contracts to prepare Bills of Quantities based on the models drawn up.

**3** How will reinforcement and grouting for the tunnel works be presented?

Reinforcement and grouting for the tunnel works will be presented in the tender enquiry documents as drawings and descriptions.

**4** Who will be responsible for the updating of models on existing conditions, for example models that describe rock surface, contaminated soil or rock material, and grouting and reinforcement classes for the tunnel works?

The party with design responsibility is responsible for updating the models and coordination with other parties. For those parts in which the contractor has responsibility for the design, for example linings and fittings in tunnels, the contractor shall update models and supply as-built documents in the form of digital installation models.

For those parts in which the client has design responsibility, for example rock reinforcement, the contractor shall supply basic input for as-built documents, for example the measuring-in of rock bolts, and the client will update the installation model.

**5** Will there be any form of quantity adjustment?

Quantity adjustment will in build only contracts take place in the traditional way regarding Bills of Quantities.

<p><b>6</b> In the case of design and build contracts, contractors will continue working on the 3D-models in the tender enquiry documents. In the IT document it states that it shall be possible for an exchange of information to take place in exchange format, but that exchange in other formats may take place if the parties are in agreement. How is this to be interpreted?</p>	<p>The term “parties” in this context refers to everyone who exchanges data with each other in the project. The parties shall always be able to expect to receive exchange format as the “lowest level”. However, the employer will not prevent exchanging parties from using a more intelligent format for information exchange if the parties consider it to be suitable.</p> <p>For example, if the designer and the contractor both use Civil3D, the parties can exchange intelligent DWG files instead of exported DWG-2010 files, and in this way avoid information loss.</p>
<p><b>7</b> When I open the same model in different viewers, objects may be displayed in different ways. Nor do associated properties appear in all software types. Is this a problem you are aware of?</p>	<p>We know that the object information that can be read off from it varies between different types of software. It is therefore important to carefully determine which attributes the project uses (see attribute list in the IT Manual) and how they are saved (attribute carriers in the IT Manual) as well as supplementary information in the technical discipline RFA document. All other information is to be regarded as surplus information.</p> <p>We will have to further analyse the fact that the geometry varies between different software. One of the main reasons why we have strictly chosen to use the exchange format is in order to acquire as “general” an interpretation of the models as possible.</p>
<p><b>8</b> Is the contractor expected to obtain software from the same supplier as the designer chose to use for his design work?</p>	<p>It is our ambition that tenderers should be free to choose their own software (always provided the programs concerned can read exchange format).</p>
<p><b>9</b> In those cases where the contractor has a responsibility for design, how can it be determined what is mandatory in the model and what is only provided for information purposes or as a sample design?</p>	<p>Our intention is, in a final set of tender enquiry documents, to publish models defining requirements in which the type of information that is not mandatory has been removed.</p> <p>We also intend – where necessary for reasons of understanding – to provide tenderers with access to a coordination model of those models that have served as a basis for the client’s joint review and founding of the design.</p> <p>These coordination models have been developed for reasons other than to serve as tender enquiry documents and shall not – to the extent the tenderer chooses to consider the material – serve as a basis for adjustment in different respects. The client is not responsible for the accuracy of these documents.</p>
<p><b>10</b> Will the Client’s documents be provided in different product-specific file formats?</p>	<p>No, the files supplied will normally be in the project’s exchange formats, which are DWG, DGN and LandXML.</p>
<p><b>11</b> If the result of the design work is a 3D model: Which data format shall be delivered to the Client?</p>	<p>Contractors will be subject to the same demands on supplies as our designers were, see IT Manual. Those construction parts that are to be returned to the employer in 3D-format will be specified in the tender enquiry documents.</p>
<p><b>12</b> If the result of the design work is 2D drawings: Are there specific CAD standards expected (e.g. revision of Trafikverkets IT-manual)?</p>	<p>Yes, all model files (including drawing models) shall follow the Stockholm Bypass Project IT requirements.</p>

<p><b>13</b> Will the Client provide “content”, components or templates that are to be used?</p>	<p>No, as things stand at present we have no plans for this.</p>
<p><b>14</b> How far do references from technical specifications to models and drawings go?</p>	<p>We have tried to be clear with our use of references, but with models the references in most cases “only” go as far as the model files, not to individual objects.</p>
<p><b>15</b> Which design/work area is the contractor expected to use?</p>	<p>Products are processed in Projectwise – documentation and administration are managed in the Swedish Transport Administration’s project portal, PPI. Chaos will be successively phased out from use by the Swedish Transport Administration and replaced by Projectwise.</p>
<p><b>16</b> What applies as the definition of rock excavation in the tunnels?</p>	<p>Supplied triangulated grid applies as the theoretical rock section. It is sufficiently dense to follow the mathematical definition of “section” and can be used in the drilling rigs.</p>
<p><b>17</b> The coding of layers is difficult to read. How can the contractor acquire assistance in understanding the content?</p>	<p>Attribute definition is presented in the IT Manual and will be given as a code list in clear text.</p>
<p><b>18</b> Do we have to model anything in our tender?</p>	<p>No, we do not intend to demand that tenderers should present models in their tenders. On the other hand, everyone will probably discover that tender design is easier if they have access to models to start from.</p>
<p><b>19</b> What is the level of detail of the tender enquiry documents? What will be available for the contractor to continue designing?</p>	<p>As far as possible, the tender enquiry documents will present requirements. This means that the models will in many cases lack any dimensions – for example thickness. In the case of design and build contracts the contractor may create original format from those obtained from the models provided, and thereafter supplement them according to their own needs.</p>
<p><b>20</b> Is the contractor allowed to see the employer’s earlier design work (for example slopes, rock surfaces and ground conditions)?</p>	<p>We have not considered providing design documents other than in those cases where coordination models are made available. However, ground surface models will generally be made available.</p>
<p><b>21</b> Is everything presented in the models to be regarded as requirements? Will it be clear in the models what is requirements and what is information?</p>	<p>Those items that are requirements will be made clear from the overall tender enquiry documentation, or in other words regulations, specifications, models, drawings, etc. Those models that are included in the tender enquiry documents, and which will constitute part of the future contract, will only consist of requirements.</p>
<p><b>22</b> What demands will be made on 3D-design? Is it, for instance, allowed to supply own object catalogues?</p>	<p>3D-design shall be performed for those parts of the construction that are to serve as design input for parallel contractors (primarily geometries and ductwork for infrastructure) since these too will design their works in 3D. In addition, certain specific construction parts will be presented in digital 3D infrastructure models for as-built documents.</p> <p>When it comes to object catalogues, we cannot give any answer at present but ask to keep the matter under consideration.</p>

<p><b>23</b> How shall information exchange between civil works contracts and electrical/mechanical works contracts take place, and how is the contractor to know which input is quality-assured?</p>	<p>Information exchange will take place via the common project server that the Swedish Transport Administration provides (Project-wise), where the status of the documents will also be indicated.</p>
<p><b>24</b> Will it be possible anywhere in the tender enquiry documents to find “everything” that is needed in order to gain an overall impression and overview of the project?</p>	<p>We intend to produce a set of tender enquiry documents that are as clear and easily understandable as possible. In the case of the design and build contracts, technical specifications (OTB) together with the models will provide a complete picture of what the contract works entail. In order to minimise the risk of information being misunderstood to be mandatory, the models will only contain requirements (details are not presented in the models either).</p> <p>With the help of, among other things, clear references and clarifying texts (RFA), it is to be hoped that the reader will also be able to easily understand and make use of the more detailed information. In other words, it will as usual still be necessary to put together different parts of the tender enquiry documents in order to obtain a comprehensive overview.</p>
<p><b>25</b> How does the Stockholm Bypass Project regard basic input for administration data? What type of as-built document data will be required?</p>	<p>We will require as-built documents, or alternatively basic input for them, with approximately the same content as previously, with the exception that certain construction information will be requested in the form of digital infrastructure models. Demands for coding and structures for documentation/supply will increase somewhat.</p>
<p><b>26</b> How will we know as contractors that we have fulfilled all the requirements that are imposed? Are they collected somewhere?</p>	<p>The entire set of tender enquiry documents must be read with the understanding that the requirements will be supplemented. In other words there is not yet any one collection of requirements and demands – at least not in connection with construction and civil works contracts.</p> <p>When it comes to electrical and mechanical contracts, the Stockholm Bypass Project may make use of databases for systematic requirement management at the tender and construction stages. With the aid of BIM (Building Information Modelling), this could also be common practice for construction and civil works contracts in the future.</p>
<p><b>27</b> Do you think that BIM will become as developed in civil works as in building construction?</p>	<p>The benefit of using BIM is significant within civil works projects in that information can be communicated within a civil works project between different designers and contractors. Thanks to standardised items, building design has in certain cases progressed further with BIM. However, the civil works side is progressing strongly and we are of the opinion that it will advance a long way, even though it may not take place in exactly the same way.</p>
<p><b>28</b> How can we make sure that the models do not become too heavy and difficult to manage?</p>	<p>We will, among other things, demand that supplies are divided up so that we do not have any problems with this. We expect our suppliers to think along the same lines.</p>
<p><b>29</b> Will the Stockholm Bypass Project be open to other exchange formats that are more common on other</p>	<p>We have no such plans at present.</p>

**Förfärd Stockholm**  
Digitala modeller i förfrågningsunderlag



» E4 Förfärd Stockholm  
Seminarium 2014-02-11




**Dagens program**



**13.00-13.45 Inledning**  
Den nya BIM världen – Johan Brantmark, projektchef  
Innehåll i FU – Patrik Magnusson, bitr. projektchef  
Trafikverkets införande av BIM – Johan Asplund, specialist BIM

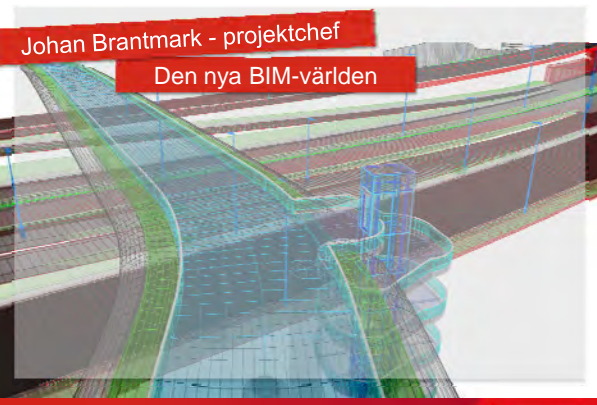
**13.45-14.30 Våra exempelmodeller – introduktion och synpunkter**  
John Ekberg

**14.30-15.30 Kaffe och gruppdiskussion vid fyra stationer**  
IT  
Anbud  
Projektering och leveranser  
Framtiden

**15.30-16.00 Sammanfattning av gruppdiskussion**

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Johan Brantmark - projektchef  
Den nya BIM-världen



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En stad på vatten och en växande storstadsregion



Det motsvarar två SL bussar varje dag

2 miljoner idag  
2,5 miljoner år 2030  
Stockholms län växer med cirka 100 personer per dag.

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Det här är Förfärd Stockholm

<b>Längd:</b>	drygt 21 km
<b>Tunnel:</b>	drygt 18 km
<b>Restid:</b>	ca 15 min
<b>Antal körfält:</b>	tre i vardera riktning
<b>Trafikplatser:</b>	sex
<b>Trafik 2035:</b>	140 000 fordon/dygn
<b>Byggtid:</b>	ca 10 år
<b>Kostnad:</b>	27,6 miljarder (2009 års pris)



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**BIM i Förfärd Stockholm**

**Ur Förfärd Stockholms BIM-strategi:**

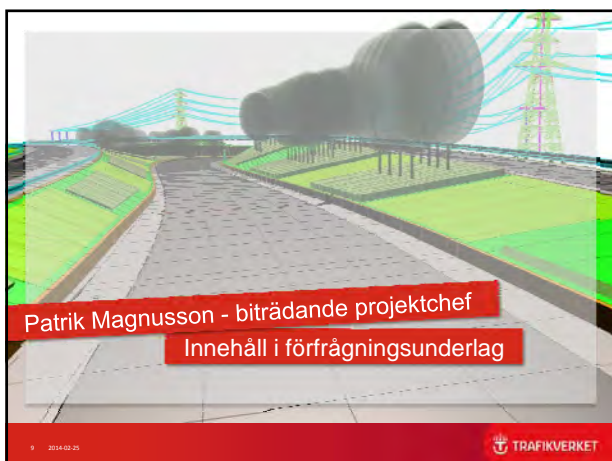
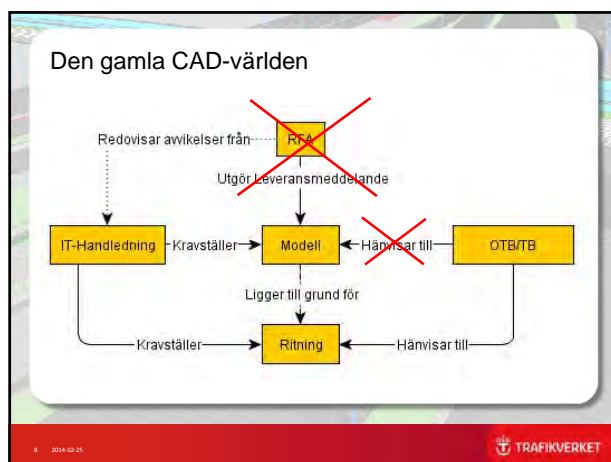
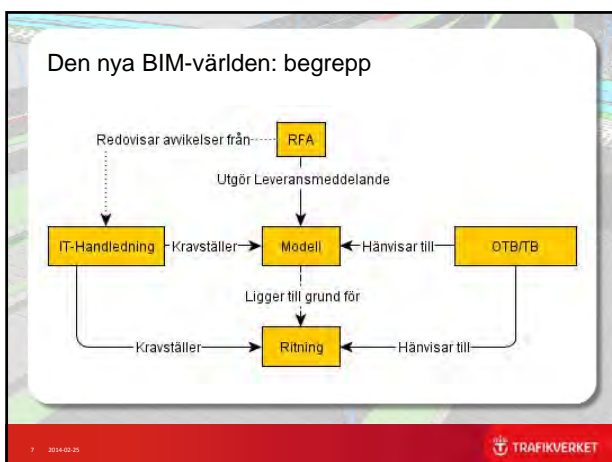
- Vi ville ha: *bättre projektering*
- Vi ville ha *säkrare projektkalkyler*
- Vi ville få *lägre kostnader*
- Vi ville få *goodwill i anläggningsbranschen*

Förfärd Stockholm Tidigt ute

**CAD-modellerna i Förfärd Stockholm är verktygsneutrala**  
Vi använder DWG, DGN och LandXML som utbytesformat mellan olika programvaror – i brist på bättre

- Vi krävställer produkten, inte arbetssättet
- Vi tvingar inte på någon en specifik programvara för projektering
- Programvaror inte alltid kompatibla så vi har tvingats acceptera att information går förlorad vid användning av utbytesformat

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### Modeller är en del av FU

Vi strävar mot en systematik i FU där tekniska krav specificeras i TB/OTB och hänvisning görs till modell eller ritning för läge och omfattning

Modeller redovisar krav samt i vissa fall föreskriven teknisk lösning (och i några fall förslag till lösning)

Där det är nödvändigt för förståelsen tillgängliggör vi de samordningsmodeller som legat till grund för vår samgranskning och förankring av projektet

### Vad gäller?

**Allmänna Bestämmelser ABT 06**

FÖR TOTALENTREPRENADEN BEBEBEH  
STYRSTÄLLS - ÅR 2010-01-01 OCH INOM 11 BYGGGARVETEN

**Svårigheter vid upphandling av TE:**  
 Hur visa beställarens krav?  
 Hur visa entreprenadens förutsättningar?  
 Hur visa förankrad totallösning?

**Förfärd Stockholms lösning:**  
 Rangordnat förfrågningsunderlag

- Beskrivning
- Modell (kravmodeller)
- Ritning

RFA (leveransmeddelande)  
 Samordningsmodell som informationshandling – ej del av kontrakt

### FSE Test

Innehåller exempel på FU-delar från ett verkligt delprojekt

Visar en totalentreprenad med stort inslag av tillhandahållna tekniska lösningar

Är ett underlag för diskussion med anläggningsbranschen

En stor förändring

Entreprenören ska, vid totalentreprenad och utförandentreprenad med konstruktionsansvar, leverera **projekteringsunderlag** för sidoentreprenader (främst installationsentreprenader) och **relationshandlingar** som digitala anläggningsmodeller

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Fackmodeller för E, K och VA i FSE Test

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Utdrag ur samordningsmodellen för FSE Test  
"Du ser det du vill se"

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Trafikverkets införande av BIM  
Johan Asplund- specialist BIM

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Verktygsspecifika

Verktysneutrala

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Ritningsorienterade

Objektsorienterade

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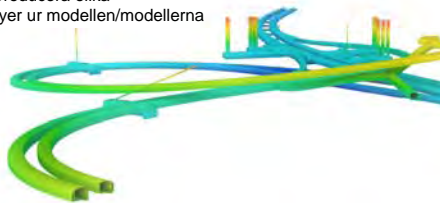


Modeller i kontraktet

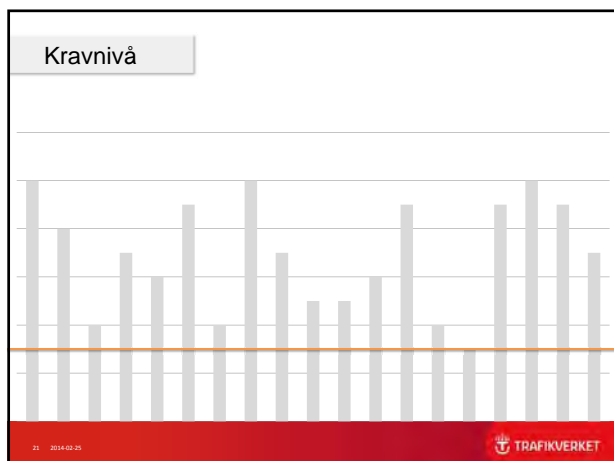
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### BIM Alliance

- En eller flera objektorienterade modeller
- Egenskaper är kopplade till objekten
- Relationer finns mellan objekt
- Möjlighet att producera olika informationsvyer ur modellen/modellerna



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### John Ekberg - entreprenadledare

### Våra exempelmodeller

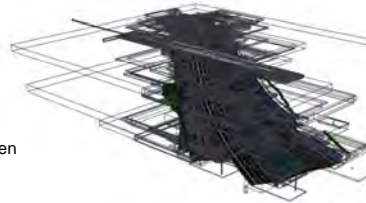


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### Modellvisning

**Genomgång av innehållet i FSE test.**


- IT-handledningen
- Redogörelse för anläggningsmodell – RFA
- Modellfilsförteckning
- Öppna filer
- Modellens uppbyggnad
- Lagerinformation
- Måta i modell
- Mängdhantering
- Samordna teknikområden
- I-model
- 3D-Pdf



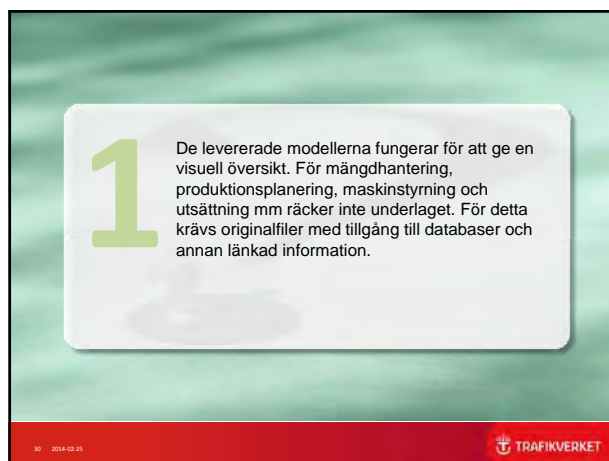
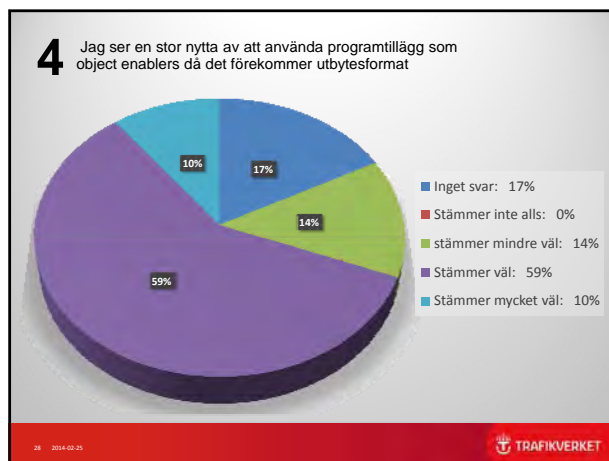
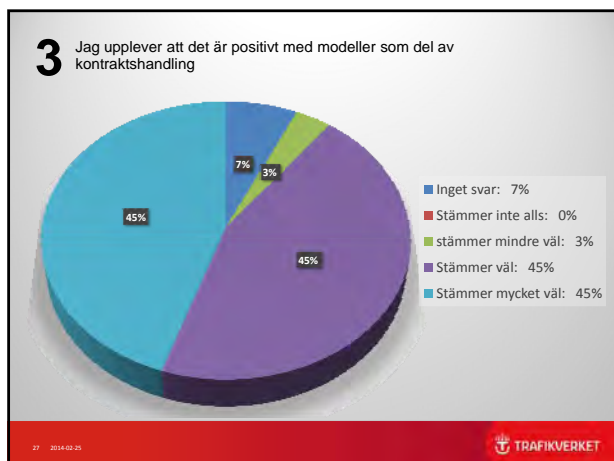
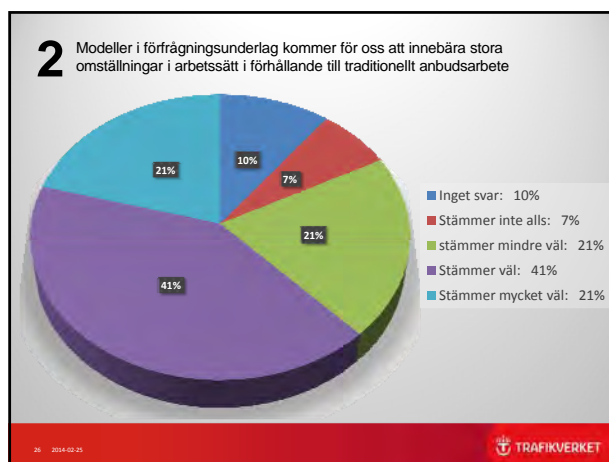
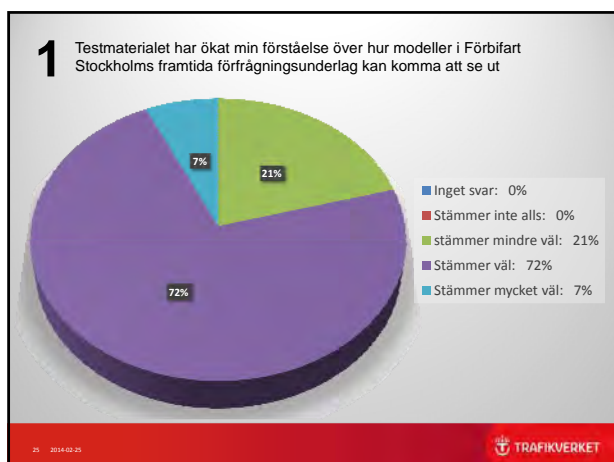
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### Frågor kopplade till FSE-test:

Fyra flervalsfrågor  
35 stycken svarade



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**2** I det publicerade materialet framgår inte 3D-modellernas status och relation till övriga handlingar i förfrågningsunderlaget. Det är viktigt att förstå hur handlingarna är samordnade och hur de kompletterar varandra.

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**3** Will the Client provide a "content", components or templates that are to be used? This is needed when we work with e.g. Autodesk REVIT and with 4D or 5D (=BIM).

*Kommer beställaren att tillhandahålla objektsbibliotek och inställningsfiler? Detta behövs vid arbete med tex Autodesk REVIT och med 4D eller 5D.*

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**4** I IT-handledningen redovisas hur 3D-modeller ska kodas. Vi noterar att koder för tunnelarbeten inte är upptagna. Ska detta tolkas som att 3D-modeller inte kommer att upprättas för tunnelarbeten?

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**5** Vid utförandeentreprenader är det av intresse för oss att förstå intentionerna beträffande mängdförteckningar och dess kopplingar till 3D-modellerna.

- Har Trafikverket för avsikt att upprätta mängdförteckningar eller förväntas entreprenören göra mängdavgtagning i modellerna?
- Hur kommer förstärkningar och injekteringar för tunnelarbeten att redovisas?
- Hur kommer mängdreglering av utfört arbete att ske?
- Vem kommer att ha ansvar för uppdatering av modeller?

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**6** Vi kan konstatera att objekt inte visas grafiskt på samma sätt och att tillhörande egenskaper inte följer med i samtliga programvaror när modellerna öppnas i olika viewers. Dessutom redovisas geometrin olika om modellen öppnas i Bentley Navigator, Tekla BIMSight respektive Autodesk Navisworks. Är detta ett problem som TRV är medveten om?

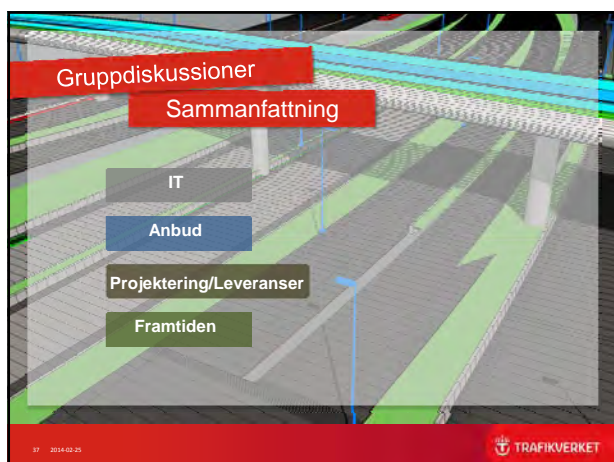
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**Kaffe och gruppdiskussioner**

<b>IT</b>	<b>Anbud</b>
Johan Asplund Göran Blomberg Tommy Kemppainen	Åsa Larsson John Ekberg Stefan Wennerström
<b>Nils Outters</b>	<b>Lars Mattson</b>
<b>Projektering/Leveranser</b>	<b>Framtiden</b>
Lina Gruber Jesper Niland Ulf Eriksson	Ingemar Lewén Lars Malthé
<b>Zanna Ehn</b>	<b>Karl Wallroth</b>

Åter-samling 15:30!

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Fortsättning och dokumentation

Frågor och svar - även de som kom fram under dagens diskussioner – kommer att publiceras på Förbifart Stockholms webbplats om ett par veckor

Nya frågor och synpunkter kan framföras fram till den 14:e februari via vårt webbformulär. Vi börjar skicka ut prekvalificeringsunderlag i slutet av februari

Dokumentation från seminariet kommer att skickas ut till samtliga deltagare

Blev du anmäld av en kollega, lämna gärna din e-post-adress till oss (finns ett papper utanför dörren)

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