

CGM v SVG

Computer Graphics Metafile v Scalable Vector Graphic

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Introduction

- What are the main drivers for the presentation
- CGM has been the primary S1000D 2D graphics format for many years
- The specification fully documents CGM usage
 - Chapter 7.3.2
- Surprisingly SVG (Scalable Vector Graphic) is not mentioned in the specification
- So why is the industry interested in SVG?
- Web browser support for ActiveX is disappearing
 - CGM relied on the ActiveX to display graphics in a web environment
- SVG is HTML5 native, no plug-in required

Chapter 7.3.2
CSDB objects - Graphics

Presentation Objectives

- Focus on the 3 main graphics data exchange considerations
 - Conversion
 - Lessons learned
 - Pros and Cons
 - Compatibility
 - Browser and Viewer Support
 - Interoperability
 - Compliance
 - Specifications and Standards
 - Have they changed?
 - Will they change?

Background

Historical the Formats

- CGM (Computer Graphics Metafile)
 - 2D graphics format with a long history of quality publishing in differing environments
 - Binary Format
- SVG (Scalable Vector Graphic)
 - Also a 2D graphics format, designed to publish primarily to the web
 - The development of SVG was influenced by:
 - VML – Vector Markup Language (Microsoft)
 - PGML – Precision Graphics Markup Language (Postscript)
 - Final decision was to base SVG on XML

CGM Background

- 2D Open Graphics format
 - Non-Proprietary
- Managed by the CGM Open Foundation
 - www.cgmopen.org
- The CGM format first appeared in the 1980's
 - The format was initially well supported by many software solutions
- W3C (World Wide Web Consortium)
 - WebCGM profile developed specifically for web delivery
 - <http://www.w3.org/Graphics/WebCGM/>
 - Profile adopted by the S1000D specification



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Where is CGM used? – Industry Sector

- Aerospace & Defense
- Automotive
- Oil & Gas
- Why these industries?
 - CGM = open, non-proprietary, reliable data exchange
 - The commonality – CGM Profiles = Validation
 - More specifically industry profiles
 - Aerospace & Defense = WebCGM
 - Oil & Gas = PIP
 - Automotive = WebCGM
- CGM is used for delivery, publishing and the display of graphics
 - In the Oil & Gas sector CGM is predominantly used for data exchange and display of information
 - No requirement for web delivery or graphical hotspots

SVG Background

- Scalable Vector Graphic (SVG)
 - XML encoded format
- W3C Standard
 - <http://www.w3.org/Graphics/SVG/>
- Managed by SVG Working Group
 - http://www.w3.org/Graphics/SVG/WG/wiki/Main_Page
- Native support in all popular web browsers
 - No plug-in technology required (HTML5 Native)



Where is SVG used? – Industry Sector

- GIS (Geographic Information System)
 - Maps on the web
 - But not Google maps!
- Graphic Arts
 - Graphics on the web, when vector will provide benefit
- Data Visualization
 - Data driven images, animation, dashboards etc. One benefit of XML
 - <https://bl.ocks.org/kerryrodden/7090426>
- Main reasons for SVG use
 - Native support for HTML5
 - Quality, the scalability of the image and retention of definition
 - Link to external data
- GIS Software Vendor
 - <https://www.esri.com>
- Data Driven Documents
 - <https://d3js.org/>

Conversion

Data Exchange

- Data Exchange is a crucial component of any graphics production process
- Import
 - Data reuse
 - Quality important, no data loss
- Export
 - Usually to publish (print) or display
 - Quality important, no data loss
- Keywords
 - Consistency
 - Reliability
 - Quality
 - Interoperability

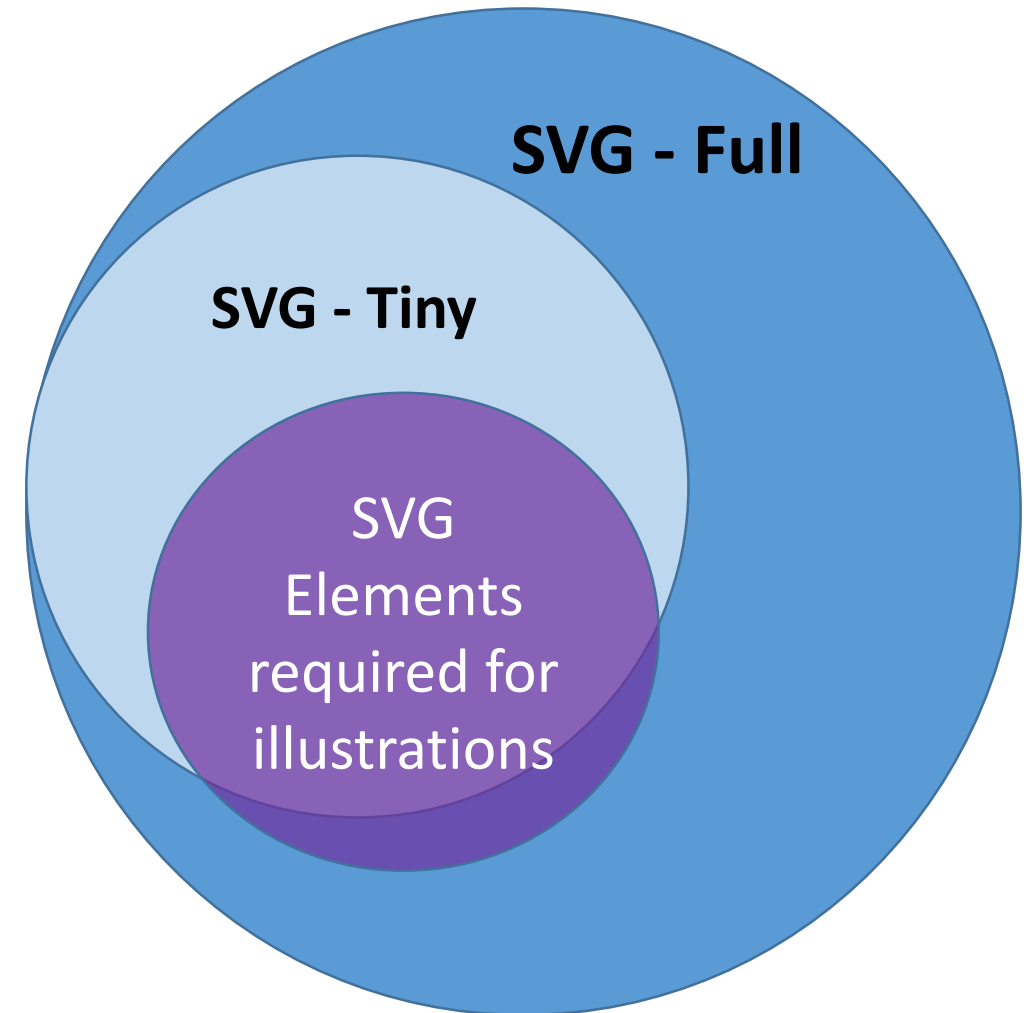
SVG the Specification

- XML based
- SVG 1.1 – Full
- SVG 1.2 – Tiny
 - A subset of the Full specification
 - Designed for phones, tablets etc.
- Version 2.0 of SVG is due for recommendation in August 2018
 - We do not believe there will be any impact on illustration requirements



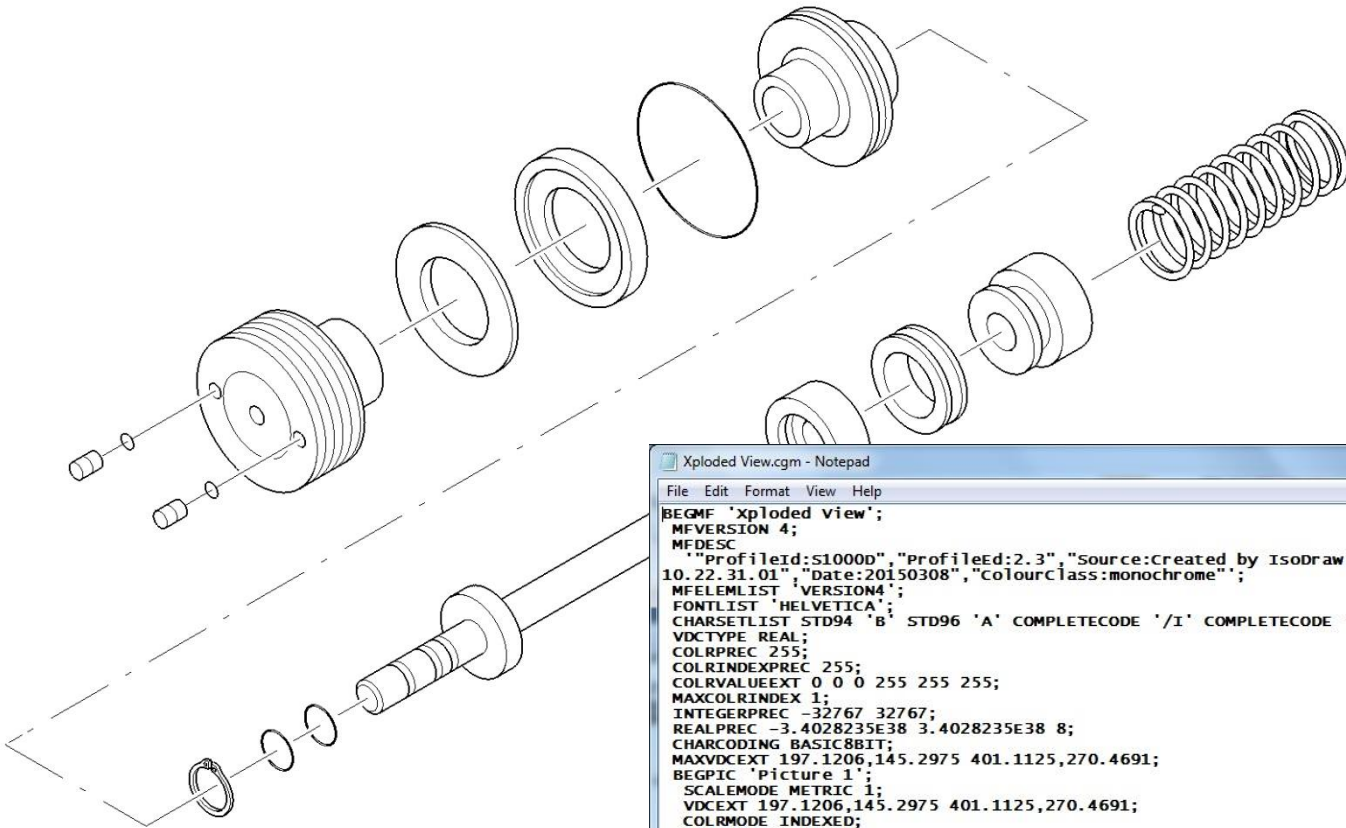
Converting CGM to SVG

- Exporting the file, approximately 30% of the SVG elements are required for illustrations
- There is an intersection of required elements for the Full and Tiny profiles
- Conversion Challenges
 - File Size
 - Embedded Raster Images
 - Hotspots
 - Line styles
 - Fonts
- SVG Viewing benchmark – CGM plug-in
 - Challenge, endeavoring to replicate the display properties



File Size Comparison

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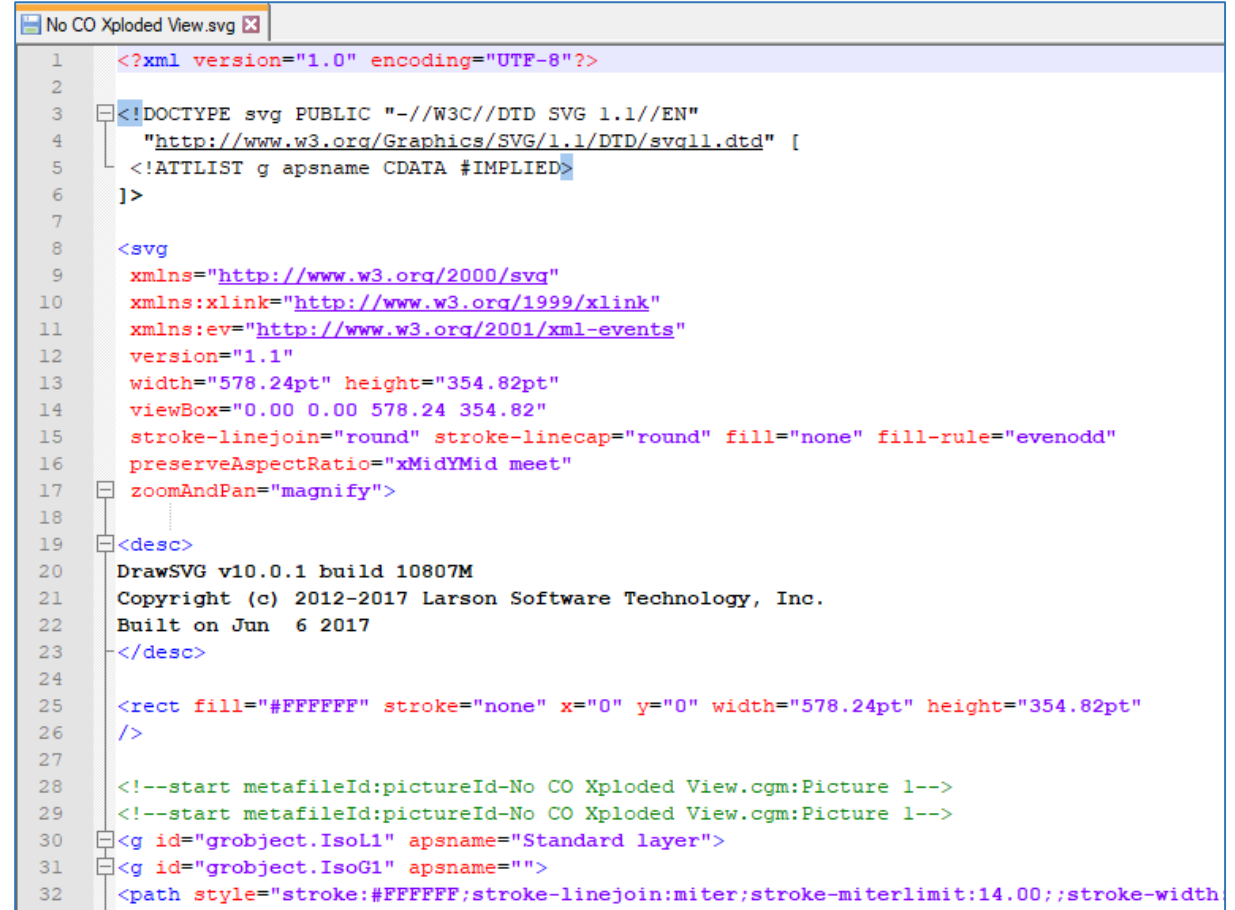
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File Edit Format View Help
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MFDESC
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10.22.31.01","Date:20150308","ColourClass:monochrome";
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FONTLIST 'HELVETICA';
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VDCTYPE REAL;
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COLRINDEXPREC 255;
COLRVALUEEXT 0 0 0 255 255 255;
MAXCOLINDEX 1;
INTEGERPREC -32767 32767;
REALPREC -3.4028235E38 3.4028235E38 8;
CHARCODING BASIC8BIT;
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BEGPIC 'Picture 1';
SCALEMODE METRIC 1;
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EDGEWIDTHMODE ABS;
LINEEDGEWIDTHDEF -17 17 10000 3000 1000 3000;
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BEGPICBODY;
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EDGEVIS ON;
TRANSPARENCY ON;
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CGM = 26KB

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1 <?xml version="1.0" encoding="UTF-8"?>
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4 "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd" [
5 <!ATTLIST g apsname CDATA #IMPLIED>
6 ]>
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10 xmlns:xlink="http://www.w3.org/1999/xlink"
11 xmlns:ev="http://www.w3.org/2001/xml-events"
12 version="1.1"
13 width="578.24pt" height="354.82pt"
14 viewBox="0 0 578.24 354.82"
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16 preserveAspectRatio="xMidYMid meet"
17 zoomAndPan="magnify">
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19 <desc>
20 DrawSVG v10.0.1 build 10807M
21 Copyright (c) 2012-2017 Larson Software Technology, Inc.
22 Built on Jun 6 2017
23 </desc>
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```

Why the difference in File Size?

- Same content, larger file?
- The key reason:
 - In SVG every single graphic attribute is coded
 - In CGM a common attribute only needs be coded once
 - CGM is also a binary file, SVG is text encoded
- The takeaway:
 - The file size could impact the size of the deliverable and the performance



```

1 <?xml version="1.0" encoding="UTF-8"?>
2
3 <!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
4   "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd" [
5   <!ATTLIST g apsname CDATA #IMPLIED>
6 ]>
7
8 <svg
9   xmlns="http://www.w3.org/2000/svg"
10  xmlns:xlink="http://www.w3.org/1999/xlink"
11  xmlns:ev="http://www.w3.org/2001/xml-events"
12  version="1.1"
13  width="578.24pt" height="354.82pt"
14  viewBox="0.00 0.00 578.24 354.82"
15  stroke-linejoin="round" stroke-linecap="round" fill="none" fill-rule="evenodd"
16  preserveAspectRatio="xMidYMid meet"
17  zoomAndPan="magnify">
18
19 <desc>
20 DrawSVG v10.0.1 build 10807M
21 Copyright (c) 2012-2017 Larson Software Technology, Inc.
22 Built on Jun 6 2017
23 </desc>
24
25 <rect fill="#FFFFFF" stroke="none" x="0" y="0" width="578.24pt" height="354.82pt"
26 />
27
28 <!--start metafileId:pictureId-No CO Xploded View.cgm:Picture 1-->
29 <!--start metafileId:pictureId-No CO Xploded View.cgm:Picture 1-->
30 <g id="grobjct.Isol1" apsname="Standard layer">
31 <g id="grobjct.IsoG1" apsname="">
32 <path style="stroke:#FFFFFF;stroke-linejoin:miter;stroke-miterlimit:14.00;;stroke-width

```

CGM to SVG Challenges (1)

- Raster Images - CGM and SVG both support the embedding of images
 - The major difference:
 - CGM will usually have a Group IV Compression (TIFF) embedded
 - SVG does not support TIFF, only JPEG and PNG
 - As a consequence there is a risk the file size could increase during conversion
- Hotspots – WebCGM profile specifies a standard way of writing hotspot information
 - The SVG specification does NOT provide a standard method
 - Larson has implemented a standard approach to writing hotspots in an SVG, thus improving interoperability

CGM to SVG Challenges (2)

- Line styles – WebCGM describes predefined line types
 - SVG a mapping issue - Larson is working with customers to improve conversion and display
- Fonts – WebCGM has recommended fonts e.g. Helvetica
 - A common conversion issue, good restriction and mapping methodology is the key to successful conversion
- **STANDARDIZATION** should be the objective

SVG Import

- SVG import is not supported in many software applications
- Testing shows that some software solutions cannot import what they export
- So what does this mean?
- The ability to round trip SVG files is very limited
- Keep the original CGM and export for display purposes only
- Objective, develop a standard and optimized method of importing and exporting an SVG graphic
- Primary objective, standardize export for consistency and reliability

Compatibility

The problem with graphics

- The topic of compatibility can be complex, it applies to hardware, software, operating systems, etc.
- The keyword for graphic file formats is interoperability
 - We will also cover this topic in **Compliance**
- Following the conversion of the file we will need to use it in different environments
 - Display
 - Publish
 - Editing
- The impact can be on both software and hardware

Displaying graphics on the web

- When viewing CGM graphics on the web there are multiple plug-in viewer choices from different vendors
 - If there is an issue you can approach the vendor to try and find a resolution
- The display of SVG graphics solves the issues with plug-ins
 - At the same time it may also cause some display problems
- SVG graphic display will be dependent on the chosen web browser
 - If the display of the SVG is not as expected, who do you approach, Google, Microsoft, Mozilla?
- Another consideration, it is probable you will have to develop and maintain the SVG viewing environment
- The above factors contribute to the requirement for a standard method of exporting SVG's

DEMO

Displaying graphics in a web environment

Publishing Graphics

- When we talk about publishing what do we mean?
- Printing a traditional book, probably a PDF file
- The CGM graphic is widely used in the publishing of the graphic in technical manuals
- The graphic will usually be part of an Arbortext Editor or Adobe Framemaker document enabling printing to PDF
 - Standalone Publishing engines are also used, usually to enable a book build
- SVG is also supported in Adobe Framemaker, so could also be used for publishing
 - However, SVG is currently used mainly for web delivery
- Best advice, retain your CGM's for print purposes

Editing Graphics

- The ability to create and maintain the graphic is crucial in the production process
- The CGM editing world is well supported by illustration tools
- SVG also has very good support from the mass market, Adobe Illustrator and CorelDraw being the main players
 - There is also freeware available e.g. Inkscape
- Keep in mind, using SVG's as a source file could be problematic due to no standard profile, interoperability?

Compliance

The Specifications

- W3C – www.w3c.org
 - World Wide Web Consortium
 - WebCGM & SVG
- S1000D – www.S1000D.org
 - International Technical Documentation Specification
- ATA (Airlines for America) - <http://airlines.org/>
 - iSpec2200 – Commercial Aircraft
- Both CGM and SVG are W3C recommendations
 - Completed the accreditation process
- CGM specified for S1000D and iSpec2200 as their recommended 2D graphics formats
 - Deliverable - CGM's are usually delivered by the supplier or contractor along with XML/SGML



Why Specifications

- The topic of specifications can result in various reactions!
- However, the bottom line is they provide valuable guidelines and a degree of confidence of all concerned
- With respect to graphics the implementation cost is usually lower than other components of information e.g. XML
- However, this does not mean the value or importance is less
- CGM has proved to be a reliable file format in the Aerospace & Defense industry, and millions of CGM graphics are in circulation
- Our advice:
 - Continue to use CGM as the origination and deliverable file format
 - Or use SVG as the graphic display option, and take into account our observations

CGM and S1000D

- **Chapter 7.3.2 – CSDB objects – Graphics**

Table of contents		Page
CSDB objects - Graphics		1
References		2
1 General		2
2 Graphic requirements		2
2.1 CGM versions		2
2.1.1 Metafile version 1		2
2.1.2 Metafile version 2		3
2.1.3 Metafile version 3		3
2.1.4 Metafile version 4		3
2.2 Terminology		3
2.2.1 Application profile		3
2.2.2 Application structure		3
2.2.3 CGM element		3
2.2.4 CGM generator		3
2.2.5 CGM interpreter		3
2.2.6 Graphical hotspot		3
2.2.7 Graphical object		4
2.2.8 Graphical primitive		4
2.2.9 Metafile		4
2.3 S1000D CGM profile		4
2.3.1 General		4
2.3.2 CGM structure		4
2.3.3 Profile details		5
2.3.4 WebCGM 2.1 architecture		9
2.4 S1000D TIFF profile		14
2.4.1 General		14
2.4.2 Profile details		14

WebCGM Profile

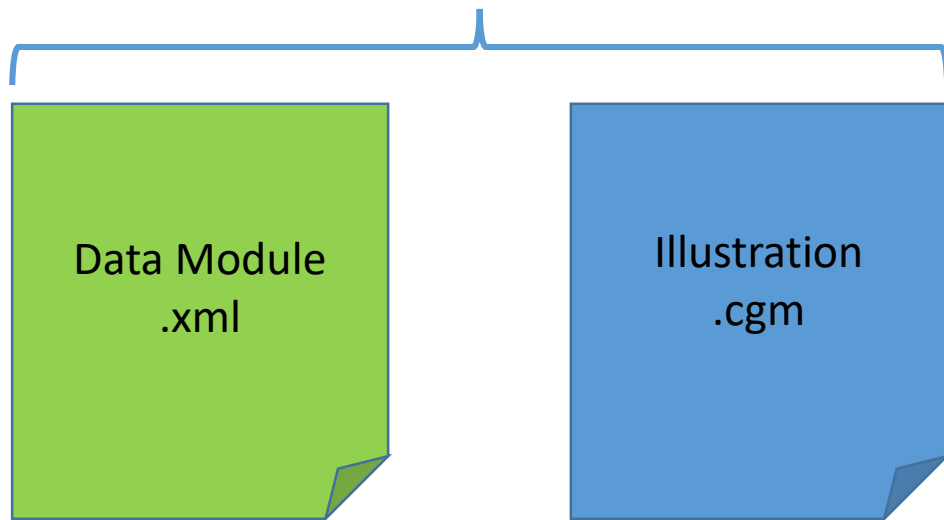
- The S1000D WebCGM profile is described as cascading
- WebCGM 2.1 is the full profile
- The S1000D profile is a subset of the WebCGM 2.1



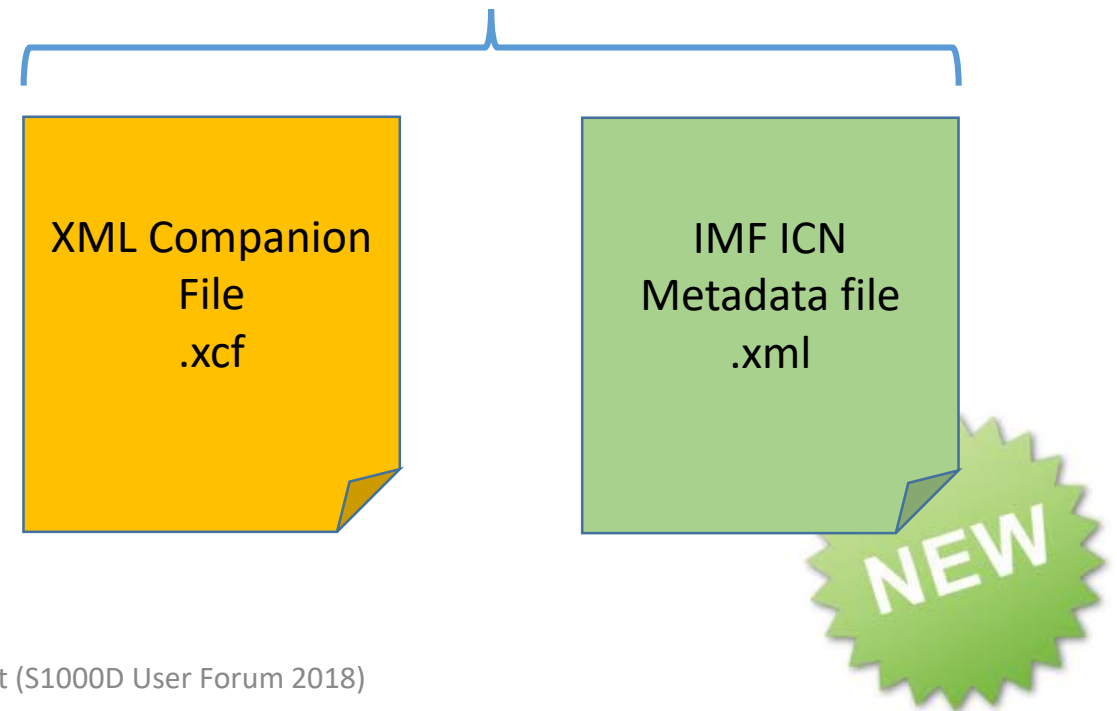
CGM Interactivity - Hotspots

- Hotspot information can be included in potentially 4 different files
- Only 2 required for linking to work between text and graphics

Essential



Optional

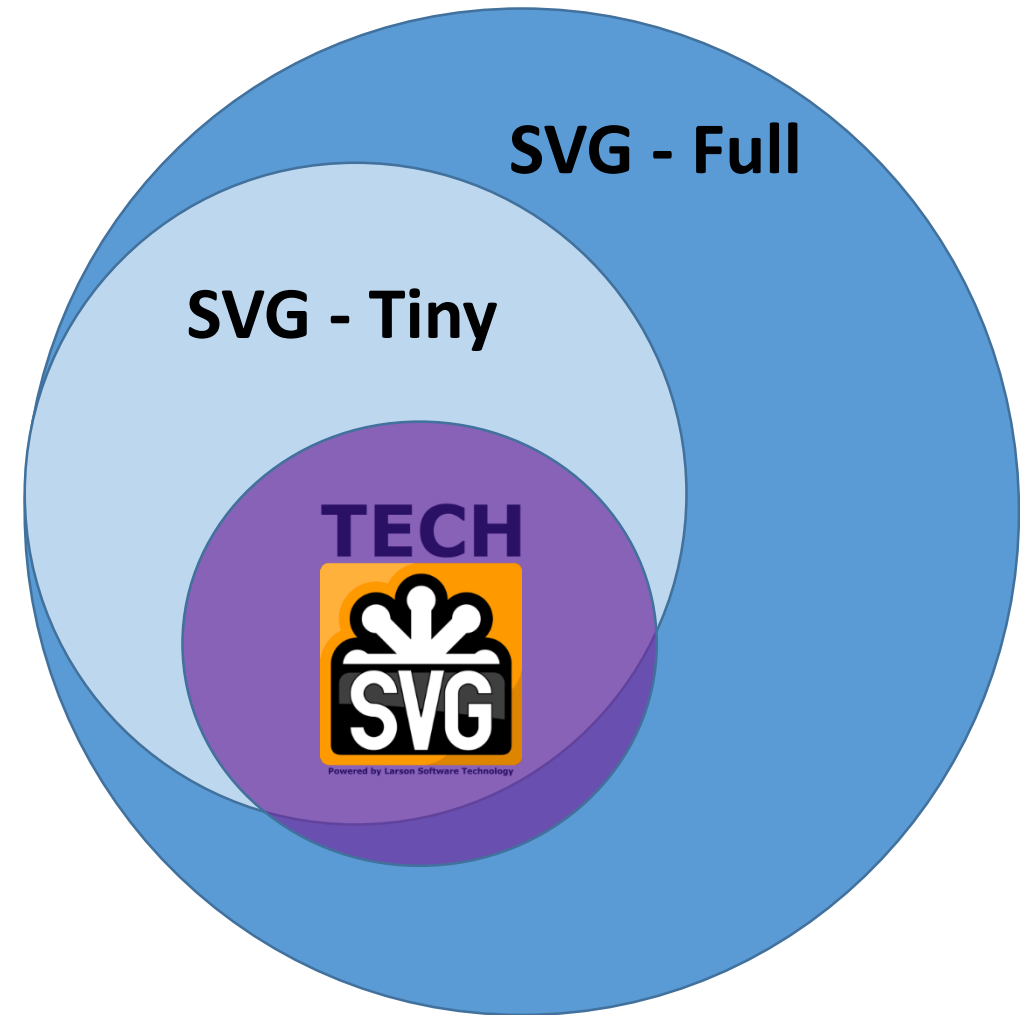


DEMO

XML companion file

SVG Standardization

- Why TECH SVG?
 - We quickly realized a standard way of writing SVG files was required
 - Best strategy was to develop the actual technology
- What is TECH SVG?
 - A subset of the Full and Tiny Specification's
- How will TECH SVG help?
 - It will define and execute a standard method of exporting SVG elements
- What else are we going to do?
 - Socialize our strategy
 - Presented draft SVG paper to S1000D Graphics committee member
 - Publish a draft a paper for further review
- This is not proprietary, it is based on the open SVG specification



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Summary

- The S1000D philosophy is based on open technology
 - XML, CGM, etc.
- This is underpinned by a standard method of creating the information, guidelines, business rules, profiles etc.
- CGM is very well documented in the S1000D specification
- The vendor community provide reliable CGM technologies
- SVG will require some effort to optimize its data exchange capabilities
- In conclusion, the graphics space should maintain the standards based approach

Thank you
for your attention!

Questions?