CAD Exchange Format in the field of public works JAPAN.

Y.KAWANAI

Japan Construction Imformation Center

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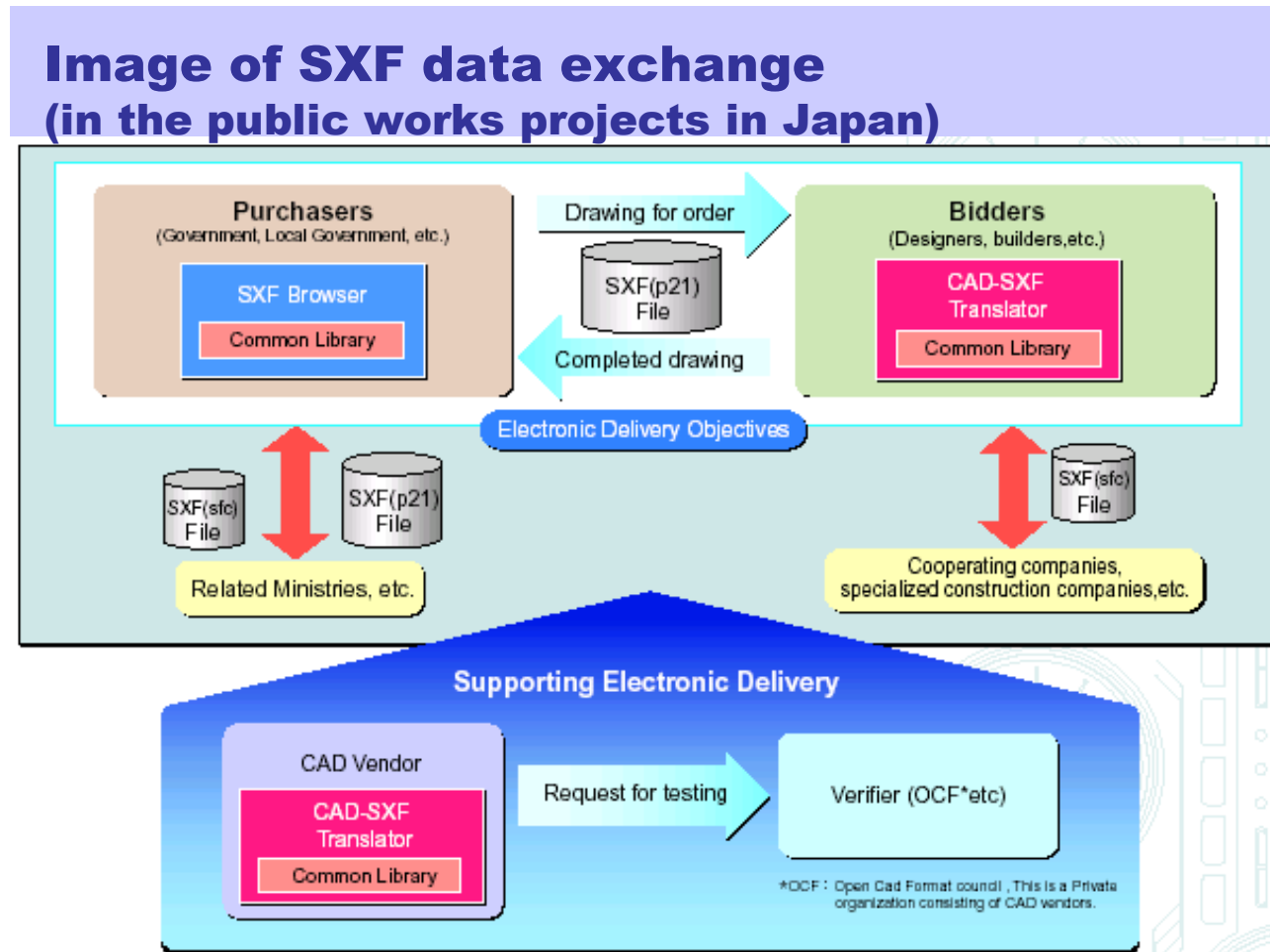
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What is SXF

- Scadec eXchange Format

  Scadec＝Standard of CAd Data Exchange Consortium

- De-jure standard for Japanese public works.
- It is based on ISO10303-202, and so
  at the STEP(ISO/TC184/SC4)meeting,
  SCADEC is known well for a good
  implementation sample of the STEP
  standard.

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SXF standard consist of 2 part, common library and the SXF browser.

Image of SXF data exchange
(in the public works projects in Japan)

Purchasers
(Government, Local Government, etc.)

SXF Browser
Common Library

Drawing for order

SXF(p21) File

Completed drawing

Bidders
(Designers, builders,etc.)

CAD-SXF Translator
Common Library

Electronic Delivery Objectives

SXF(sfc) File

SXF(p21) File

Related Ministries, etc.

SXF(sfc) File

Cooperating companies, specialized construction companies,etc.

Supporting Electronic Delivery

CAD Vendor

CAD-SXF Translator
Common Library

Request for testing

Verifier (OCF*etc)

*OCF: Open Cad Format council , This is a Private organization consisting of CAD vendors.

・CAD venders adopt the common library of XSF and translator to SXF into their products.

・Designers and contractors' companies adopt those CAD and change the drawings to SXF and submit to the owners.

And the owners can check the drawing by SXF browser every time.

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SXFブラウザ
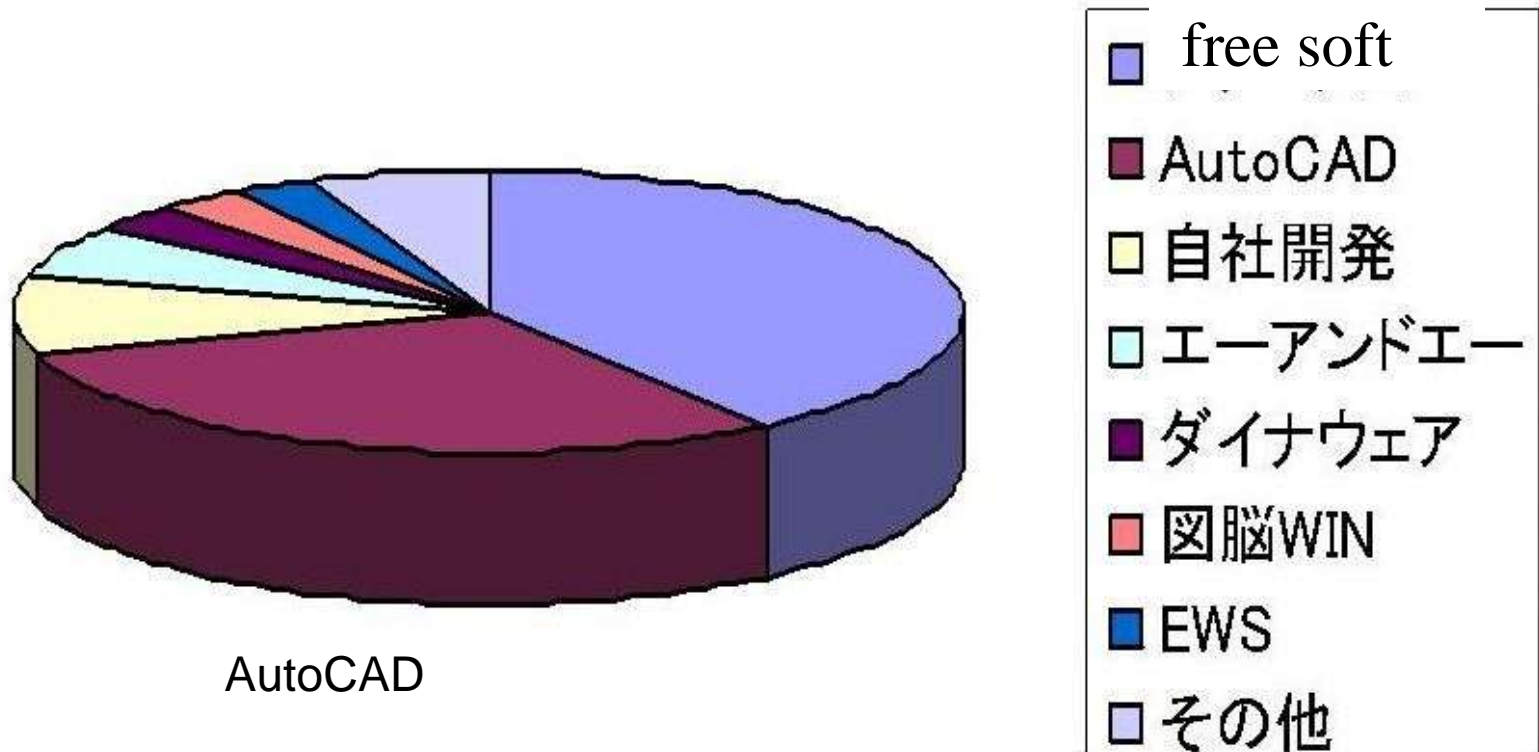
SXF in public works

- MLIT has adopted SXF as a standard format for the electronic supply in public works

  - It is prescribed in the Standard (published by MLIT on July,2002) for the CAD drafting in public works. And then other public organizations followed to use the format.

  MLIT: Japanese Ministry of Land, Infrastructure, Transportation

Why the public owners in Japan needed SXF ?

MLIT would start electric submission project of CAD drawings and they needed a standard of CAD then.

Market share of CAD in JAPAN Civil field in 2000

Legend:
- free soft
- AutoCAD
- 自社開発
- エーアンドエー
- ダイナウェア
- 図脳WIN
- EWS
- その他

AutoCAD

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▪If we left the market to take its own course, it would choose naturally the de-fact standard then. The de-fact is almost AutoCAD. But the standard of Autodesk is not open standard.

▪The government needs a open standard to start e-submit project. And so the Japanese government decided to make a national standard SXF.

▪The standard for SXF has specifications only, not including hard systems so that many small domestic venders also shall make competitive business conditions.

SXF was developed in a consortium SCADEC

- **SCADEC (March 1999 - August 2000)**

  Member :Purchaser organizations such as central government and local governments: 37 organizations

  Construction and IT industries: 201 companies

  Mission : To develop the standard CAD data format
  - To conform to STEP/AP202(ISO10303-202)
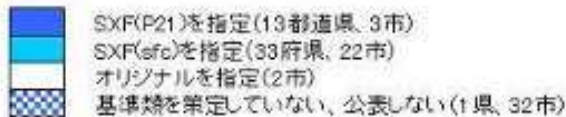 - To meet actual circumstances in the Japanese construction field

  ＊In those days JAPAN had much vigor, much powerful than today.

  My organization JACIC played as the secretary of this consotium.

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Present status of SXF in JAPAN in 2008.

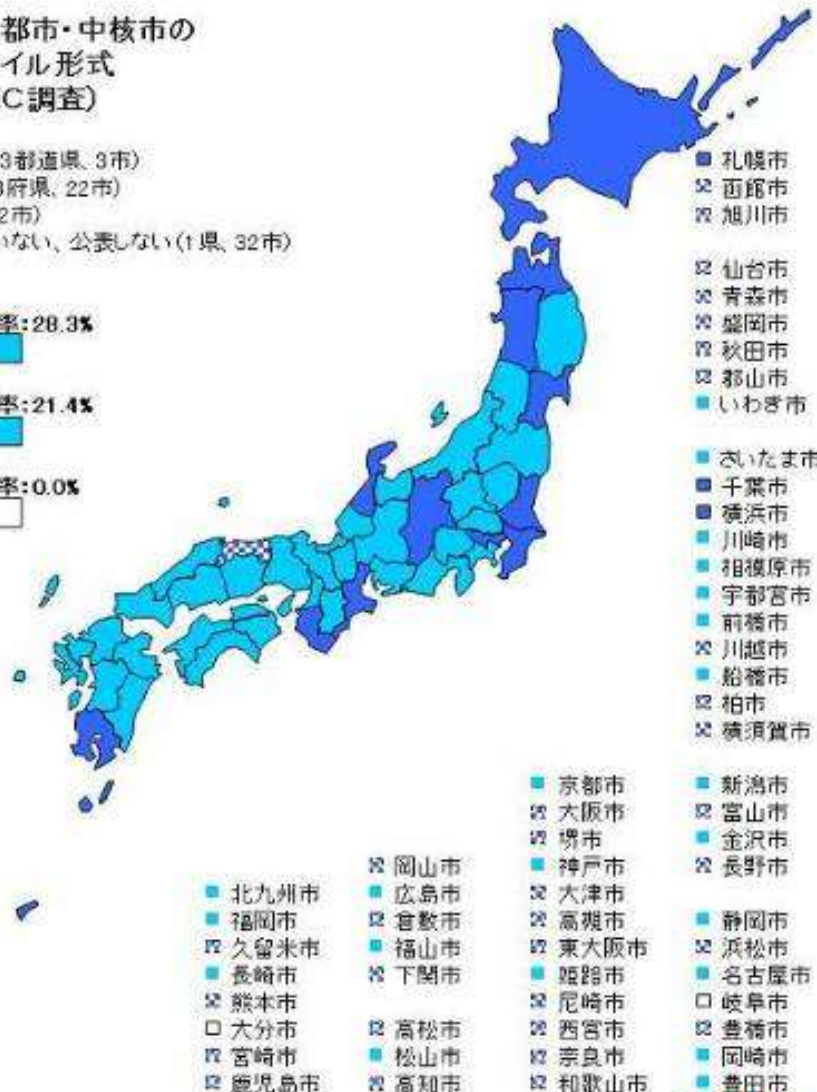都道府県・政令指定都市・中核市の
電子納品時CADファイル形式
（平成22年7月JACIC調査）

SXF(P21)を指定(13都道県、3市)
SXF(sfc)を指定(33府県、22市)
オリジナルを指定(2市)
基準類を策定していない、公表しない(1県、32市)

都道府県　P21指定率:28.3%

政令指定都市　P21指定率:21.4%

中核市　P21指定率:0.0%

It was also MLIT policy
to spread SXF standard.

札幌市
函館市
旭川市

仙台市
青森市
盛岡市
秋田市
郡山市
いわき市

さいたま市
千葉市
横浜市
川崎市
相模原市
宇都宮市
前橋市
川越市
船橋市
柏市
横須賀市

京都市　新潟市
大阪市　富山市
堺市　金沢市
神戸市　長野市
大津市
高槻市
東大阪市　静岡市
姫路市　浜松市
尼崎市　名古屋市
西宮市　岐阜市
奈良市　豊橋市
和歌山市　岡崎市
　　　　豊田市

岡山市
北九州市　広島市
福岡市　倉敷市
久留米市　福山市
長崎市　下関市
熊本市
大分市　高松市
宮崎市　松山市
鹿児島市　高知市

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SXF has 2 types , part21 & sfc.

Part21, which is sub-set of ISO standard, is very heavy.

And so we made one more light shape, sfc,

for the local government.

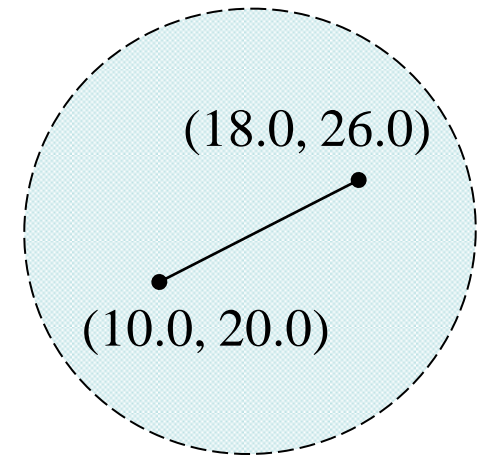Sfc was just picture file and it was made for local diffusion.

For example,   SXF = .sfc + .p21

Line-feature (start（10.0,20.0）stop（18.0、26.0）line)

.p21 {
#420 = CARTESIAN-POINT(‘’,(10.0,20.0));
#430 = CARTESIAN-POINT(‘’,(18.0,26.0));
#440 = DIRECTION(‘’,(1.,0.));
#450 = VECTOR(‘’,#440,1.);
#460 = CARTESIAN-POINT(‘’,(10.0,20.0));
#470 = LINE(‘’,#460,#450);
#480 = TRIMMED-CURVE(‘’,#470,(#430),(#420),.T.,.CARTESIAN.);
#490 = CURVE-STYLE(‘’,#20,#30,#10);
#500 = PRESENTATION-STYLE-ASSIGNMENT((#490));
#510 = (
ANNOTATION-CURVE-OCCURRENCE()
ANNOTATION-OCCURRENCE()
DRAUGHTING-ANNOTATION-OCCURRENCE()
GEOMETRIC-PRESENTATION-ITEM()
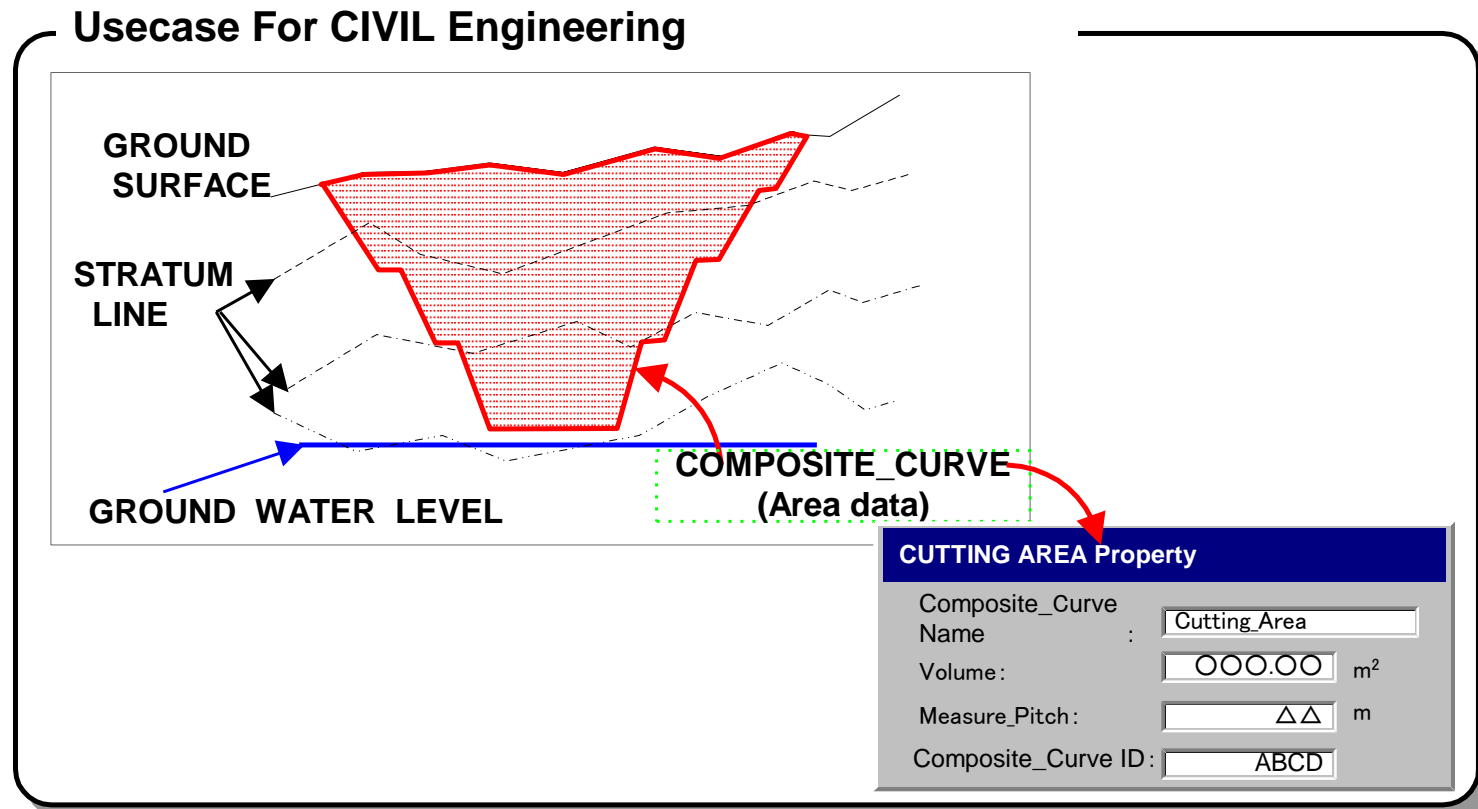REPRESENTATION-ITEM(‘’)
STYLED-ITEM((#500),#480)
);

(18.0, 26.0)

(10.0, 20.0)

.sfc {
/*
 #490 = line-feature
 (‘1’,’1’,’1’,’1’,’10.0’,’20,0’,18.’,26.0’)
*/

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Present version of SXF is Version3.1

- It may have Property for the 2D-Geometry element, too.
    - e.g. measure quantities --- earthwork volume from the cross section area

Some attitude also

Usecase For CIVIL Engineering

GROUND
SURFACE

STRATUM
LINE

GROUND WATER LEVEL

COMPOSITE_CURVE
(Area data)

CUTTING AREA Property		
Composite_Curve Name :	Cutting_Area	
Volume :	OOO.OO	m²
Measure_Pitch :	△△	m
Composite_Curve ID :	ABCD	

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Problems and Future

SXF is spread to Japanese government already.

But there are many problems remained yet. Because it is not de-fact standard.

・De-fact in JAPAN is Auto-CAD even now.

  And so SXF is regarded as a format of only submission standard against the public owners.

・ SXF is only one open standard in Japan.

  I think this SXF project was successful. It's very rare example in the world, but the future of this format is not clear, not transparent, not stable yet.

  But JACIC is going to support this standard for the future,too.

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