CAD Exchange Format in the field of public works JAPAN.

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

- 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.
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

- 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

free soft
• 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 vendors 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 consortium.

It was also MLIT policy to spread SXF standard.
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,

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

\[
\begin{align*}
#420 &= \text{CARTESIAN-POINT}('',(10.0,20.0)); \\
#430 &= \text{CARTESIAN-POINT}('',(18.0,26.0)); \\
#440 &= \text{DIRECTION}('',(1.,0.)); \\
#450 &= \text{VECTOR}('',#440,1.); \\
#460 &= \text{CARTESIAN-POINT}('',(10.0,20.0)); \\
#470 &= \text{LINE}('',#460,#450); \\
#480 &= \text{TRIMMED-CURVE}('',#470,#430,#420,.T.,.CARTESIAN.); \\
#490 &= \text{CURVE-STYLE}('',#20,#30,#10); \\
#500 &= \text{PRESENTATION-STYLE-ASSIGNMENT}((#490)); \\
#510 &= ( \\
  \text{ANNOTATION-CURVE-OCCURRENCE}() \\
  \text{ANNOTATION-OCCURRENCE}() \\
  \text{DRAUGHTING-ANNOTATION-OCCURRENCE}() \\
  \text{GEOMETRIC-PRESENTATION-ITEM}() \\
  \text{REPRESENTATION-ITEM}('') \\
  \text{STYLED-ITEM}((#500),#480) \\
); \\
\end{align*}
\]

\[\text{SXF} = \text{.sfc} + \text{.p21}\]
Present version of SXF is Version 3.1

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

Usecase For CIVIL Engineering

![Diagram showing GROUND SURFACE, STRATUM LINE, GROUND WATER LEVEL, and COMPOSITE_CURVE (Area data)]

Some attitude also
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.