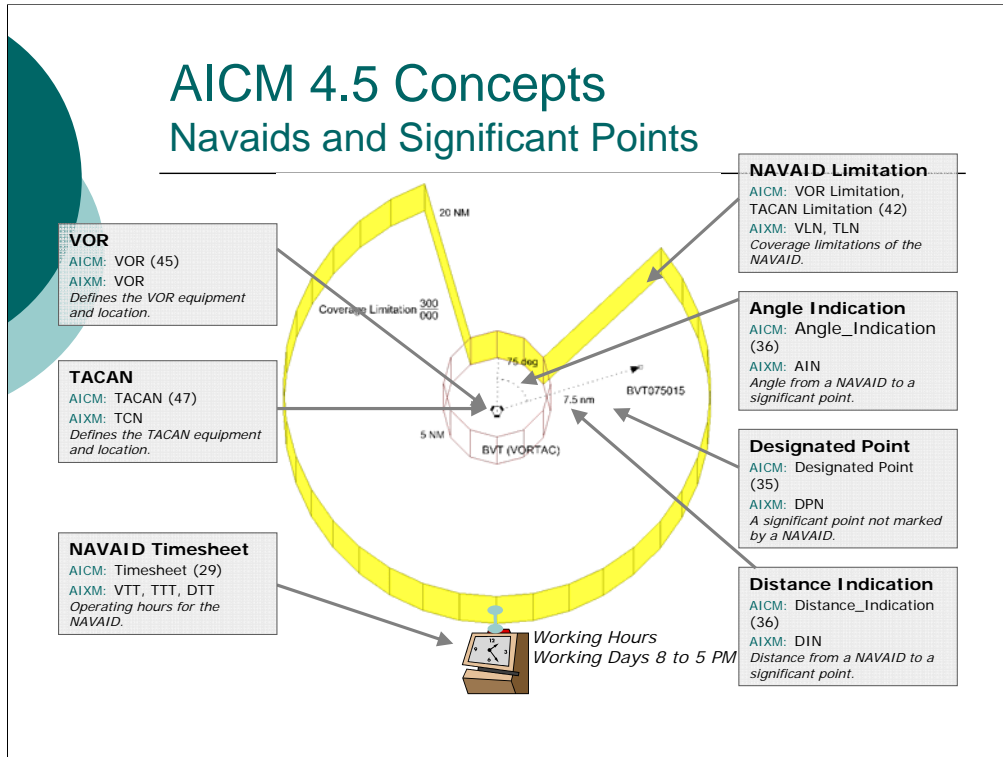# AICM Domain Introduction

AIXM 5 Public Design Review
February 7-8, 2006
Washington DC

AICM 4.5 Concepts

○ Aerodrome/Heliport
○ Navaids and Points
○ Routes
○ Airspace
○ Organisation/Service
○ Traffic Flow Restrictions
○ *New model*
  • *Obstacles*
  • *Procedures*
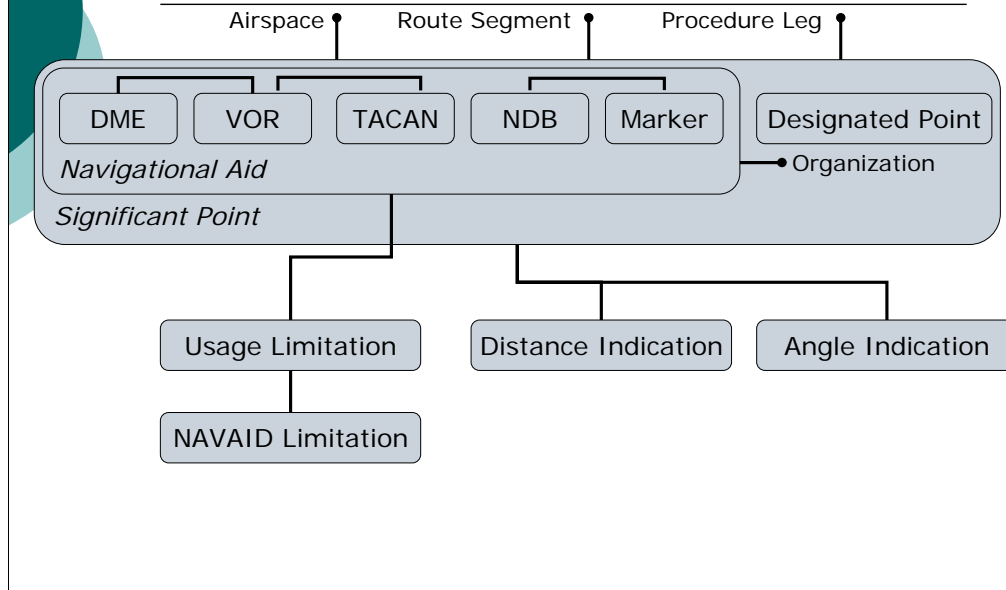
AICM 4.5 Concepts
Navaids and Significant Points

The NAVAID and Points Domain defines points in space used for navigational and air traffic control purposes. An abstract concept called the "Significant Point" is defined by ICAO as a "specified geographical location used to define an ATS route, the flight path of an aircraft or for other navigation/ATS purposes." Within the abstract concept of Significant Points are those points marked by a radio navigation aid and those points that are not marked by a navigational aid. In this document the general term NAVAID is used to represent points marked by the site of a navigation aid. NAVAIDS include VOR, DME, TACANs and others. The phrase "Designated Points" is used to represent locations that are not sited at a NAVAID.

This example illustrates a NAVAID called BVT which happens to be a TACAN collocated with a VOR (in FAA terminology this would be called a VORTAC). The BVT NAVAID has specific performance limitations outlined by the orange and yellow volumes. Within 5 nm of BVT there is full coverage from 0 to FL300, but from 5 to 15 nm from BVT there is a gap in coverage between the 355 and 25 degree radials. The coverage definition is termed a LIMITATION.

Here we see that the BVT NAVAID has working hours from 8:00 AM to 5:00 PM on weekdays.

In addition, this diagram shows a point in space called BVT075015, this is a DESIGNATED_POINT. This designated point can be defined as an angular reference (called ANGLE_INDICATION) from the VORTAC and a distance (called DISTANCE_INDICATION) from the co-located TACAN.

AICM 4.5 Concepts
Navaids and Significant Points

The AICM data model for NAVAIDs and Points is shown in this slide. The dashed lines indicate optional relationships and the solid lines are mandatory relationships. The dotted lines with balls at the end represent interfaces to the rest of the AICM data model.

Now that we've taken a look at the conceptual illustration and the overall NAVAID and Point data model, let's take a look at how NAVAIDS can be defined both conceptually and using AIXM.

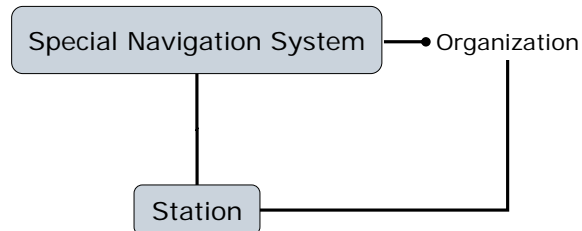# AICM 4.5 Concepts
Navaids and Significant Points

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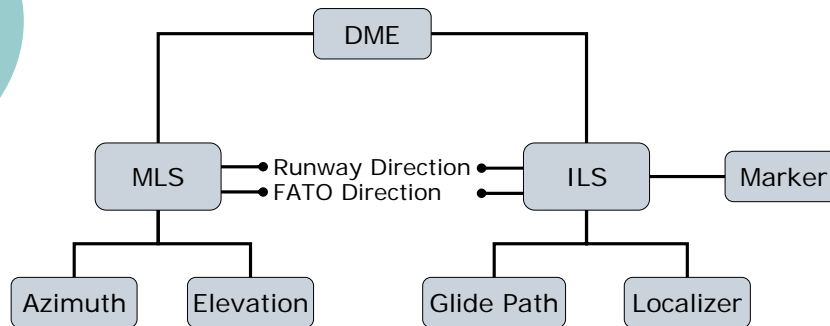
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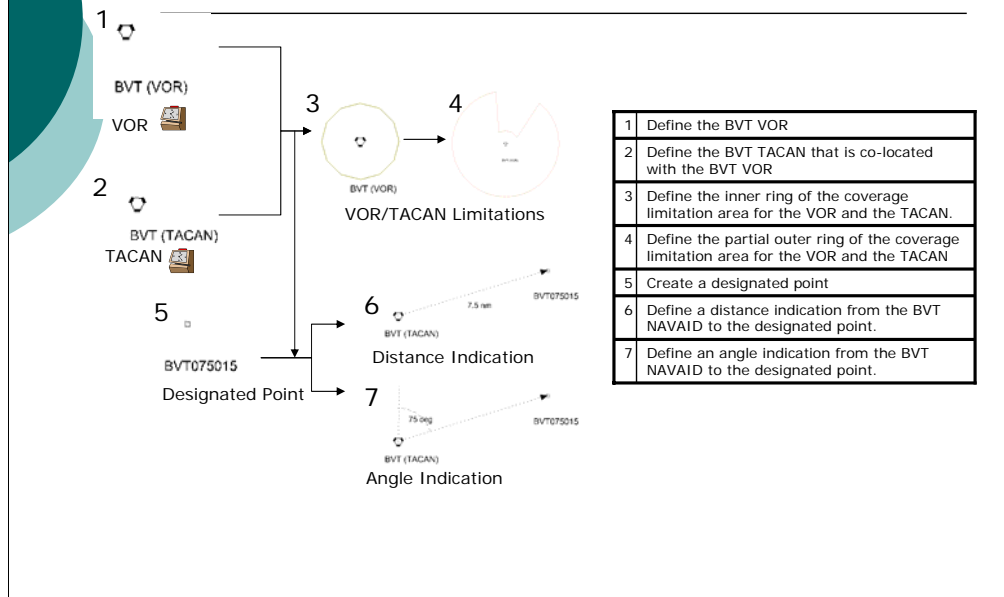
AICM 4.5 Concepts
Navaids and Significant Points

1	Define the BVT VOR
2	Define the BVT TACAN that is co-located with the BVT VOR
3	Define the inner ring of the coverage limitation area for the VOR and the TACAN.
4	Define the partial outer ring of the coverage limitation area for the VOR and the TACAN
5	Create a designated point
6	Define a distance indication from the BVT NAVAID to the designated point.
7	Define an angle indication from the BVT NAVAID to the designated point.

This slide shows a decomposition of the previous slide into a series of steps that can be used to construct our example.

1. First we are going to define the BVT VOR

2. Next we will create the BVT TACAN record and reference the BVT VOR record to indicate that the TACAN is collocated with the VOR.

3. In step three we model the inner coverage limitations.

4. Here we model the more complex outer coverage limitation ring.

5. Now we define the designated point located at BVT075015

6. and 7. The final two steps show how you can define angular and distance references from a NAVAID to any significant point.

AICM 4.5 Concepts
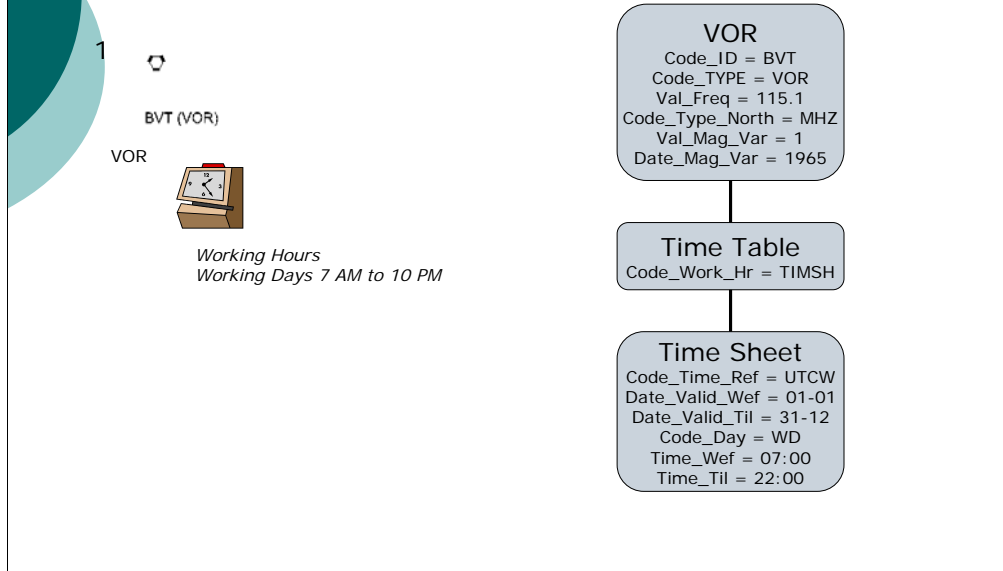## Navaids and Significant Points

AICM 4.5 Concepts
Navaids and Significant Points

VOR

*	CODE_ID	Standard
○	TXT_NAME	
*	CODE_TYPE	
*	VAL_FREQ	
*	UOM_FREQ	
*	CODE_TYPE_NORTH	VOR Specific
○	VAL_DECLINATION	
○	VAL_MAG_VAR	
○	DATE_MAG_VAR	
○	CODE_EM	
*	GEO_LAT	
*	GEO_LONG	
○	VAL_GEO_ACCURACY	
○	UOM_GEO_ACCURACY	
*	CODE_DATUM	
○	VAL_ELEV	Standard
○	VAL_ELEV_ACCURACY	
○	VAL_GEOID_UNDULATION	
○	UOM_DIST_VER	
○	VAL_CRC	
○	TXT_VER_DATUM	
○	TXT_RMK	

AICM 4.5 Concepts
Navaids and Significant Points

1

BVT (VOR)

VOR

Working Hours
Working Days 7 AM to 10 PM

VOR
Code_ID = BVT
Code_TYPE = VOR
Val_Freq = 115.1
Code_Type_North = MHZ
Val_Mag_Var = 1
Date_Mag_Var = 1965

Time Table
Code_Work_Hr = TIMSH

Time Sheet
Code_Time_Ref = UTCW
Date_Valid_Wef = 01-01
Date_Valid_Til = 31-12
Code_Day = WD
Time_Wef = 07:00
Time_Til = 22:00

Let's illustrate how an object diagram for the example NVAID system can be created step by step. In each of these slides we'll show the current step we are working on. In the blue box to the right we show an excerpt of the object model and important attributes.

First we define the BVT VOR and its associated timesheet.

AICM 4.5 Concepts
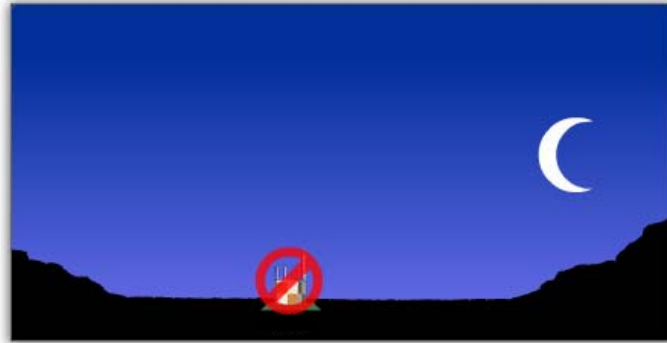## Navaids and Significant Points

AICM 4.5 Concepts
Navaids and Significant Points

AICM 4.5 Concepts
Navaids and Significant Points

SR   TIME_WEF   SS   TIME_TIL

START   END
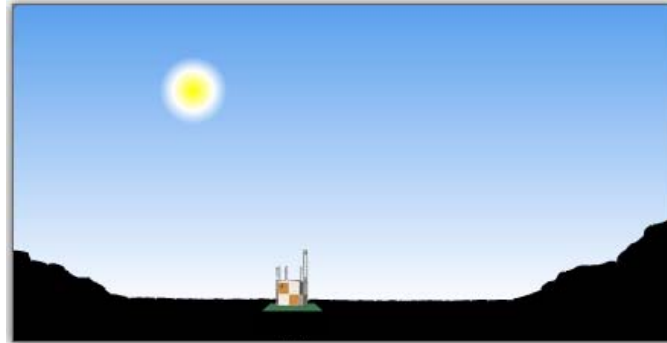
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Hours

CODE_COMB_WEF: [Earlier] [Later]
CODE_COMB_TIL: [Earlier] [Later]
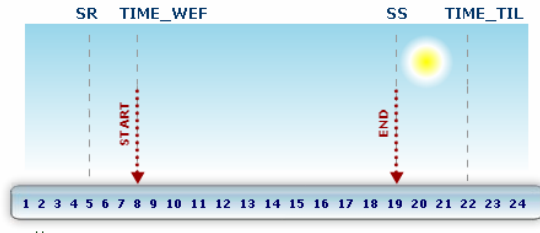
TIMESHEET

CODE_ TIME_ REF	CODE_ DAY	TIME_ WEF	CODE_ EVENT_ WEF	CODE_ COMB_ WEF	TIME_ TIL	CODE_ EVENT_ TIL	CODE_ COMB_ TIL
UTC	MON	08:00	SR	L	22:00	SS	E
UTC	TUE	08:00	SR	L	22:00	SS	E
UTC	WED	08:00	SR	L	22:00	SS	E
UTC	THU	08:00	SR	L	22:00	SS	E
UTC	FRI	08:00	SR	L	22:00	SS	E

AICM 4.5 Concepts
Navaids and Significant Points

AICM 4.5 Concepts
Navaids and Significant Points

2

BVT (TACAN)
TACAN

Working Hours
Working Days 8 to 5 PM
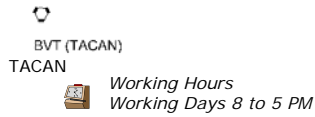
```
<Tcn>
  <TcnrUid>
    <codeId>BVT</codeId>
    <geoLat>403730.00N</geoLat>
    <geoLon>0864630.00W</geoLon>
  </TcnUid>...
  <VorUid>
    <codeId>BVT</codeId>
    <geoLat>403730.00N</geoLat>
    <geoLon>0864630.00W</geoLon>
  </VorUid>...
</Tcn>
```

VOR

TACAN
Code_ID = BVT
Code_Channel = 3X
Val_Mag_Var = 1
Date_Mag_Var = 1965

Time Table
Code_Work_Hr = TIMSH

Time Sheet
Code_Time_Ref = UTCW
Date_Valid_Wef = 01-01
Date_Valid_Til = 31-12
Code_Day = WD
Time_Wef = 08:00
Time_Til = 17:00
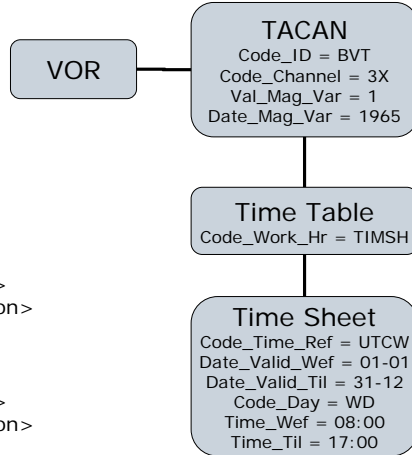
Similarly we will define the BVT TACAN. In this step we also reference the BVT VOR to indicate that the TACAN is collocated with the VOR.

AICM 4.5 Concepts
Navaids and Significant Points

TACAN

TACAN Usage Limitation
Code_Component = DIST
Code_Type = CVR

Navaid Limitation
Val_Angle_Fm = 0
Val_Angle_To = 360
Val_Dist_Inner = 0
Val_Dist_Outer = 5
Val_Dist_Ver_Upper = 0
Val_Dist_Ver_Lower = 300

Navaid Limitation
Val_Angle_Fm = 35
Val_Angle_To = 355
Val_Dist_Inner = 5
Val_Dist_Outer = 20
Val_Dist_Ver_Upper = 0
Val_Dist_Ver_Lower = 300

3

BVT (VOR)
TACAN Limitations

4

BVT (VOR)

What is missing?
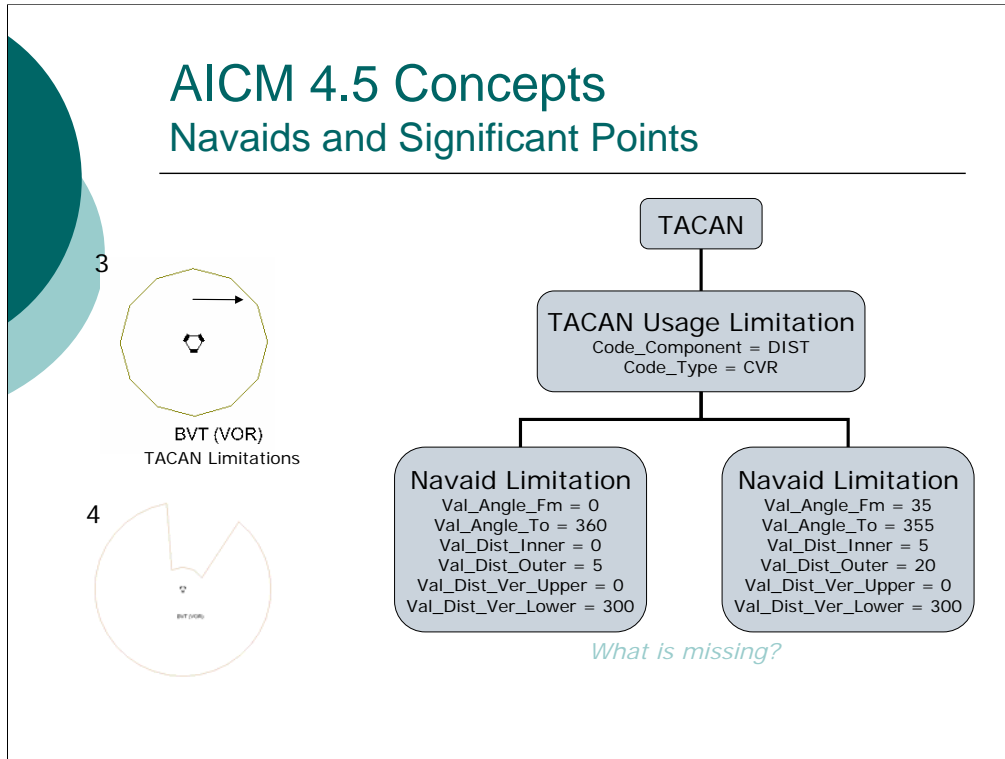
In step three we define the inner TACAN limitation. In this case there is full coverage on the TACAN out to 5 nm and up to FL300.

AICM 4.5 Concepts
Navaids and Significant Points

DESIGNATED_POINT

*	**CODE_ID**	Coded identifier of designated point – e.g. ICAO 5 letter identifier

* **GEO_LAT**
* **GEO_LONG**
* **CODE_DATUM**
○ **VAL_GEO_ACCURACY**
○ **UOM_GEO_ACCURACY**
○ **VAL_CRC**

*	**CODE_TYPE**	Type of designated point

○ **TXT_NAME**

○ **TXT_RMK**

AICM 4.5 Concepts
Navaids and Significant Points

CODE_TYPE Value	Description
ICAO	CODE_ID fulfils ICAO requirements for 5-letter name code identifiers Unique world wide
ADHP	Designated point for a particular AD/HP CODE_ID unique for the related AD/HP
COORD	Points published by their coordinates Latitude/longitude in full or half degrees only CODE_ID derived using ARINC 424 conventions
OTHER	No other type appropriate

AICM 4.5 Concepts
Navaids and Significant Points

DESIGNATED_POINT

*	CODE_ID	Coded identifier of designated point – e.g. ICAO 5 letter identifier
*	GEO_LAT	Position group
*	GEO_LONG	
*	CODE_DATUM	No elevation component
o	VAL_GEO_ACCURACY	
o	UOM_GEO_ACCURACY	
o	VAL_CRC	
*	CODE_TYPE	Type of designated point
o	TXT_NAME	Text name of the designated point
o	TXT_RMK	

AICM 4.5 Concepts
Navaids and Significant Points

5

BVT075015

Designated Point

Designated Point
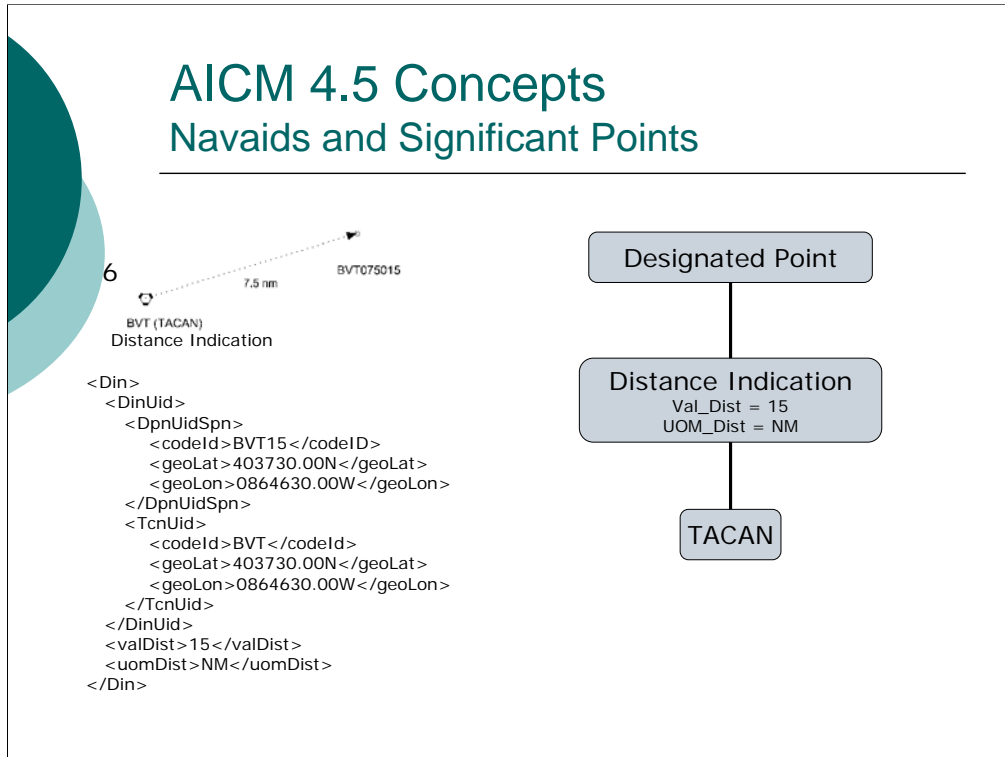Code_ID = BVT15
Geo_Lat = 403730.00N
Geo_Long = 866430.00W
Code_Type = OTHER
Txt_Name = BVT075015

```
<Dpn>
  <DpnUid>
    <codeId>BVT15</codeID>
    <geoLat>403730.00N</geoLat>
    <geoLon>0864630.00W</geoLon>
  </DpnUid>
  <codeDatum>WGE</codeDatum>
  <codeType>OTHER</codeType>
  <txtName>BVT075015</txtName>
</Dpn>
```

BVT075015 is a designated point since it is not the site of a NAVAID. The AICM model assumes that the code_id is a 5-character identifier. A common naming convention is to include the NAVAID abbreviation and the distance relative to the NAVAID. So we created a code_id called BVT15. Notice that the txt_name field is used to store the full name of the designated point.

AICM 4.5 Concepts
Navaids and Significant Points

```
<Din>
    <DinUid>
        <DpnUidSpn>
            <codeId>BVT15</codeID>
            <geoLat>403730.00N</geoLat>
            <geoLon>0864630.00W</geoLon>
        </DpnUidSpn>
        <TcnUid>
            <codeId>BVT</codeId>
            <geoLat>403730.00N</geoLat>
            <geoLon>0864630.00W</geoLon>
        </TcnUid>
    </DinUid>
    <valDist>15</valDist>
    <uomDist>NM</uomDist>
</Din>
```

In this step we illustrate how to define a distance indication from the BVT NAVAID to the BVT075015 designated point.

AICM 4.5 Concepts
Navaids and Significant Points

7   75 deg   BVT075015

BVT (TACAN)
Angle Indication

Designated Point

Angle Indication
Val_Angle = 75

TACAN
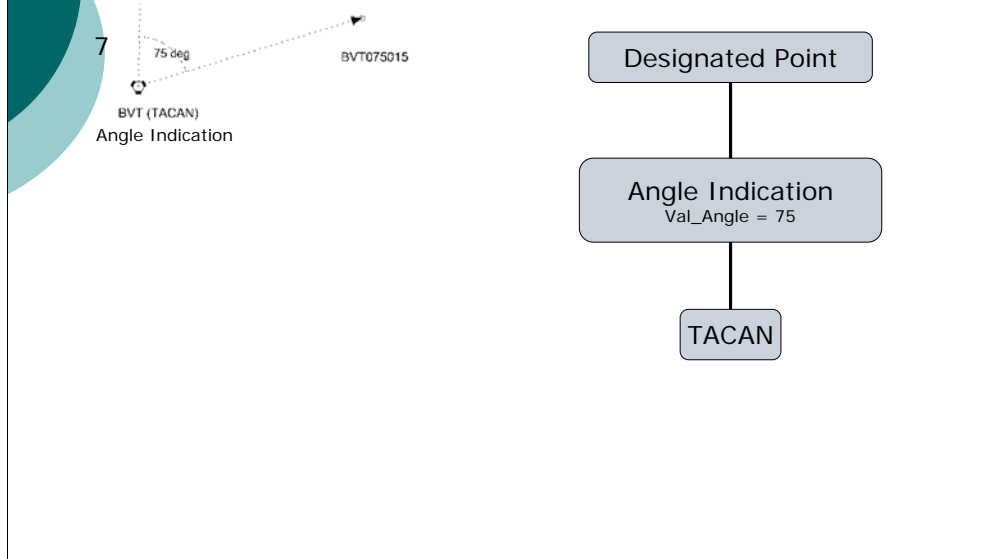
In this step we illustrate how to define a angle indication from the BVT NAVAID to the BVT075015 designated point.