

Brief Description of the CTX Casualty Database

Jack Devanney
Center for Tankship Excellence, USA, djw1@c4tx.org

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1 Synopsis

The Center for Tankship Excellence Casualty Data Base (CDB) is a free, public, open source data base of tanker and bulk carrier casualties. It was designed to avoid the defects of existing marine casualty data bases almost all of which are proprietary, un-auditable, inflexible, attempt to divide casualties into overlapping categories, confuse cause and effect, and/or fail to record any real causal information.

For the CTX CDB, **a casualty is simply a sequence of events**. A casualty is not a collision, although it may contain one or more collision events. A casualty is not a grounding, although it may contain one or more grounding events. A casualty is not a fire/explosion although it may contain one or more conflagration events. And so on. A casualty may contain any combination of structural failure/damage events, machinery failure/damage events, attacks, bridge events (such as course, speed alterations), response events (such as coastal stage provision/denial of refuge), and many more including collisions, groundings, and fires.

In the CTX CDB, a casualty is **NOT** bound to a ship. Rather ships are bound to events. Each event may have one or more *actors* associated with it. In almost all cases, the actor is a ship, but an actor may also be a terminal, an offshore platform, or any other entity that plays an important role in the event.

Causality is handled at the event level. Each event may fall into exactly one of the following cause categories:

Necessary Cause Each casualty must have one or more *necessary* causes. A *necessary* cause is an **error** or **defect** or **failure** which, if had not happened, then with high probability the casualty would have been averted. Exactly one of the *necessary* causes is designated the *primary* cause.

Secondary Cause A secondary cause is an error or defect or failure which, if it had not happened, then with high probability the casualty would have been mitigated. Poor or non-existent inerting is a common example. A casualty may have zero or more secondary causes.

Non-causal The event is a consequence, not a cause. Collisions, groundings, and fires among others are consequences not causes.

The treatment of causality does three things:

1. It allows multiple causality, a commonplace in most casualties.
2. It separates the necessarily subjective cause assignment from the more factual data. The CTX CDB can be used by people who disagree with the coder's cause assignments.
3. It avoids confusing cause with effect.

The CTX CDB is an XML format. This accomplishes at least four goals:

1. The hierarchical nature of XML allows an unlimited set of fields, and sub-fields, and sub-sub-fields. This is in sharp contrast to tabular arrangements, including spreadsheets, in which the number of columns is fixed. This in turn forces coders into either/or decisions. Either the casualty is a collision or grounding or whatever when in fact a casualty may involve any combination of such events.
2. The data is human readable, and self-identifying. Figure 1 and 3 show a couple of examples. Even without consulting the manual, it is easy to guess what most of the fields are. The raw CTX data can be inspected by anyone with a browser or a general purpose editor. No specialized software is required to view all the information in the database. Unlike relational databases, all the data on a particular casualty is localized in one place. Simply point your browser at the CDB core file.. The CTX CDB is truly auditable.¹
3. As Figures 1 and 3 hint, The CTX CDB is capable of recording a casualty in considerable detail. The goal is to allow complete analysis of the casualty including flooding, spillage, and residual strength. However, in most cases, we have very little information on a casualty, especially just after the casualty has occurred. The hierarchical nature of XML makes it easy to include the data when we have it, but allows us to not include it if we don't.
4. XML allows the database to be easily expanded. New fields and new elements can be added without affecting existing code.

Each casualty in the CDB is supported by a *precis* file. This file contains text descriptions of the casualty from whatever sources we have been able to locate — including sources CTX may disagree with — and/or links to other sites that have descriptions of the casualty, the most important of which are usually the coastal state investigation reports. The *precis* file allows anyone to see what the CDB entry for that casualty is based on.

These *precis* files in turn are supported by a *pics* folder for each casualty which contains whatever photos, drawing and charts we have been able to obtain relevant to the casualty.

The CTX CDB currently contains about 1650 tanker and bulk carrier casualties. It can be downloaded in its raw form from www.c4tx.org/ctx/job/cdb/ctx_coresort.zip. It can also be accessed via a browser at www.c4tx.org/ctx/job/cdb/flex.html. Be aware that the browser interface allows only the simplest of queries. The draft manual can be viewed at www.c4tx.org/ctx/pub/cdb_man.pdf. The paper *Uses and Abuses of Ship casualty Data* at www.c4tx.org/ctx/pub/cas_data.pdf contains a critique of existing casualty databases and the motivation behind the design of the CTX CDB.

Currently, the CTX CDB contains only tanker and bulk carrier casualties. However, it could very easily be expanded to handle other types of ships.

¹ XML is also not only machine readable but an open and nearly universal standard. Powerful software tools exist — many of them Open Source — which make it easy to query, aggregate, and analyse XML data.

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<casualty
  id="19890324_001" date="19890324" Edu="8" site="Prince William Sound "
  locale="R"          tod="0009"          acc="B" lat=" 60.850" long="-146.867"
  coastal="US"        area="np,UW,PWS,    " weather="B3"          vis="A3"
  note="master not on bridge, nav error, stranded leaving Valdez      ">
<event ec="Vu" sid="1" date="19890323" tod="2324"
  note="VLCC, 20 man crew, lving Valdez after loading. Pilot off.">
  <alter tod="2325" course="  " sog="  " helm="  " engine="FA"/>
  <alter tod="2330" course="  " sog="  " helm="p" engine="HA"
    note="turning away from ice, reduced speed"/>
  <alter tod="2339" course="200" sog="  " helm="p" engine="HA"/>
  <alter tod="2352" course="180" sog="12 " helm="  " engine="FA"
    note="Load program up, 55 to 79 RPM over 43 mins"/>
</event>
<event ec="GY" sid="1" date="19890323" tod="2353" Cause="N" Sure="5"
  Drugs="M"
  note="Master leaves bridge to tired mate to work around ice">
  <alter tod="2355" course="180" sog="  " helm="  " engine="  "
    lat="-60.123" long="-146.123"
    note="Busby Is. Lt abeam, "/>
  <alter tod="2356" course="180" sog="  " helm="  " engine="  "
    note="Mate said he ordered turn, but no course change"/>
</event>
<event ec="NA" sid="1" date="19890324" tod="000130" Cause="P" Sure="4"
  Tired="Y"          Crew_small="Y" GPS="P"          Owner_care="Y"
  note="Starboard turn begins at 0001.5, too late">
  <alter tod="000130" course="180" sog="  " helm="s" engine="  "
    note="Course recorder shows first course change, 0001.5"/>
  <alter tod="0002" course="  " sog="  " helm="S" engine="  "
    note="Almost certain Mate ordered turn too late"/>
  <alter tod="0007" course="247" sog="  " helm="S" engine="  "
    note="But possible helmsman failed to execute order"/>
</event>
<event ec="WS" sid="1" tod="0009" nuc="N"
  lat=" 60.855" long="-146.873" sog="12"          course="289"
  wind_bf="B3" wind_dir="  " vis="A3"
  ait_temp="1" sw_temp="  "
  cur_spd="N " cur_dir="  " wave_ht="N" wave_dir="  "
  depth="15.0" chart="" squat=""
  hop="4.6" lop="160.0" str="Y" days="12"
  note="Hits Bligh reef 2 hrs before high tide at 11-12 kts">
  <tide datum="MLLW" next_hi_tod="0155" next_hi="+3.81"
    at_hit="+2.99" next_lo_tod="0811" next_lo="+0.0"/>
</event>

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Figure 1: Sample casualty involving a grounding (cont. on next page)

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<event ec="HL" sid="1" vol="41000000" mat="C" hbl="Y" DS="Y" DB="M"
  steel_wt="3500" ref="ntsb91, fig 8, height numbers look optimistic"
  note="160m long damage, 8 of 11 cargo tanks holed, 41000m3 spill">
  <tank code="1C" size="" perim=""
    note="ntsb way low in this tank, damage extended past c1">
    <hi xs="236.1" ys="-12.1" zs="1.0"/>
    <lo xs="274.5" ys="0.0" zs="0.0"/>
  </tank>
  <tank code="2C" size="" perim=""
    <hi xs="186.5" ys="-12.1" zs="1.0"/>
    <lo xs="236.1" ys="0.0" zs="0.0"/>
  </tank>

..... lots more compartments (damage location) .....

  <tank code="5S" size="" perim=""
    <hi xs="69.2" ys="-25.3" zs="1.2"/>
    <lo xs="103.0" ys="-12.1" zs="0.0"/>
  </tank>
  <tank code="FP" size="" perim=""
    note="jack guess, nstb said nothing about FP, but it was a mess">
    <hi xs="274.6" ys="-15.0" zs="3.0"/>
    <lo xs="292.0" ys="0.0" zs="0.0"/>
  </tank>
</event>
<event ec="DL" sid="1" date="19890325" tod="0736"
  note="lightering to Exxon Baton Rouge begins"/>
<event ec="DL" sid="1" date="19890330" tod="1518"
  note="lightering to Exxon San Francisco begins"/>
<event ec="DL" sid="1" date="19890402" tod="2200"
  note="lightering to Exxon Baytown begins"/>
<event ec="DR" sid="1" date="19890405" tod=""
  note=""/>
<event ec="Sr" sid="1"
  note="3500 tons of steel, renamed S/R Mediterranean"/>
<ship sid="1" imo="8414520" class="AB" name="exxon valdez"
  st="TC" dwt="214853" yob="1986" flag="US" tnks="11"
  ht="SM" grt=" 94999" status="L" cgo="PC" sts="N"
  ns="1" crew="20" ig="Y" pob="N">
<load ref="djw1"
  draft_fp="17.07" draft_ap="17.07" heel="0.0"
  cargo_wt="174391" ballast_wt="0" fuel_wt="1336"
  note="djw1 guess to give 56 ft draft, even keel, min fuel to LA">
  <tank code="1C" pct="83.24" sg="0.897" temp="35"/>
  <tank code="2C" pct="83.24" sg="0.897" temp="35"/>

..... lots more tanks (pre-damage loading pattern) .....

  <tank code="F0_P_F" pct="15.00" sg="0.980"/>
</load>
<condition
note="steel in excellent condition, like new.
  but stiffener to bottom welds useless">
  </condition>

</ship>
</casualty>

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Figure 2: Sample casualty involving a grounding

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<casualty
  id="19961214_001" date="19961214" Edu="7" site="Riverwalk, New Orleans"
  locale="H" tod="1410" acc="C" lat=" 29.950" long=" -90.060"
  coastal="US" area="na,GM,MSR," weather="GD" vis="GD"
  note="lost power, then steerage, downbound Miss, hit Riverwalk, 62 hurt">
<event ec="ME" sid="1" Cause="P" Sure="5"
  Owner_care="Y" Maint="Y"
  note="mn engine tripped on low LO pressure, horrible maintenance">
<component er="M" sfi="713004" name="No 1 lube oil pump"
  maker="" model=""
  power="" hours="" ttr="" survey=""
  failure="low pressure tripped mn engine"
  note="lo pump in bad condition">
</component>
<component sfi="713006" name="No 1 LO pump filter"
  failure="filter partially clogged"
  note="lube oil contaminated with fuel">
</component>
<component sfi="797010" name="LO pump automation"
  failure="standby pump auto-start failed"
  note="relay had high resistance">
</component>
</event>
<event ec="DS" sid="1" Cause="N" Sure="5" Design="Y" lop_hrs="0.03" TS="Y"
  curr_spd="3.5" wind_bf="3" wind_dir="SW" air_temp="21" vis="GD"
  note="still had rudder, 10 kts sog, but lost steerage anyway"/>
<event ec="Ca" sid="1" cid="1" nuc="Y" sog="10" impact="BP" Maneuv="Y"
  enc="L"
  note="Turned port, full stbd did not work, hit Poydras St Wharf"/>
<event ec="Ca" sid="2" cid="1" dop="+17" angle="45"
  note="Penetrated 50-60 ft into wharf at 40-45 deg angle."/>
<event ec="HL" sid="1" dead="-3" hurt="-3"
  note="Forward port tanks holed. No spill reported.">
  <tank code="FP" flood="Y"/>
  <tank code="H1" flood="Y"/>
</event>
<event ec="HL" sid="2" dead="-3" hurt="+62"
  note=" At least 62 injured on shore, 20 mm dollar damage"/>
<ship sid="1" imo="8715302" class="NV" name="bright field"
  st="BC" dwt=" 68200" yob="1988" flag="LR" tnks=" 7"
  ht=" " grt=" 36120" status="L" cgo="G_" sts="N"
  ns="1" crew=" " ig=" " pob="Y">
<load draft_fp="11.96" draft_ap="12.06" sag=""
  cargo_wt="56397" ballast_wt="" fuel_wt=""
  note="cargo corn, 7 holds, river at high stage">
</load>
</ship>
<ship sid="2" st="NV" name="Poydras St. Wharf">
</ship>
</casualty>

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Figure 3: Sample casualty involving an allision