

# US Patent & Trademark Office

## Patent Public Search | Text View

---

United States Patent	12395588
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Xiang; Jiali et al.

---

### Method and apparatus for creating a database of contact center response records

---

#### Abstract

Methods and systems for creating and using a knowledge base in a contact center. Templates, including responses to specific issues, are made available to agents in dynamic manner to allow agents to be more efficient while performing their daily job. A centralized database of templates is created in a novel manner to be used for multiple digital channels. The templates can be used and reused by multiple systems such as an agent assistant system or a virtual agent system, providing an integrated and consistent experience for responding to communications in a contact center.

---

**Inventors:** Xiang; Jiali (Wuhan, CN), Pereira; Marta Sofia da Silva (Oporto, PT), Marques; João Ribeiro (Lisbon, PT), Cardoso; Vitor Alves (Coimbra, PT), Barbosa; Dina Raquel Dias (Lisbon, PT), Zhen; Haili (Wuhan, CN), Costa; Isa Maria da Silva (Lisbon, PT), Wake; Alex Harvey (Shrewsbury, GB)

**Applicant:** Talkdesk, Inc. (San Francisco, CA)

**Family ID:** 1000008763068

**Assignee:** Talkdesk, Inc. (San Francisco, CA)

**Appl. No.:** 18/238926

**Filed:** August 28, 2023

#### Prior Publication Data

<b>Document Identifier</b>	<b>Publication Date</b>
US 20250080653 A1	Mar. 06, 2025

---

#### Publication Classification

**Int. Cl.:** H04M3/51 (20060101); H04M3/523 (20060101)

**U.S. Cl.:**

CPC      **H04M3/5175** (20130101); H04M2203/558 (20130101)

## Field of Classification Search

**USPC:**      None

---

## References Cited

### U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
5343518	12/1993	Kneipp	N/A	N/A
5570419	12/1995	Cave et al.	N/A	N/A
5862203	12/1998	Wulkan et al.	N/A	N/A
5897616	12/1998	Kanevsky et al.	N/A	N/A
5966691	12/1998	Kibre et al.	N/A	N/A
5970124	12/1998	Csaszar et al.	N/A	N/A
6100891	12/1999	Thorne	N/A	N/A
6128415	12/1999	Hultgren et al.	N/A	N/A
6163607	12/1999	Bogart et al.	N/A	N/A
6230197	12/2000	Beck et al.	N/A	N/A
6263057	12/2000	Silverman	N/A	N/A
6263065	12/2000	Durinovic-Johri et al.	N/A	N/A
6345093	12/2001	Lee et al.	N/A	N/A
6373938	12/2001	Palacios et al.	N/A	N/A
6377944	12/2001	Busey et al.	N/A	N/A
6385584	12/2001	Mcalister et al.	N/A	N/A
6411687	12/2001	Bohacek et al.	N/A	N/A
6493695	12/2001	Pickering et al.	N/A	N/A
6560222	12/2002	Pounds et al.	N/A	N/A
6587831	12/2002	O'Brien	N/A	N/A
6639982	12/2002	Stuart et al.	N/A	N/A
6721416	12/2003	Farrell	N/A	N/A
6754333	12/2003	Flockhart et al.	N/A	N/A
6859776	12/2004	Cohen et al.	N/A	N/A
6970829	12/2004	Leamon	N/A	N/A
7023979	12/2005	Wu et al.	N/A	N/A
7076047	12/2005	Brennan et al.	N/A	N/A
7110525	12/2005	Heller et al.	N/A	N/A
7209475	12/2006	Shaffer et al.	N/A	N/A
7274787	12/2006	Schoeneberger	N/A	N/A
7292689	12/2006	Odinak et al.	N/A	N/A
7343406	12/2007	Buonanno et al.	N/A	N/A
7372952	12/2007	Wu et al.	N/A	N/A
7382773	12/2007	Schoeneberger et al.	N/A	N/A
7409336	12/2007	Pak et al.	N/A	N/A
7426268	12/2007	Walker et al.	N/A	N/A
7466334	12/2007	Baba	N/A	N/A

7478051	12/2008	Nourbakhsh et al.	N/A	N/A
7537154	12/2008	Ramachandran	N/A	N/A
7634422	12/2008	Andre et al.	N/A	N/A
7657263	12/2009	Chahrouri	N/A	N/A
7664641	12/2009	Pettay et al.	N/A	N/A
7672746	12/2009	Hamilton et al.	N/A	N/A
7672845	12/2009	Beranek et al.	N/A	N/A
7676034	12/2009	Wu et al.	N/A	N/A
7698163	12/2009	Reed et al.	N/A	N/A
7752159	12/2009	Nelken et al.	N/A	N/A
7774790	12/2009	Jirman et al.	N/A	N/A
7788286	12/2009	Nourbakhsh et al.	N/A	N/A
7853006	12/2009	Fama et al.	N/A	N/A
7864946	12/2010	Fama et al.	N/A	N/A
7869998	12/2010	Di Fabbrizio et al.	N/A	N/A
7949123	12/2010	Flockhart et al.	N/A	N/A
7953219	12/2010	Freedman et al.	N/A	N/A
7966187	12/2010	Pettay et al.	N/A	N/A
7966369	12/2010	Briere et al.	N/A	N/A
8060394	12/2010	Woodings et al.	N/A	N/A
8073129	12/2010	Kalavar	N/A	N/A
8116446	12/2011	Kalavar	N/A	N/A
8135125	12/2011	Sidhu et al.	N/A	N/A
8160233	12/2011	Keren et al.	N/A	N/A
8184782	12/2011	Vatland et al.	N/A	N/A
8223951	12/2011	Edelhaus et al.	N/A	N/A
8229761	12/2011	Backhaus et al.	N/A	N/A
8243896	12/2011	Rae	N/A	N/A
8300798	12/2011	Wu et al.	N/A	N/A
8335704	12/2011	Trefler et al.	N/A	N/A
8369338	12/2012	Peng et al.	N/A	N/A
8370155	12/2012	Byrd et al.	N/A	N/A
8391466	12/2012	Noble, Jr.	N/A	N/A
8447279	12/2012	Peng et al.	N/A	N/A
8488769	12/2012	Noble et al.	N/A	N/A
8526576	12/2012	Deich et al.	N/A	N/A
8535059	12/2012	Noble, Jr. et al.	N/A	N/A
8583466	12/2012	Margulies et al.	N/A	N/A
8594306	12/2012	Laredo et al.	N/A	N/A
8626137	12/2013	Devitt et al.	N/A	N/A
8635226	12/2013	Chang et al.	N/A	N/A
8644489	12/2013	Noble et al.	N/A	N/A
8671020	12/2013	Morrison et al.	N/A	N/A
8688557	12/2013	Rose et al.	N/A	N/A
8738739	12/2013	Makar et al.	N/A	N/A
8767948	12/2013	Riahi et al.	N/A	N/A
8811597	12/2013	Hackbarth et al.	N/A	N/A
8861691	12/2013	De et al.	N/A	N/A
8869245	12/2013	Ranganathan et al.	N/A	N/A
8898219	12/2013	Ricci	N/A	N/A

8898290	12/2013	Siemsgluess	N/A	N/A
8909693	12/2013	Frissora et al.	N/A	N/A
8935172	12/2014	Noble, Jr. et al.	N/A	N/A
8995648	12/2014	Gibbs et al.	N/A	N/A
8996509	12/2014	Sundaram	N/A	N/A
9020142	12/2014	Kosiba et al.	N/A	N/A
9026431	12/2014	Moreno Mengibar et al.	N/A	N/A
9060057	12/2014	Danis	N/A	N/A
9065915	12/2014	Lillard et al.	N/A	N/A
9082094	12/2014	Etter et al.	N/A	N/A
9100483	12/2014	Snedden	N/A	N/A
9117450	12/2014	Cook et al.	N/A	N/A
9123009	12/2014	Etter et al.	N/A	N/A
9137366	12/2014	Medina et al.	N/A	N/A
9152737	12/2014	Micali et al.	N/A	N/A
9160853	12/2014	Daddi et al.	N/A	N/A
9178999	12/2014	Hegde et al.	N/A	N/A
9185222	12/2014	Govindarajan et al.	N/A	N/A
9237232	12/2015	Williams et al.	N/A	N/A
9280754	12/2015	Schwartz et al.	N/A	N/A
9286413	12/2015	Coates et al.	N/A	N/A
9300801	12/2015	Warford et al.	N/A	N/A
9317825	12/2015	Defusco et al.	N/A	N/A
9319524	12/2015	Webster	N/A	N/A
9386152	12/2015	Riahi et al.	N/A	N/A
9397985	12/2015	Seger et al.	N/A	N/A
9426291	12/2015	Ouimette et al.	N/A	N/A
9473637	12/2015	Venkatapathy et al.	N/A	N/A
9514463	12/2015	Grigg et al.	N/A	N/A
9595049	12/2016	Showers et al.	N/A	N/A
9602665	12/2016	Koster	N/A	N/A
9609131	12/2016	Placiakis et al.	N/A	N/A
9674361	12/2016	Ristock et al.	N/A	N/A
9679265	12/2016	Schwartz et al.	N/A	N/A
9774731	12/2016	Haltom et al.	N/A	N/A
9787840	12/2016	Neuer, III et al.	N/A	N/A
9813495	12/2016	Van et al.	N/A	N/A
9813559	12/2016	Noble et al.	N/A	N/A
9823949	12/2016	Ristock et al.	N/A	N/A
9883037	12/2017	Lewis et al.	N/A	N/A
9894478	12/2017	Deluca et al.	N/A	N/A
9930181	12/2017	Moran et al.	N/A	N/A
9936066	12/2017	Mammen	N/A	H04M 3/2218
9955021	12/2017	Liu et al.	N/A	N/A
RE46852	12/2017	Petrovykh	N/A	N/A
9998596	12/2017	Dunmire et al.	N/A	N/A
10009465	12/2017	Fang et al.	N/A	N/A
10038788	12/2017	Khalatian	N/A	N/A
10044862	12/2017	Cai et al.	N/A	N/A

10079939	12/2017	Bostick et al.	N/A	N/A
10085073	12/2017	Ray et al.	N/A	N/A
10101974	12/2017	Ristock et al.	N/A	N/A
10115065	12/2017	Fama et al.	N/A	N/A
10135973	12/2017	Algard et al.	N/A	N/A
10154138	12/2017	Te Booij et al.	N/A	N/A
10194027	12/2018	Daddi et al.	N/A	N/A
10235999	12/2018	Naughton et al.	N/A	N/A
10241752	12/2018	Lemay et al.	N/A	N/A
10242019	12/2018	Shan et al.	N/A	N/A
10276170	12/2018	Gruber et al.	N/A	N/A
10277745	12/2018	Araujo et al.	N/A	N/A
10290017	12/2018	Traasdahl et al.	N/A	N/A
10331402	12/2018	Spector et al.	N/A	N/A
10354677	12/2018	Mohamed et al.	N/A	N/A
10380246	12/2018	Clark et al.	N/A	N/A
10440180	12/2018	Jayapalan et al.	N/A	N/A
10445742	12/2018	Prendki et al.	N/A	N/A
10460728	12/2018	Anbazhagan et al.	N/A	N/A
10497361	12/2018	Rule et al.	N/A	N/A
10554590	12/2019	Cabrera-Cordon et al.	N/A	N/A
10554817	12/2019	Sullivan et al.	N/A	N/A
10572879	12/2019	Hunter et al.	N/A	N/A
10574822	12/2019	Sheshaiahgari et al.	N/A	N/A
10601992	12/2019	Dwyer et al.	N/A	N/A
10623572	12/2019	Copeland	N/A	N/A
10635973	12/2019	Dirac et al.	N/A	N/A
10636425	12/2019	Naughton et al.	N/A	N/A
10699303	12/2019	Ismail et al.	N/A	N/A
10715648	12/2019	Vashisht et al.	N/A	N/A
10718031	12/2019	Wu et al.	N/A	N/A
10728384	12/2019	Channakeshava et al.	N/A	N/A
10735586	12/2019	Johnston	N/A	N/A
10742806	12/2019	Kotak	N/A	N/A
10750019	12/2019	Petrovykh et al.	N/A	N/A
10783568	12/2019	Chandra et al.	N/A	N/A
10789956	12/2019	Dube	N/A	N/A
10803865	12/2019	Naughton et al.	N/A	N/A
10812654	12/2019	Wozniak	N/A	N/A
10812655	12/2019	Adibi et al.	N/A	N/A
10827069	12/2019	Paiva	N/A	N/A
10827071	12/2019	Adibi et al.	N/A	N/A
10839432	12/2019	Konig et al.	N/A	N/A
10841425	12/2019	Langley et al.	N/A	N/A
10855844	12/2019	Smith et al.	N/A	N/A
10861031	12/2019	Sullivan et al.	N/A	N/A
10878479	12/2019	Wu et al.	N/A	N/A
10923127	12/2020	Mckenzie et al.	N/A	N/A
10929796	12/2020	Stepanov	N/A	N/A
10943589	12/2020	Naughton et al.	N/A	N/A

10970682	12/2020	Aykin	N/A	N/A
11017176	12/2020	Ayers et al.	N/A	N/A
11089158	12/2020	Holland et al.	N/A	N/A
11272054	12/2021	Gerrard et al.	N/A	N/A
11417343	12/2021	Cohen et al.	N/A	N/A
11425252	12/2021	Martin et al.	N/A	N/A
2001/0008999	12/2000	Bull	N/A	N/A
2001/0024497	12/2000	Campbell	N/A	N/A
2001/0054072	12/2000	Discolo et al.	N/A	N/A
2002/0019737	12/2001	Stuart et al.	N/A	N/A
2002/0029272	12/2001	Weller	N/A	N/A
2002/0034304	12/2001	Yang	N/A	N/A
2002/0038420	12/2001	Collins et al.	N/A	N/A
2002/0067823	12/2001	Walker et al.	N/A	N/A
2002/0143599	12/2001	Nourbakhsh et al.	N/A	N/A
2002/0169664	12/2001	Walker et al.	N/A	N/A
2002/0174182	12/2001	Wilkinson et al.	N/A	N/A
2002/0181689	12/2001	Rupe et al.	N/A	N/A
2003/0007621	12/2002	Graves et al.	N/A	N/A
2003/0009520	12/2002	Nourbakhsh et al.	N/A	N/A
2003/0032409	12/2002	Hutcheson et al.	N/A	N/A
2003/0061068	12/2002	Curtis	N/A	N/A
2003/0112927	12/2002	Brown et al.	N/A	N/A
2003/0126136	12/2002	Omoigui	N/A	N/A
2003/0154072	12/2002	Young et al.	N/A	N/A
2003/0167167	12/2002	Gong	N/A	N/A
2004/0044585	12/2003	Franco	N/A	N/A
2004/0044664	12/2003	Cash et al.	N/A	N/A
2004/0062364	12/2003	Dezonno et al.	N/A	N/A
2004/0078257	12/2003	Schweitzer et al.	N/A	N/A
2004/0098274	12/2003	Dezonno et al.	N/A	N/A
2004/0103051	12/2003	Reed et al.	N/A	N/A
2004/0141508	12/2003	Schoeneberger et al.	N/A	N/A
2004/0162724	12/2003	Hill et al.	N/A	N/A
2004/0162753	12/2003	Vogel et al.	N/A	N/A
2004/0174980	12/2003	Knott et al.	N/A	N/A
2004/0215451	12/2003	Macleod	N/A	N/A
2004/0249650	12/2003	Freedman	705/7.29	G06Q 30/0201
2005/0033957	12/2004	Enokida	N/A	N/A
2005/0043986	12/2004	McConnell et al.	N/A	N/A
2005/0063365	12/2004	Mathew et al.	N/A	N/A
2005/0065837	12/2004	Kosiba et al.	N/A	N/A
2005/0071178	12/2004	Beckstrom et al.	N/A	N/A
2005/0105712	12/2004	Williams et al.	N/A	N/A
2005/0177368	12/2004	Odinak et al.	N/A	N/A
2005/0226220	12/2004	Kilkki et al.	N/A	N/A
2005/0228774	12/2004	Ronnewinkel	N/A	N/A
2005/0246511	12/2004	Willman et al.	N/A	N/A
2005/0271198	12/2004	Chin et al.	N/A	N/A

2006/0095575	12/2005	Sureka et al.	N/A	N/A
2006/0126818	12/2005	Berger et al.	N/A	N/A
2006/0153357	12/2005	Acharya et al.	N/A	N/A
2006/0166669	12/2005	Claussen	N/A	N/A
2006/0173724	12/2005	Trefler et al.	N/A	N/A
2006/0188086	12/2005	Busey et al.	N/A	N/A
2006/0203994	12/2005	Shaffer et al.	N/A	N/A
2006/0209797	12/2005	Anisimov et al.	N/A	N/A
2006/0215831	12/2005	Knott et al.	N/A	N/A
2006/0229931	12/2005	Fligler et al.	N/A	N/A
2006/0256953	12/2005	Pulaski et al.	N/A	N/A
2006/0271361	12/2005	Vora et al.	N/A	N/A
2006/0274856	12/2005	Dun et al.	N/A	N/A
2006/0277108	12/2005	Altberg et al.	N/A	N/A
2007/0011153	12/2006	Pillai et al.	N/A	N/A
2007/0016565	12/2006	Evans et al.	N/A	N/A
2007/0036334	12/2006	Culbertson et al.	N/A	N/A
2007/0038499	12/2006	Margulies et al.	N/A	N/A
2007/0041519	12/2006	Erhart et al.	N/A	N/A
2007/0061183	12/2006	Seetharaman et al.	N/A	N/A
2007/0078725	12/2006	Koszewski et al.	N/A	N/A
2007/0121894	12/2006	Noble	N/A	N/A
2007/0121902	12/2006	Stoica et al.	N/A	N/A
2007/0121903	12/2006	Moore et al.	N/A	N/A
2007/0133760	12/2006	Cotignola et al.	N/A	N/A
2007/0136284	12/2006	Cobb et al.	N/A	N/A
2007/0155411	12/2006	Morrison	N/A	N/A
2007/0157021	12/2006	Whitfield	N/A	N/A
2007/0160188	12/2006	Sharpe et al.	N/A	N/A
2007/0162296	12/2006	Altberg et al.	N/A	N/A
2007/0198329	12/2006	Lyerly et al.	N/A	N/A
2007/0201636	12/2006	Gilbert et al.	N/A	N/A
2007/0211881	12/2006	Parker-Stephen	N/A	N/A
2007/0263810	12/2006	Sterns	N/A	N/A
2007/0265990	12/2006	Sidhu et al.	N/A	N/A
2007/0269031	12/2006	Honig et al.	N/A	N/A
2007/0280460	12/2006	Harris et al.	N/A	N/A
2007/0287430	12/2006	Hosain et al.	N/A	N/A
2008/0002823	12/2007	Fama et al.	N/A	N/A
2008/0004933	12/2007	Gillespie	N/A	N/A
2008/0043976	12/2007	Maximo et al.	N/A	N/A
2008/0065902	12/2007	Spohrer et al.	N/A	N/A
2008/0095355	12/2007	Mahalaha et al.	N/A	N/A
2008/0115213	12/2007	Bhatt et al.	N/A	N/A
2008/0126957	12/2007	Tysowski et al.	N/A	N/A
2008/0205620	12/2007	Odinak et al.	N/A	N/A
2008/0225872	12/2007	Collins et al.	N/A	N/A
2008/0254774	12/2007	Lee	N/A	N/A
2008/0255944	12/2007	Shah et al.	N/A	N/A
2008/0260138	12/2007	Chen et al.	N/A	N/A

2008/0288770	12/2007	Kline et al.	N/A	N/A
2008/0300955	12/2007	Hamilton et al.	N/A	N/A
2009/0018996	12/2008	Hunt et al.	N/A	N/A
2009/0055920	12/2008	Murtagh et al.	N/A	N/A
2009/0080411	12/2008	Lyman	N/A	N/A
2009/0086945	12/2008	Buchanan et al.	N/A	N/A
2009/0086949	12/2008	Caspi et al.	N/A	N/A
2009/0086953	12/2008	Vendrow	N/A	N/A
2009/0110182	12/2008	Knight, Jr. et al.	N/A	N/A
2009/0171164	12/2008	Jung et al.	N/A	N/A
2009/0222551	12/2008	Neely et al.	N/A	N/A
2009/0228264	12/2008	Williams et al.	N/A	N/A
2009/0234710	12/2008	Belgaied et al.	N/A	N/A
2009/0234732	12/2008	Zorman et al.	N/A	N/A
2009/0245479	12/2008	Surendran	N/A	N/A
2009/0285384	12/2008	Pollock et al.	N/A	N/A
2009/0306981	12/2008	Cromack et al.	N/A	N/A
2009/0307052	12/2008	Mankani et al.	N/A	N/A
2010/0106568	12/2009	Grimes	N/A	N/A
2010/0114645	12/2009	Hamilton et al.	N/A	N/A
2010/0114646	12/2009	Mcilwain et al.	N/A	N/A
2010/0165977	12/2009	Mccord	N/A	N/A
2010/0189249	12/2009	Shah et al.	N/A	N/A
2010/0189250	12/2009	Williams et al.	N/A	N/A
2010/0211515	12/2009	Woodings et al.	N/A	N/A
2010/0226490	12/2009	Schultz et al.	N/A	N/A
2010/0235341	12/2009	Bennett	N/A	N/A
2010/0250196	12/2009	Lawler et al.	N/A	N/A
2010/0262549	12/2009	Kannan et al.	N/A	N/A
2010/0266115	12/2009	Fedorov et al.	N/A	N/A
2010/0266116	12/2009	Stolyar et al.	N/A	N/A
2010/0274618	12/2009	Byrd et al.	N/A	N/A
2010/0287131	12/2009	Church	N/A	N/A
2010/0293033	12/2009	Hall et al.	N/A	N/A
2010/0299268	12/2009	Guha et al.	N/A	N/A
2010/0332287	12/2009	Gates et al.	N/A	N/A
2011/0014932	12/2010	Estevez	N/A	N/A
2011/0022461	12/2010	Simeonov	N/A	N/A
2011/0071870	12/2010	Gong	N/A	N/A
2011/0077994	12/2010	Segev et al.	N/A	N/A
2011/0082688	12/2010	Kim et al.	N/A	N/A
2011/0116618	12/2010	Zyarko et al.	N/A	N/A
2011/0125697	12/2010	Erhart et al.	N/A	N/A
2011/0143323	12/2010	Cohen	N/A	N/A
2011/0182283	12/2010	Van et al.	N/A	N/A
2011/0185293	12/2010	Barnett et al.	N/A	N/A
2011/0194684	12/2010	Ristock et al.	N/A	N/A
2011/0216897	12/2010	Laredo et al.	N/A	N/A
2011/0264581	12/2010	Clyne	N/A	N/A
2011/0267985	12/2010	Wilkinson et al.	N/A	N/A



2011/0286592	12/2010	Nimmagadda	N/A	N/A
2011/0288897	12/2010	Erhart et al.	N/A	N/A
2012/0046996	12/2011	Shah et al.	N/A	N/A
2012/0051537	12/2011	Chishti et al.	N/A	N/A
2012/0084217	12/2011	Kohler et al.	N/A	N/A
2012/0087486	12/2011	Guerrero et al.	N/A	N/A
2012/0095835	12/2011	Makar et al.	N/A	N/A
2012/0109830	12/2011	Vogel	N/A	N/A
2012/0257116	12/2011	Hendrickson et al.	N/A	N/A
2012/0265587	12/2011	Kinkead	N/A	N/A
2012/0290373	12/2011	Ferzacca et al.	N/A	N/A
2012/0300920	12/2011	Fagundes et al.	N/A	N/A
2012/0321073	12/2011	Flockhart et al.	N/A	N/A
2013/0023235	12/2012	Fan et al.	N/A	N/A
2013/0060587	12/2012	Bayrak et al.	N/A	N/A
2013/0073361	12/2012	Silver	N/A	N/A
2013/0085785	12/2012	Rogers et al.	N/A	N/A
2013/0090963	12/2012	Sharma et al.	N/A	N/A
2013/0124361	12/2012	Bryson	N/A	N/A
2013/0136252	12/2012	Kosiba et al.	N/A	N/A
2013/0223608	12/2012	Flockhart et al.	N/A	N/A
2013/0223610	12/2012	Kohler et al.	N/A	N/A
2013/0236002	12/2012	Jennings et al.	N/A	N/A
2013/0257877	12/2012	Davis	N/A	N/A
2013/0304581	12/2012	Sorooca et al.	N/A	N/A
2013/0325972	12/2012	Boston et al.	N/A	N/A
2014/0012603	12/2013	Scanlon et al.	N/A	N/A
2014/0016762	12/2013	Mitchell et al.	N/A	N/A
2014/0039944	12/2013	Humbert et al.	N/A	N/A
2014/0039962	12/2013	Nudd et al.	N/A	N/A
2014/0067375	12/2013	Wooters	N/A	N/A
2014/0079195	12/2013	Srivastava et al.	N/A	N/A
2014/0079207	12/2013	Zhakov et al.	N/A	N/A
2014/0099916	12/2013	Mallikarjunan et al.	N/A	N/A
2014/0101261	12/2013	Wu et al.	N/A	N/A
2014/0136346	12/2013	Teso	N/A	N/A
2014/0140494	12/2013	Zhakov	N/A	N/A
2014/0143018	12/2013	Nies et al.	N/A	N/A
2014/0143249	12/2013	Cazzanti et al.	N/A	N/A
2014/0161241	12/2013	Baranovsky et al.	N/A	N/A
2014/0164502	12/2013	Khodorenko et al.	N/A	N/A
2014/0177819	12/2013	Vymenets et al.	N/A	N/A
2014/0188477	12/2013	Zhang	N/A	N/A
2014/0200988	12/2013	Kassko et al.	N/A	N/A
2014/0219132	12/2013	Delveaux et al.	N/A	N/A
2014/0219438	12/2013	Brown et al.	N/A	N/A
2014/0233719	12/2013	Vyemenets et al.	N/A	N/A
2014/0244712	12/2013	Walters et al.	N/A	N/A
2014/0254790	12/2013	Shaffer et al.	N/A	N/A
2014/0257908	12/2013	Steiner et al.	N/A	N/A

2014/0270108	12/2013	Riahi et al.	N/A	N/A
2014/0270138	12/2013	Uba et al.	N/A	N/A
2014/0270142	12/2013	Bischoff et al.	N/A	N/A
2014/0270145	12/2013	Erhart et al.	N/A	N/A
2014/0278605	12/2013	Borucki et al.	N/A	N/A
2014/0278649	12/2013	Guerinik et al.	N/A	N/A
2014/0279045	12/2013	Shottan et al.	N/A	N/A
2014/0279050	12/2013	Makar et al.	N/A	N/A
2014/0314225	12/2013	Riahi et al.	N/A	N/A
2014/0335480	12/2013	Asenjo et al.	N/A	N/A
2014/0372171	12/2013	Martin et al.	N/A	N/A
2014/0379424	12/2013	Shroff	N/A	N/A
2015/0006400	12/2014	Eng et al.	N/A	N/A
2015/0010134	12/2014	Erel et al.	N/A	N/A
2015/0012278	12/2014	Metcalf	N/A	N/A
2015/0016600	12/2014	Desai et al.	N/A	N/A
2015/0023484	12/2014	Ni et al.	N/A	N/A
2015/0030151	12/2014	Bellini et al.	N/A	N/A
2015/0030152	12/2014	Waxman et al.	N/A	N/A
2015/0051957	12/2014	Griebeler et al.	N/A	N/A
2015/0066632	12/2014	Gonzalez et al.	N/A	N/A
2015/0071418	12/2014	Shaffer et al.	N/A	N/A
2015/0078538	12/2014	Jain	N/A	N/A
2015/0100473	12/2014	Manoharan et al.	N/A	N/A
2015/0117632	12/2014	Konig et al.	N/A	N/A
2015/0127400	12/2014	Chan et al.	N/A	N/A
2015/0127441	12/2014	Feldman	N/A	N/A
2015/0127677	12/2014	Wang et al.	N/A	N/A
2015/0142704	12/2014	London	N/A	N/A
2015/0172463	12/2014	Quast et al.	N/A	N/A
2015/0178371	12/2014	Seth et al.	N/A	N/A
2015/0195406	12/2014	Dwyer et al.	N/A	N/A
2015/0213454	12/2014	Vedula	N/A	N/A
2015/0215464	12/2014	Shaffer et al.	N/A	N/A
2015/0222751	12/2014	Odinak et al.	N/A	N/A
2015/0256677	12/2014	Konig et al.	N/A	N/A
2015/0262188	12/2014	Franco	N/A	N/A
2015/0262208	12/2014	Bjontegard et al.	N/A	N/A
2015/0269377	12/2014	Gaddipati	N/A	N/A
2015/0271334	12/2014	Wawrzynowicz	N/A	N/A
2015/0281445	12/2014	Kumar et al.	N/A	N/A
2015/0281449	12/2014	Milstein et al.	N/A	N/A
2015/0281450	12/2014	Shapiro et al.	N/A	N/A
2015/0281454	12/2014	Milstein et al.	N/A	N/A
2015/0287410	12/2014	Mengibar et al.	N/A	N/A
2015/0295788	12/2014	Witzman et al.	N/A	N/A
2015/0296081	12/2014	Jeong	N/A	N/A
2015/0302301	12/2014	Petersen	N/A	N/A
2015/0334230	12/2014	Volzke	N/A	N/A
2015/0339446	12/2014	Sperling et al.	N/A	N/A

2015/0339620	12/2014	Esposito et al.	N/A	N/A
2015/0339769	12/2014	Deoliveira et al.	N/A	N/A
2015/0347900	12/2014	Bell et al.	N/A	N/A
2015/0350429	12/2014	Kumar et al.	N/A	N/A
2015/0350440	12/2014	Steiner et al.	N/A	N/A
2015/0350442	12/2014	O'connor	N/A	N/A
2015/0350443	12/2014	Kumar et al.	N/A	N/A
2015/0379562	12/2014	Spievak et al.	N/A	N/A
2016/0026629	12/2015	Clifford et al.	N/A	N/A
2016/0034260	12/2015	Ristock et al.	N/A	N/A
2016/0034995	12/2015	Williams et al.	N/A	N/A
2016/0036981	12/2015	Hollenberg et al.	N/A	N/A
2016/0036983	12/2015	Korolev et al.	N/A	N/A
2016/0042419	12/2015	Singh	N/A	N/A
2016/0042749	12/2015	Hirose	N/A	N/A
2016/0055499	12/2015	Hawkins et al.	N/A	N/A
2016/0057284	12/2015	Nagpal et al.	N/A	N/A
2016/0065739	12/2015	Brimshan et al.	N/A	N/A
2016/0080567	12/2015	Hooshiari et al.	N/A	N/A
2016/0085891	12/2015	Ter et al.	N/A	N/A
2016/0112867	12/2015	Martinez	N/A	N/A
2016/0124937	12/2015	Elhaddad	N/A	N/A
2016/0125456	12/2015	Wu et al.	N/A	N/A
2016/0134624	12/2015	Jacobson et al.	N/A	N/A
2016/0140627	12/2015	Moreau et al.	N/A	N/A
2016/0150086	12/2015	Pickford	N/A	N/A
2016/0155080	12/2015	Gnanasambandam et al.	N/A	N/A
2016/0162478	12/2015	Blassin et al.	N/A	N/A
2016/0171422	12/2015	Wicaksono et al.	N/A	N/A
2016/0173692	12/2015	Wicaksono et al.	N/A	N/A
2016/0180381	12/2015	Kaiser et al.	N/A	N/A
2016/0191699	12/2015	Agrawal et al.	N/A	N/A
2016/0191709	12/2015	Pullamplavil et al.	N/A	N/A
2016/0191712	12/2015	Bouزيد et al.	N/A	N/A
2016/0234386	12/2015	Wawrzynowicz	N/A	N/A
2016/0247165	12/2015	Ryabchun et al.	N/A	N/A
2016/0261747	12/2015	Thirugnanasundaram et al.	N/A	N/A
2016/0295018	12/2015	Loftus et al.	N/A	N/A
2016/0295020	12/2015	Shaffer et al.	N/A	N/A
2016/0300573	12/2015	Carbune et al.	N/A	N/A
2016/0335576	12/2015	Peng	N/A	N/A
2016/0349960	12/2015	Kumar et al.	N/A	N/A
2016/0358611	12/2015	Abel	N/A	N/A
2016/0360033	12/2015	Kocan	N/A	N/A
2016/0360336	12/2015	Gross et al.	N/A	N/A
2016/0378569	12/2015	Ristock et al.	N/A	N/A
2016/0381222	12/2015	Ristock et al.	N/A	N/A
2017/0004178	12/2016	Ponting et al.	N/A	N/A
2017/0006135	12/2016	Siebel et al.	N/A	N/A

2017/0006161	12/2016	Riahi et al.	N/A	N/A
2017/0011311	12/2016	Backer et al.	N/A	N/A
2017/0024762	12/2016	Swaminathan	N/A	N/A
2017/0032436	12/2016	Disalvo et al.	N/A	N/A
2017/0034226	12/2016	Bostick et al.	N/A	N/A
2017/0068436	12/2016	Auer et al.	N/A	N/A
2017/0068854	12/2016	Markiewicz et al.	N/A	N/A
2017/0098197	12/2016	Yu et al.	N/A	N/A
2017/0104875	12/2016	Im et al.	N/A	N/A
2017/0111505	12/2016	Mcgann et al.	N/A	N/A
2017/0111507	12/2016	McGann et al.	N/A	N/A
2017/0111509	12/2016	Mcgann et al.	N/A	N/A
2017/0116173	12/2016	Lev-Tov et al.	N/A	N/A
2017/0118336	12/2016	Tapuhi et al.	N/A	N/A
2017/0132536	12/2016	Goldstein et al.	N/A	N/A
2017/0148073	12/2016	Nomula et al.	N/A	N/A
2017/0155766	12/2016	Kumar et al.	N/A	N/A
2017/0161439	12/2016	Raduchel et al.	N/A	N/A
2017/0162197	12/2016	Cohen	N/A	N/A
2017/0169325	12/2016	Mccord et al.	N/A	N/A
2017/0207916	12/2016	Luce et al.	N/A	N/A
2017/0214795	12/2016	Charlson	N/A	N/A
2017/0220966	12/2016	Wang	N/A	N/A
2017/0223070	12/2016	Lin	N/A	N/A
2017/0236512	12/2016	Williams et al.	N/A	N/A
2017/0286774	12/2016	Gaidon	N/A	N/A
2017/0288866	12/2016	Vanek et al.	N/A	N/A
2017/0308794	12/2016	Fischerstrom	N/A	N/A
2017/0316386	12/2016	Joshi et al.	N/A	N/A
2017/0323344	12/2016	Nigul	N/A	N/A
2017/0337578	12/2016	Chittilappilly et al.	N/A	N/A
2017/0344754	12/2016	Kumar et al.	N/A	N/A
2017/0344988	12/2016	Cusden et al.	N/A	N/A
2017/0359421	12/2016	Stoops et al.	N/A	N/A
2017/0372436	12/2016	Dalal et al.	N/A	N/A
2018/0018705	12/2017	Tognetti	N/A	N/A
2018/0032997	12/2017	Gordon et al.	N/A	N/A
2018/0052664	12/2017	Zhang et al.	N/A	N/A
2018/0053401	12/2017	Martin et al.	N/A	N/A
2018/0054464	12/2017	Zhang et al.	N/A	N/A
2018/0060830	12/2017	Abramovici et al.	N/A	N/A
2018/0061256	12/2017	Elchik et al.	N/A	N/A
2018/0077088	12/2017	Cabrera-Cordon et al.	N/A	N/A
2018/0077250	12/2017	Prasad et al.	N/A	N/A
2018/0083898	12/2017	Pham	N/A	N/A
2018/0097910	12/2017	D'Agostino et al.	N/A	N/A
2018/0114234	12/2017	Fighel	N/A	N/A
2018/0121766	12/2017	Mccord et al.	N/A	N/A
2018/0137472	12/2017	Gorzela et al.	N/A	N/A
2018/0137555	12/2017	Clausse et al.	N/A	N/A

2018/0146093	12/2017	Kumar et al.	N/A	N/A
2018/0150749	12/2017	Wu et al.	N/A	N/A
2018/0152558	12/2017	Chan et al.	N/A	N/A
2018/0164259	12/2017	Liu et al.	N/A	N/A
2018/0165062	12/2017	Yoo et al.	N/A	N/A
2018/0165691	12/2017	Heater et al.	N/A	N/A
2018/0165692	12/2017	Mccoy	N/A	N/A
2018/0165723	12/2017	Wright et al.	N/A	N/A
2018/0174198	12/2017	Wilkinson et al.	N/A	N/A
2018/0189273	12/2017	Campos et al.	N/A	N/A
2018/0190144	12/2017	Corelli et al.	N/A	N/A
2018/0198917	12/2017	Ristock et al.	N/A	N/A
2018/0205825	12/2017	Vymenets et al.	N/A	N/A
2018/0248818	12/2017	Zucker et al.	N/A	N/A
2018/0248895	12/2017	Watson et al.	N/A	N/A
2018/0260857	12/2017	Kar et al.	N/A	N/A
2018/0285423	12/2017	Ciano et al.	N/A	N/A
2018/0286000	12/2017	Berry et al.	N/A	N/A
2018/0293327	12/2017	Miller et al.	N/A	N/A
2018/0293532	12/2017	Singh et al.	N/A	N/A
2018/0300295	12/2017	Maksak et al.	N/A	N/A
2018/0300641	12/2017	Donn et al.	N/A	N/A
2018/0308072	12/2017	Smith et al.	N/A	N/A
2018/0309801	12/2017	Rathod	N/A	N/A
2018/0349858	12/2017	Walker et al.	N/A	N/A
2018/0361253	12/2017	Grosso	N/A	N/A
2018/0365651	12/2017	Sreedhara et al.	N/A	N/A
2018/0367672	12/2017	Ristock et al.	N/A	N/A
2018/0372486	12/2017	Farniok et al.	N/A	N/A
2018/0376002	12/2017	Abraham	N/A	N/A
2019/0013017	12/2018	Kang et al.	N/A	N/A
2019/0020757	12/2018	Rao et al.	N/A	N/A
2019/0028587	12/2018	Unitt et al.	N/A	N/A
2019/0028588	12/2018	Shinseki et al.	N/A	N/A
2019/0037077	12/2018	Konig et al.	N/A	N/A
2019/0042988	12/2018	Brown et al.	N/A	N/A
2019/0043106	12/2018	Talmor et al.	N/A	N/A
2019/0058793	12/2018	Konig et al.	N/A	N/A
2019/0104092	12/2018	Koohmarey et al.	N/A	N/A
2019/0108834	12/2018	Nelson et al.	N/A	N/A
2019/0124202	12/2018	Dubey et al.	N/A	N/A
2019/0130329	12/2018	Fama et al.	N/A	N/A
2019/0132443	12/2018	Munns et al.	N/A	N/A
2019/0146647	12/2018	Ramachandran et al.	N/A	N/A
2019/0147045	12/2018	Kim	N/A	N/A
2019/0172291	12/2018	Naseath	N/A	N/A
2019/0180095	12/2018	Ferguson et al.	N/A	N/A
2019/0180747	12/2018	Back et al.	N/A	N/A
2019/0182383	12/2018	Shaev et al.	N/A	N/A
2019/0196676	12/2018	Hillis et al.	N/A	N/A

2019/0197568	12/2018	Li et al.	N/A	N/A
2019/0205389	12/2018	Tripathi et al.	N/A	N/A
2019/0236205	12/2018	Jia et al.	N/A	N/A
2019/0238680	12/2018	Narayanan et al.	N/A	N/A
2019/0253553	12/2018	Chishti	N/A	N/A
2019/0258825	12/2018	Krishnamurthy	N/A	N/A
2019/0287517	12/2018	Green et al.	N/A	N/A
2019/0295027	12/2018	Dunne et al.	N/A	N/A
2019/0306315	12/2018	Portman et al.	N/A	N/A
2019/0335038	12/2018	Alonso Y Caloca et al.	N/A	N/A
2019/0341030	12/2018	Hammons et al.	N/A	N/A
2019/0342450	12/2018	Kulkarni et al.	N/A	N/A
2019/0349477	12/2018	Kotak	N/A	N/A
2019/0377789	12/2018	Jegannathan et al.	N/A	N/A
2019/0378076	12/2018	O'Gorman et al.	N/A	N/A
2019/0385597	12/2018	Katsamanis et al.	N/A	N/A
2019/0386917	12/2018	Malin	N/A	N/A
2019/0392357	12/2018	Surti et al.	N/A	N/A
2019/0394333	12/2018	Jiron et al.	N/A	N/A
2020/0005375	12/2019	Sharan et al.	N/A	N/A
2020/0007680	12/2019	Wozniak	N/A	N/A
2020/0012697	12/2019	Fan et al.	N/A	N/A
2020/0012992	12/2019	Chan et al.	N/A	N/A
2020/0019893	12/2019	Lu	N/A	N/A
2020/0028968	12/2019	Mendiratta et al.	N/A	N/A
2020/0050788	12/2019	Feuz et al.	N/A	N/A
2020/0050996	12/2019	Generes, Jr. et al.	N/A	N/A
2020/0058299	12/2019	Lee et al.	N/A	N/A
2020/0076947	12/2019	Deole	N/A	N/A
2020/0097544	12/2019	Alexander et al.	N/A	N/A
2020/0104801	12/2019	Kwon et al.	N/A	N/A
2020/0118215	12/2019	Rao et al.	N/A	N/A
2020/0119936	12/2019	Balasaygun et al.	N/A	N/A
2020/0125919	12/2019	Liu et al.	N/A	N/A
2020/0126126	12/2019	Briancon et al.	N/A	N/A
2020/0128130	12/2019	Geary	N/A	N/A
2020/0134492	12/2019	Copeland	N/A	N/A
2020/0134648	12/2019	Qi et al.	N/A	N/A
2020/0137097	12/2019	Zimmermann et al.	N/A	N/A
2020/0154170	12/2019	Wu et al.	N/A	N/A
2020/0160870	12/2019	Baughman et al.	N/A	N/A
2020/0175478	12/2019	Lee et al.	N/A	N/A
2020/0193335	12/2019	Sekhar et al.	N/A	N/A
2020/0193983	12/2019	Choi	N/A	N/A
2020/0211120	12/2019	Wang et al.	N/A	N/A
2020/0218766	12/2019	Yaseen et al.	N/A	N/A
2020/0219500	12/2019	Bender et al.	N/A	N/A
2020/0242540	12/2019	Rosati et al.	N/A	N/A
2020/0250272	12/2019	Kantor et al.	N/A	N/A
2020/0250557	12/2019	Kishimoto et al.	N/A	N/A

2020/0257996	12/2019	London	N/A	N/A
2020/0280578	12/2019	Hearty et al.	N/A	N/A
2020/0280635	12/2019	Barinov et al.	N/A	N/A
2020/0285936	12/2019	Sen	N/A	N/A
2020/0329154	12/2019	Baumann et al.	N/A	N/A
2020/0336567	12/2019	Dumaine	N/A	N/A
2020/0342868	12/2019	Lou et al.	N/A	N/A
2020/0351375	12/2019	Lepore et al.	N/A	N/A
2020/0351405	12/2019	Pace	N/A	N/A
2020/0357026	12/2019	Liu et al.	N/A	N/A
2020/0364507	12/2019	Berry	N/A	N/A
2020/0365148	12/2019	Ji et al.	N/A	N/A
2020/0380451	12/2019	Izadi	N/A	N/A
2020/0395008	12/2019	Cohen et al.	N/A	N/A
2020/0410506	12/2019	Jones et al.	N/A	N/A
2021/0004536	12/2020	Adibi et al.	N/A	N/A
2021/0005206	12/2020	Adibi et al.	N/A	N/A
2021/0042839	12/2020	Adamec	N/A	N/A
2021/0056481	12/2020	Wicaksono et al.	N/A	N/A
2021/0067627	12/2020	Delker et al.	N/A	N/A
2021/0073819	12/2020	Hernandez et al.	N/A	N/A
2021/0081869	12/2020	Zeelig et al.	N/A	N/A
2021/0081955	12/2020	Zeelig et al.	N/A	N/A
2021/0082417	12/2020	Zeelig et al.	N/A	N/A
2021/0082418	12/2020	Zeelig et al.	N/A	N/A
2021/0084149	12/2020	Zeelig et al.	N/A	N/A
2021/0089762	12/2020	Rahimi et al.	N/A	N/A
2021/0090570	12/2020	Aharoni et al.	N/A	N/A
2021/0091996	12/2020	Mcconnell et al.	N/A	N/A
2021/0105361	12/2020	Bergher et al.	N/A	N/A
2021/0124843	12/2020	Vass et al.	N/A	N/A
2021/0125275	12/2020	Adibi	N/A	N/A
2021/0133763	12/2020	Adibi et al.	N/A	N/A
2021/0133765	12/2020	Adibi et al.	N/A	N/A
2021/0134282	12/2020	Adibi et al.	N/A	N/A
2021/0134283	12/2020	Adibi et al.	N/A	N/A
2021/0134284	12/2020	Adibi et al.	N/A	N/A
2021/0136198	12/2020	Leavitt et al.	N/A	N/A
2021/0136204	12/2020	Adibi et al.	N/A	N/A
2021/0136205	12/2020	Adibi et al.	N/A	N/A
2021/0136206	12/2020	Adibi et al.	N/A	N/A
2021/0201244	12/2020	Sella et al.	N/A	N/A
2021/0201359	12/2020	Sekar et al.	N/A	N/A
2021/0295237	12/2020	Taher et al.	N/A	N/A
2021/0405897	12/2020	Hansalia	N/A	N/A
2022/0114200	12/2021	Johnston	N/A	H04M 3/527
2022/0114593	12/2021	Johnson et al.	N/A	N/A
2022/0114594	12/2021	Nunes et al.	N/A	N/A
2022/0116415	12/2021	Burgis et al.	N/A	N/A

2022/0122182	12/2021	Marshall et al.	N/A	N/A
2022/0129905	12/2021	Sethumadhavan et al.	N/A	N/A
2022/0398682	12/2021	Tam et al.	N/A	N/A
2023/0007123	12/2022	Krucek et al.	N/A	N/A
2023/0107335	12/2022	Garyani et al.	N/A	N/A

## FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
1 418 519	12/2003	EP	N/A
5986065	12/2015	JP	N/A
1732352	12/1991	SU	N/A
2006/037836	12/2005	WO	N/A
2012/024316	12/2011	WO	N/A
2015/099587	12/2014	WO	N/A
2019142743	12/2018	WO	N/A

## OTHER PUBLICATIONS

Galetto, Molly., “What is Customer DNA?”,—NGDATA Product News, Oct. 27, 2015, 10 pages. cited by applicant

Fan et al., “Demystifying Big Data Analytics for Business Intelligence Through the Lens of Marketing Mix”, Big Data Research, vol. 2, Issue 1, Mar. 1, 2015, 16 pages. cited by applicant

An et al., Towards Automatic Persona Generation Using Social Media Aug. 1, 2016, 2016 IEEE 4th International Conference on Future Internet of Things and Cloud Workshops (FiCloudW), 2 pages. cited by applicant

Bean-Mellinger, Barbara., “What Is the Difference Between Marketing and Advertising?”, available on Feb. 12, 2019, retrieved from <https://smallbusiness.chron.com/difference-between-marketing-advertising-25047.html>, Feb. 12, 2019, 6 pages. cited by applicant

Twin, Alexandra., “Marketing”, URL: <https://www.investopedia.com/terms/m/marketing.asp>, Mar. 29, 2019, 5 pages. cited by applicant

dictionary.com, “Marketing”, URL: <https://www.dictionary.com/browse/marketing>, Apr. 6, 2019, 7 pages. cited by applicant

Ponn et al., “Correlational Analysis between Weather and 311 Service Request Volume”, eil.mie.utoronto.ca., Jan. 1, 2017, 16 pages. cited by applicant

Zhang et al., “A Bayesian approach for modeling and analysis of call center arrivals”, Jan. 1, 2013 Winter Simulations Conference (WSC), [ieeexplore.ieee.org](http://ieeexplore.ieee.org), pp. 713-723. cited by applicant

Mehrotra et al., “Call Center Simulation Modeling: Methods, Challenges, and Opportunities” Proceedings of the 2003 Winter Simulation Conference, vol. 1, Jan. 1, 2003, pp. 135-143. cited by applicant

Mandelbaum et al., “Staffing Many-Server Queues with Impatient Customers: Constraint Satisfaction in Call Center”, Operations Research, Sep.-Oct. 2009, vol. 57, No. 5 (Sep. 1-Oct. 2009), pp. 1189-1205. cited by applicant

Fukunaga et al., “Staff Scheduling for Inbound Call Centers and Customer Contact Centers”, AI Magazine, Winter, vol. 23, No. 4, Jan. 1, 2002, pp. 30-40. cited by applicant

Feldman et al., “Staffing of Time-Varying Queues to Achieve Time-Stable Performance”, Management Science, Feb. 1, 2008, vol. 54, No. 2, Call Center Management, pp. 324-338. cited by applicant

Business Wire, “Rockwell SSD announces Call Center Simulator”, Feb. 4, 1997, 4 pages. cited by applicant

Stearns, “Using skills-based routing to the advantage of your contact center”, Customer



Inter@ction Solutions, Technology Marketing Corporation, May 1, 2001, vol. 19 No. 11, pp. 54-56. cited by applicant

Aksin et al., "The Modern Call Center: A Multi-Disciplinary Perspective on Operations Management Research", *Production and Operations Management*, 2007, vol. 16, No. 6, pp. 665-688. cited by applicant

Aldor-Noiman, et al., "Workload forecasting for a call center: Methodology and a case study." *The Annals of Applied Statistics* 3.4 (2009); 1403-1447. cited by applicant

Buesing et al., "Getting the Best Customer Service from your IVR: Fresh eyes on an old problem," [online] McKinsey and Co., published on Feb. 1, 2019, available at: <  
<https://www.nnckinsey.conn/business-functions/operations/our-insights/getting-the-best-customer-service-from-your-ivr-fresh-eyes> . . . (Year: 2019). cited by applicant

Chiu et al., "A multi-agent infrastructure for mobile workforce management in a service oriented enterprise", *Proceedings of the 38th annual Hawaii international conference on system sciences*, IEEE, 2005, pp. 10. cited by applicant

Krishnan, Krish, "Data Warehousing in the Age of Big Data", Morgan Kaufmann, Chapter 5, 2013, 28 pages. cited by applicant

Diimitrios et al., "An overview of workflow management: From process modeling to workflow automation infrastructure," *Distributed and parallel Databases*, 1995, vol. 3, No. 2 pp. 119-153. cited by applicant

Ernst et al. "An Annotated Bibliography of Personnel Scheduling and Rostering", CSIRO Mathematical and Information Sciences, 2003, 155 pages. cited by applicant

Ernst et al., "Staff scheduling and rostering: A review of applications, methods and models," *European Journal of Operational Research*, 2004, vol. 153, pp. 3-27. cited by applicant

Federal Register, vol. 72, No. 195, Oct. 10, 2007, pp. 57526-57535. cited by applicant

Federal Register, vol. 75, No. 169, Sep. 1, 2010, pp. 53643-53660. cited by applicant

Federal register, vol. 79, No. 241 issued on Dec. 16, 2014, p. 74629, col. 2, *Gottschalk v. Benson*. cited by applicant

Federal Register, vol. 84, No. 4, Jan. 7, 2019, pp. 50-57. cited by applicant

Federal Register, vol. 84, No. 4, Jan. 7, 2019, p. 53-55. cited by applicant

Grefen et al., "A reference architecture for workflow management systems", *Data & Knowledge Engineering*, 1998, vol. 27, No. 1, pp. 31-57. cited by applicant

<https://www.uspto.gov/patent/laws-and-regulations/examination-policy/examination-guidelines-training-materials-view-ksr>, signed Aug. 20, 2010. cited by applicant

Huang et al., "Agent-based workflow management in collaborative product development on the Internet", *Computer-Aided Design*, 2000, vol. 32, No. 2, pp. 133-144. cited by applicant

Janarthanam, "Hands on Chatbots and conversational UI development: Build chatbots and voice user interfaces with Chatfuel, Dialogflow, Microsoft Bot Framework, Twilio, and Alexa Skills" Dec. 2017. cited by applicant

Koole, et al., "An overview of routing and staffing algorithms in multi-skill customer contact centers." 2006. cited by applicant

Myers et al., "At the Boundary of Workflow and AI", *Proc. AAAI 1999 Workshop on Agent-Based Systems in the Business Context*, 1999, 09 pages. cited by applicant

Niven, "Can music with prosocial lyrics heal the working world? A field intervention in a call center." *Journal of Applied Social Psychology*, 2015; 45(3), 132-138. doi: 10.1111/jasp.12282 ). cited by applicant

On Hold Marketing, "Growing Your Business with Customized on-Hold Messaging" (Published on Apr. 5, 2018 at <https://adhq.com/about/ad-news/growing-your-business-with-customized-on-hold-messaging>) (Year: 2018). cited by applicant

U.S. Appl. No. 16/668,214, NFOA mailed Nov. 10, 2021. cited by applicant

U.S. Appl. No. 16/668,215, NFOA mailed Dec. 7, 2021. cited by applicant

Van Den Bergh et al. "Personnel scheduling: A literature review", European journal of operational research, 2013, vol. 226, No. 3 pp. 367-385. cited by applicant  
United States Patent and Trademark Office, Non-Final Office Action for U.S. Appl. No. 16/550,961 mailed Mar. 2, 2020. cited by applicant  
United States Patent and Trademark Office, Final Office Action for U.S. Appl. No. 16/550,961 mailed Jun. 17, 2020. cited by applicant  
An, J., Kwak, H. and Jansen, B.J., ip.com, Nov. 2016. "Validating social media data for automatic persona generation", English Abstract, In 2016 IEEE/ACS 13th International Conference of Computer Systems and Applications (AICCSA), 2 pages. cited by applicant  
European Search Report in corresponding European Application No. 22178124 dated Oct. 20, 2022. cited by applicant

---

*Primary Examiner:* Hong; Harry S

*Attorney, Agent or Firm:* Potomac Law Group, PLLC

---

## **Background/Summary**

### **BACKGROUND**

- (1) Contact centers, in which incoming communications from inquiring parties (such as customers) are routed to agents, are well known. FIG. 1 is an example system architecture of a cloud-based contact center platform. Customers **110**, i.e., parties originating incoming communications to a contact center, interact with the contact center **150** using voice, email, text, web, chat and other channels to communicate with the agents **120** through a network **130**. Note that the term "customer", as used herein, refers to a party contacting the contact center for service, information, or the like and includes actual purchasers, potential purchasers, and other parties.
- (2) Contact center **150** includes computing modules for the routing communications from customers **110** to agents **120** for the contact center **150**. These modules are referred to herein as the contact routing system **140**. The contact routing system **140** could be any of a contact center as a service (CCaaS) system, an automated call distributor (ACD) system, or a case system, for example.
- (3) Agents **120** may be remote from the contact center **150** and handle communications (also referred to as "conversations" herein) with customers **110** on behalf of an enterprise or other entity. Agents **120** may utilize devices, such as work stations, desktop computers, laptops, telephones, a mobile smartphone and/or a tablet. Similarly, customers **110** may communicate using a plurality of devices, including but not limited to, a telephone, a mobile smartphone, a tablet, a laptop, a desktop computer, or other devices. For example, telephone communication may traverse networks such as a public switched telephone networks (PSTN), Voice over Internet Protocol (VOIP) telephony (via the Internet), a Wide Area Network (WAN) or a Large Area Network (LAN). The network types are provided by way of example and are not intended to limit types of networks used for communications.
- (4) Agents **120** may be assigned to one or more "queues" representing communication categories and/or agent skill levels. Agents **120** assigned to a queue may handle communications that are placed in the queue by the contact routing system **140**. For example, there may be queues associated with a language capability of the agent (e.g., English or Chinese), topic (e.g., technical support or billing), or a particular country of origin. When a communication is received by the contact routing system **140**, the communication may be placed in a relevant queue, and one of agents **120** associated with the relevant queue may handle the communication. The

communications may be assigned to an agent (“push communications”) or selected by the agent out of the queue (“pull communications”).

(5) Agents **120** may be further organized into one or more teams based on a variety of factors including skills, location, experience, assigned queues, associated or assigned customers **110**, and shift. The purpose of communication routing system **140** is to route communications to an agent who is likely to be able to handle the communication in an efficient manner and to the satisfaction of the customer who originated the communication.

(6) Also It is known to use pre-defined messages, i.e., templates, when replying to customers to increase the agent's efficiency and present harmonized responses that are not dependent on the capabilities of the agent. Instead of writing all the messages from scratch, agents can use a library of predefined responses, stored in a knowledge base, to assist them while composing the answers for the communications. To be effective, template responses should be aligned with the company speech and the information must be as updated and accurate as possible, to make sure that the contact center is sharing the correct information with various systems.

(7) “Virtual Agent” systems have been developed recently to provide fully automated answers, through messaging channels for example, to customers without the need for intervention by a human agent. Information changes rapidly and it is very cumbersome to get the information updated consistently when the same content is used for several different purposes in several different applications. If a customer changes the information to be shared with the agent, they need to get this information updated in several different systems, such as in virtual agent systems and live agent assist systems, in order to avoid inconsistency of data.

#### SUMMARY OF THE INVENTION

(8) The disclosed implementations make templates available to agents in dynamic manner to allow agents to be more efficient while performing their daily job. A centralized database of templates is created in a novel manner to be used for multiple digital channels. The templates can be used and reused by multiple systems such as an agent assistant system or a virtual agent system, providing an integrated and consistent experience for responding to communications in a contact center. Templates can be initially created by content creators or administrators within a contact center system. These templates serve as pre-defined messages or responses for agents to use during customer interactions. During template creation, tags and metadata can be assigned to the templates to identify the intent and purpose of the template content. The tagging process ensures that templates are properly categorized and can be easily retrieved based on specific criteria. A guide API plays a role in integrating the template database with the contact center system and applications. The guide API enables seamless communication and synchronization between the template database and various components, such as an agent assist component and a virtual agent component. Once the templates are created, tagged, and stored in the database, the templates can be used by both an agent assist component and a virtual agent component. These AI-driven features utilize the tags and metadata to propose relevant template answers or responses to agents during customer interactions. This proactively assists agents by suggesting the most suitable template based on the context and intent of the conversation. As new customer interactions occur, feedback is collected from agents and customers. This feedback is then used to refine and improve the existing templates or create new ones. The database is updated accordingly to reflect these changes, ensuring that it remains up-to-date and aligned with evolving customer needs.

(9) A first aspect is a method for creating a database of contact center template response records which can be used to provide contact center agents with responses to communications from customers, the method comprising: creating at least one response template data structure including at least one potential response to a customer communication; for each of the at least one response template data structure: (1) associating metadata with each of the at least one response template data structures, the metadata including one or more channels of communication relating to the at least one response template data structure, at least one keyword from the response of the at least

one response template data structure, and a template group indicator; and (2) associating an intent tag with each of the at least one response template data structures, the intent tag being determined by an AI intent engine analyzing a specific communication between a contact center agent and a customer for which the contact center agent used the potential response of the at least one response template data structures as a response to the specific communication; and storing each of the at least one response template data structures with corresponding metadata and intent tags in a database of a knowledge management system that is used to provide contact center agents with responses to communications from customers.

(10) A second aspect of the invention is a computer system for creating a database of contact center template response records which can be used to provide contact center agents with responses to communications from customers, the method comprises computer processors executing instructions that are stored in memory to accomplish a method of: creating at least one response template data structure including at least one potential response to a customer communication; for each of the at least one response template data structure: (1) associating metadata with each of the at least one response template data structures, the metadata including one or more channels of communication relating to the at least one response template data structure, at least one keyword from the response of the at least one response template data structure, and a template group indicator; and (2) associating an intent tag with each of the at least one response template data structures, the intent tag being determined by an AI intent engine analyzing a specific communication between a contact center agent and a customer for which the contact center agent used the potential response of the at least one response template data structures as a response to the specific communication; and storing each of the at least one response template data structures with corresponding metadata and intent tags in a database of a knowledge management system that is used to provide contact center agents with responses to communications from customers.

---

## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

(1) The foregoing summary, as well as the following detailed description of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the appended drawings various illustrative embodiments. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown. In the drawings:

(2) FIG. 1 is a block diagram of a contact center platform architecture.

(3) FIG. 2 is a flowchart of template workflows in accordance with disclosed implementations.

(4) FIG. 3 is a flowchart of a process for creating database records in accordance with disclosed implementations.

(5) FIG. 4 is a computing system for creating database records in accordance with disclosed implementations.

(6) FIG. 5 illustrates an example of a user interface in accordance with disclosed implementations.

(7) FIG. 6 illustrates an example of a user interface in accordance with disclosed implementations.

(8) FIG. 7 illustrates an example of a user interface in accordance with disclosed implementations.

(9) FIG. 8 illustrates an example of a user interface in accordance with disclosed implementations.

(10) FIG. 9 illustrates an example of a user interface in accordance with disclosed implementations.

### DETAILED DESCRIPTION

(11) Disclosed implementations create and enhance templates as records in a database using tags that identify the intent of the content. The tags can be gathered from various remote systems. These tags are then used in live agent assist systems and/or in virtual agent systems. The templates can be used to propose content to live agents (thereby proactively assisting the contact center agent) and

can be used as automated responses by virtual agents. Interactions by the live agents are used to enhance the tags and update the template records. FIG. 2 illustrates a workflow implementing templates in accordance with disclosed implementations. FIG. 2 illustrates three separate but related The first workflow is initiated by an administrator, at **202**, to create a database record. At **204**, an administrator uses an application having a user interface to configure or edit a template and/or add metadata to the template in the manner described in detail below. At **206**, a database template record, including the response and the metadata is created and/or updated. At **208**, the record is supplied to an artificial intelligence (AI) model and the AI model analyzes the intent and/or sentiment of the communications for which the template is used (in the workflows described below) and the AI database is updated based on the record to associate new content with the specific intent. Similarly, the administrator can configure or edit content records, such as relevant articles in the database at **203**. The second workflow is initiated, at **210**, by a live agent, during a communication for example, to retrieve a response from the database based on the communication that is being handled by the agent. At **212**, an agent searches the database based using a query based on a current communication. At **214**, the agent receives templates and/or other content (such as relevant articles) as search results and uses the search results to address an issue raised in the communication.

(12) Stated differently, the query is used to locate one or more templates or other content records having a response or other information relevant to the communication and the response or other information is returned to the live agent to assist the live agent in addressing an issue raised in the communication being handled by the live agent. For example, the query can include keywords and topics from the conversation between the live agent and a customer. The third workflow is initiated at **216** by an agent who, for example, is not currently on a communication. At **218**, this agent searches that database for articles and templates. In each instance, templates and other content, such as articles are enhanced by the AI algorithm and stored in the database.

(13) The metadata that is stored in the record in association with the response language can include a channel indicator (channels can include voice, text, IM, chat . . . ), keywords, and collection information (such as links to related records). Further, the AI engine is used to determine the sentiment and/or intent of a communication and sentiment and/or intent data is stored as record metadata. This allows an AI engine, such as an AI engine used for a virtual assistant, to leverage a Knowledge Management (KM) database that is created for live agent assist applications, thus enhancing the data records in the KM database and allowing a virtual assistant AI engine to leverage the KM database. Stated differently, templates are created using tags that help identify the intent of the content. These tags are then used in live agent assist systems and/or virtual agent systems when proposing the content to the agent, pro-actively, assisting the contact center agent. All of these operations can be supported by an API.

(14) Intent metadata added to the KM database can be indexed by the AI Search which adds AI capability to templates. AI search can leverage APIs that are used not just as a federated search over different knowledge bases (internal like Knowledge Management or external imported like Confluence, Zendesk, or even from external databases) but contains AI capabilities over searching and knowledge context, e.g., a cognitive search. Since the templates are built on top of the KM database suite, templates leverage KM capabilities.

(15) FIG. 3 illustrates a method for creating the database records which can be used to provide contact center agents with responses to communications from customers. At step **302**, at least one response template data structure, is created. The data structure includes at least one potential response to a customer communication. Steps **304** and **306** are then accomplished for each template data structure. At step **304**, metadata is associated with the response in the template at which, when executed by processor **460** can accomplish the method of FIG. 3. Each code portion includes instructions which, when executed by processor **430** comprise a module that accomplishes a step of the method of FIG. 3. The code portions include code portion **402** corresponding to step **302** of

FIG. 3, code portion **404** corresponding to step **304** of FIG. 3, code portion **406** corresponding to step **306** of FIG. 3, and code portion **408** corresponding to step **308** of FIG. 3. KB system **140** is illustrated as being part of contact center **150**. However, KB system **140** can be separate from contact center **150** and provide a knowledge base for contact center **150** as a service, through a network and appropriate APIs and protocols. Various data from the remote systems of the contact center can be used by KB system **140** to enhance data records.

(16) During a communication, the agent can access the knowledge base of templates by activating a user interface element, such as using a hotkey in an Email editor. When composing the outbound message, and without having the need to go to the templates list, the agent can activate the user interface element and/or enter a keyword and a list of templates associated with that keyword (through tags) will be listed. Since this is a cross-channel feature, only the templates suitable for the channel in context will be presented to the agent.

(17) By activating a user interface element, such as clicking on a “Preview” button, the agent can check the template details and confirm if the template includes information relevant to the communication. Templates can be generic, which means that the same content can be used for different channels. Each template can be associated with one or more channels. An administrator can have the ability to order the templates so that the templates can be presented in a preferred order to the agents (live agent) or customer (virtual agent). The administrator can group templates together to aid in organizing and managing content that should be consistent. Manual tags can be added to templates during creation of management thereof by an administrator. Each template can belong to a collection and each collection can be associated with a specified language. This approach allows the templates to be grouped by the pair collection/language, which will allow administrators to organize the content correctly.

(18) Each template can include a topic and messages/responses for each channel to allow different content to be surfaced for each channel. The agent can use a search interface to search for templates that contain specified keywords, topics, and/or contexts. Multiple templates can be selected by an agent to compose a more complex and complete response. Agents can search and select templates in a first language and the corresponding template responses in a second language can be presented to the customer to effectively provide communication translation. Various metrics can be gathered to more efficiently surface the most relevant template, such as how many times each agent accesses the template and how satisfied customers are with the associated response.

(19) The disclosed implementations are an improvement over conventional systems because they provide: Centralization and Reusability: By using a centralized Knowledge Management/Guide system, templates are stored in a single location. This centralized approach enables easy access and reuse of templates across multiple contact center applications. This eliminates the need for redundant content creation in different places, ensuring consistency and efficiency. Consistency and Harmonization: The use of tags and metadata allows for consistent classification and organization of templates, ensuring that the same set of tags can be shared across different applications, databases, and technologies. This harmonization facilitates a standardized communication approach, regardless of the channel or agent handling the interaction. Proactive Assistance and Efficiency: The integration of agent assist and virtual agent functionalities with the same database provides proactive assistance to agents. The AI-driven capabilities leverage the tags and metadata to suggest the most appropriate templates based on the context and intent of the conversation. This streamlines the agent's workflow, increases efficiency, and improves response accuracy. Scalability and Agility: This approach offers scalability and agility, allowing for easy updates, additions, and modifications to templates. As customer needs change or new scenarios arise, the content can be adapted and expanded accordingly. This flexibility ensures that the templates remain relevant and effective over time.

(20) FIG. 5 shows an example of user interface **500** presented to an agent displaying one or more templates **502** to an agent that are relevant to question **504** asked by a customer over an sms

channel. FIG. 6 shows an example of user interface 600 showing content details 602 of a template selected by the agent. FIG. 7 shows an example of user interface 700 from which record 702 is retrieved from an agent assist component. FIG. 8 shows an example of user interface 800 showing the back office/admin for templates management alongside the agent assist window wherein the same content is available in both virtual agent templates and agent assist templates. FIG. 9 shows an example of user interface 800 for searching templates in the agent assist mode.

(21) The disclosed implementations can be implemented by various computing devices programmed with software and/or firmware to provide the disclosed functions and modules of executable code implemented by hardware. The software and/or firmware can be stored as executable code on one or more non-transient computer-readable media. The computing devices may be operatively linked via one or more electronic communication links. For example, such electronic communication links may be established, at least in part, via a network such as the Internet and/or other networks.

(22) A given computing device may include one or more processors configured to execute computer program modules. The computer program modules may be configured to enable an expert or user associated with the given computing platform to interface with the system and/or external resources. By way of non-limiting example, the given computing platform may include one or more of a server, a desktop computer, a laptop computer, a handheld computer, a tablet computing platform, a Smartphone, a gaming console, and/or other computing platforms.

(23) The various data and code can be stored in electronic storage devices which may comprise non-transitory storage media that electronically stores information. The electronic storage media of the electronic storage may include one or both of system storage that is provided integrally (i.e., substantially non-removable) with the computing devices and/or removable storage that is removably connectable to the computing devices via, for example, a port (e.g., a USB port, a firewire port, etc.) or a drive (e.g., a disk drive, etc.). The electronic storage may include one or more of optically readable storage media (e.g., optical disks, etc.), magnetically readable storage media (e.g., magnetic tape, magnetic hard drive, floppy drive, etc.), electrical charge-based storage media (e.g., EEPROM, RAM, etc.), solid-state storage media (e.g., flash drive, etc.), and/or other electronically readable storage media.

(24) Processor(s) of the computing devices may be configured to provide information processing capabilities and may include one or more of a digital processor, an analog processor, a digital circuit designed to process information, an analog circuit designed to process information, a state machine, and/or other mechanisms for electronically processing information. As used herein, the term “module” may refer to any component or set of components that perform the functionality attributed to the module. This may include one or more physical processors during execution of processor readable instructions, the processor readable instructions, circuitry, hardware, storage media, or any other components.

(25) It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

## Claims

1. A method for creating a database of contact center response records which can be used to provide contact center agents with responses to communications from customers, the method comprising: creating at least one response template data structure including at least one potential response to a customer communication; for each of the at least one response template data structure: associating metadata with each of the at least one response template data structures, the metadata including one

or more channels of communication relating to the at least one response template data structure, at least one keyword from the at least one potential response of the at least one response template data structure, and a template group indicator; and associating an intent tag with each of the at least one response template data structures, the intent tag identifying the intent of a communication and being determined by an AI intent engine analyzing a communication between a contact center agent and a customer for which the contact center agent used one or more of the at least one potential response of the at least one response template data structures as a response to the communication; and storing each of the at least one response template data structures with corresponding metadata and intent tags in a database of a knowledge management system that is used to provide contact center agents with responses to communications from customers.

2. The method of claim 1, further comprising: analyzing the content of a communication between a contact center agent and a customer; conducting a search of the database with the AI engine to identify at least one response template data structure that corresponds to the communication; and presenting the potential response of the at least one response template data structure that corresponds to the communication as a response to the communication.

3. The method of claim 1, wherein the step of associating an intent tag is repeated for multiple specific communications between contact center agents and customers.

4. The method of claim 1, wherein the database includes data records from additional resources.

5. The method of claim 4, wherein the additional resources are at least one of a CRM system, an accounting system, and an interaction records system.

6. A distributed computing system for creating a database of contact center response records which can be used to provide contact center agents with responses to communications from customers, the system comprising: at least one computer hardware processor; and at least one memory device operatively coupled to the at least one computer hardware processor and storing computer-readable instructions which, when executed by the at least one computer hardware processor, carry out a method of: creating at least one response template data structure including at least one potential response to a customer communication; for each of the at least one response template data structure: associating metadata with each of the at least one response template data structures, the metadata including one or more channels of communication relating to the at least one response template data structure, at least one keyword from the response of the at least one response template data structure, and a template group indicator; and associating an intent tag with each of the at least one response template data structures, the intent tag being determined by an AI intent engine analyzing a communication between a contact center agent and a customer for which the contact center agent used the potential response of the at least one response template data structures as a response to the communication; and storing each of the at least one response template data structures with corresponding metadata and intent tags in a database of a knowledge management system that is used to provide contact center agents with responses to communications from customers.

7. The computing system of claim 6, the method further comprising: analyzing the content of a communication between a contact center agent and a customer; conducting a search of the database with the AI engine to identify at least one response template data structure that corresponds to the communication; and presenting the potential response of the at least one response template data structure that corresponds to the communication as a response to the communication.

8. The computing system of claim 6, wherein the step of associating an intent tag is repeated for multiple communications between contact center agents and customers.

9. The computing system of claim 6, wherein the database includes data records from additional resources.

10. The computing system of claim 9, wherein the additional resources are at least one of a CRM system, an accounting system, and an interaction records system.

---



